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Consumer Preference-Based Redesign of Vanish Detergent Packaging Using Conjoint Analysis

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Abstract: Packaging is an essential component of household cleaning products because it influences consumer convenience, product safety, storage efficiency, and repeated product use. However, detergent packaging redesign based on consumer preferences, especially by integrating functional and ergonomic attributes, remains limited. **Objective:** This study aims to redesign Vanish detergent packaging by identifying the most influential packaging attributes and determining the optimal packaging configuration using Conjoint Analysis. **Methodology:** This study used a quantitative approach with Conjoint Analysis. Primary data were collected through questionnaires distributed to 50 respondents who had experience using laundry cleaning products. Five packaging attributes were evaluated: package type, content size, package design, closure system, and ease of use. Consumer preferences were analyzed by estimating utility values and the relative importance of each attribute. **Findings:** The results showed that the closure system was the most influential attribute, with an importance value of 32%, followed by package type (25%), ease of use (20%), package design (13%), and content size (10%). The ziplock closure system obtained the highest utility value (+1.42), followed by pouch ziplock packaging (+1.18) and bright package design (+0.96). The most preferred packaging configuration was a bright pouch ziplock package with a content size of 900 mL to 1 L and a resealable ziplock closure system. **Implications:** The findings suggest that detergent packaging redesign should prioritize functional and ergonomic attributes, particularly resealability, practicality, and storage safety, to improve consumer satisfaction and product competitiveness. **Originality:** This study contributes to packaging design research by applying Conjoint Analysis to identify the optimal combination of functional, ergonomic, and visual attributes for Vanish detergent packaging.

Keywords: Conjoint Analysis; consumer preference; detergent packaging; packaging redesign; ziplock pouch.

INTRODUCTION

Packaging plays an essential role in household consumer products because it is directly related to protection, communication, convenience, and user experience. In detergent and fabric stain remover products, consumers repeatedly interact with the package when opening, pouring, closing, storing, and reusing the product. Therefore, packaging that is difficult to close, uncomfortable to handle, prone to spilling, or inconvenient to store may reduce consumer satisfaction and weaken product competitiveness. Recent studies have

shown that packaging is no longer viewed only as a product container, but also as a strategic communication tool that influences purchase intention and perceived product value (Rahimi, 2025). In this context, redesigning detergent packaging to be more ergonomic, practical, and resealable is important to support consumer needs in daily household activities.

The demand for practical packaging has increased along with changes in consumer lifestyles and purchasing behavior. Consumers tend to prefer packaging that is easy to carry, easy to open, easy to pour, easy to store, and safe after the product has been opened. A resealable closure system, such as ziplock packaging, provides functional benefits because it can reduce the risk of spillage and support repeated product use. From a usability perspective, packaging should be designed to provide effectiveness, efficiency, and satisfaction during product interaction (ISO, 2018). Functional packaging also contributes to purchase intention because packaging that supports consumption activities can increase perceived product meaningfulness (Baccarella et al., 2021).

Previous studies on packaging design can be grouped into three major categories. The first category focuses on visual packaging attributes, such as color, typography, shape, graphics, and label information. These visual elements are important because they influence consumer attention, product perception, and purchasing decisions. Liu found that visual elements of packaging design significantly influence consumer purchase decision-making (Liu et al., 2025). Su also demonstrated that packaging color affects consumer perception and purchase intention (Su et al., 2024). These findings indicate that visual packaging attributes remain important in strengthening product attractiveness in competitive markets.

The second category emphasizes functional and ergonomic packaging attributes. Functional packaging is closely related to ease of handling, opening, pouring, reclosing, carrying, and storing. Baccarella explained that consumption-supportive packaging functionality can positively influence purchase intention because it helps consumers achieve their consumption goals (Baccarella et al., 2021). Sonck-Rautio also showed that consumers interpret packaging functions through containment, protection, information, and usability meanings (Sonck-Rautio et al., 2024). For household products that are used repeatedly, functional attributes such as resealability, storage safety, and pouring convenience become highly relevant to consumer satisfaction.

The third category relates to sustainable and preference-based packaging design. Consumers increasingly consider packaging material, recyclability, reusability, and environmental impact when evaluating products. Boz stated that consumer considerations for sustainable packaging are influenced not only by environmental concerns but also by functionality, safety, and convenience (Boz et al., 2020). Ketelsen also found that consumer responses to environmentally friendly packaging are shaped by material type, design, information, and perceived usefulness (Ketelsen et al., 2020). In addition, McKinsey & Company reported that consumers continue to show interest in sustainable packaging, although preferences may vary across product categories and markets (McKinsey & Company, 2025). These studies suggest that packaging redesign should integrate consumer preference, functionality, and material efficiency.

Conjoint Analysis is one of the methods commonly used to identify consumer preferences for products with multiple attributes. This method is suitable for packaging research because it can estimate the utility value of each attribute level and determine the relative importance of each attribute. Wang used Conjoint Analysis to evaluate consumer preferences for yogurt packaging design and showed that packaging shape, graphics, color, and label style influenced consumer preference (Wang et al., 2022). Yokokawa also developed a packaging design assessment framework that integrates consumer preference and environmental impact (Yokokawa et al., 2021). These studies indicate that preference-based analysis can provide a systematic basis for determining the most suitable packaging design.

Although packaging design has been widely studied, several research gaps remain. First, many previous studies focus more on food, beverage, and cosmetic packaging, while household cleaning product packaging has received less attention. Second, most packaging studies emphasize visual and sustainability aspects, whereas functional attributes such as closure system, resealability, ease of pouring, and storage convenience are not always analyzed as an integrated preference model. Third, studies specifically discussing Vanish detergent packaging redesign based on consumer preferences using Conjoint Analysis are still limited. This gap is important because Vanish packaging requires not only visual attractiveness but also practical and ergonomic features that support repeated household use.

Based on these gaps, this study aims to redesign Vanish detergent packaging based on consumer preferences using the Conjoint Analysis method. This study evaluates five main

packaging attributes: package type, content size, package design, closure system, and ease of use. Each attribute is analyzed to determine its utility value and relative importance in shaping consumer preference. The results are then used to identify the most preferred attribute combination and to recommend a redesigned Vanish package that is more ergonomic, practical, resealable, and aligned with consumer needs.

The main argument of this study is that consumer preference for detergent packaging is not determined only by visual appearance, but also by functional attributes that directly affect user experience. A resealable closure system, flexible package type, appropriate content size, attractive visual design, and ease of pouring or storage are expected to be dominant factors in consumer preference. Therefore, a pouch package with a ziplock closure is hypothesized to be the preferred alternative because it integrates ergonomic usability, practicality, storage safety, material efficiency, and visual appeal in one packaging design.

RESEARCH METHOD

This study employed a quantitative research design using the Conjoint Analysis method to identify the most preferred combination of Vanish detergent packaging attributes based on consumer preferences. The unit of analysis in this study was Vanish detergent packaging, which was evaluated based on functional and ergonomic attributes. The observed attributes included package type, content size, package design, closure system, and ease of use. These attributes were selected because they represent packaging characteristics that directly affect consumer interaction, practicality, storage convenience, and repeated product use.

The Conjoint Analysis method was selected because this study aimed to evaluate consumer preferences toward a product consisting of several attributes and attribute levels. This method allows researchers to estimate the utility value of each attribute level and determine the relative importance of each attribute in shaping consumer preference. In this study, the packaging attributes and levels were determined based on initial observation, literature review, and identification of consumer needs. The attributes and levels used in this study are presented in Table 1.

Table 1. Packaging Attributes and Levels

Attribute	Level 1	Level 2	Level 3
Package Type	Pouch Ziplock	Plastic Bottle	Box Packaging
Content Size	500 mL	900 mL	1 L
Package Design	Bright	Minimalist	Premium
Closure System	Ziplock	Screw Cap	Single-use
Ease of Use	Easy to Carry	Easy to Store	Easy to Pour

Based on the five attributes with three levels for each attribute, the full factorial design produced 243 possible product combinations. Since evaluating all combinations would create a high cognitive burden for respondents and potentially reduce the quality of responses, an orthogonal design was used to reduce the number of combinations. The orthogonal design generated 16 representative product stimuli that maintained the balance and independence of the attribute levels. These stimuli were used as product profiles in the questionnaire, as shown in Table 2.

Table 2. Orthogonal Design of Product Stimuli

Stimulus	Package Type	Content Size	Package Design	Closure System	Ease of Use
S1	Pouch	500 mL	Bright	Ziplock	Easy to Carry
S2	Pouch	900 mL	Minimalist	Screw Cap	Easy to Store
S3	Pouch	1 L	Premium	Single-use	Easy to Pour
S4	Plastic Bottle	500 mL	Minimalist	Single-use	Easy to Store
S5	Plastic Bottle	900 mL	Premium	Ziplock	Easy to Pour
S6	Pouch	900 mL	Bright	Ziplock	Easy to Store
S7	Plastic Bottle	1 L	Bright	Screw Cap	Easy to Carry
S8	Box Packaging	500 mL	Premium	Screw Cap	Easy to Pour
S9	Box Packaging	900 mL	Bright	Single-use	Easy to Carry
S10	Pouch	1 L	Bright	Ziplock	Easy to Pour
S11	Box Packaging	1 L	Minimalist	Ziplock	Easy to Store
S12	Plastic Bottle	500 mL	Bright	Screw Cap	Easy to Pour
S13	Box Packaging	900 mL	Premium	Single-use	Easy to Store
S14	Pouch	900 mL	Bright	Ziplock	Easy to Carry
S15	Plastic Bottle	1 L	Minimalist	Ziplock	Easy to Store
S16	Box Packaging	500 mL	Bright	Screw Cap	Easy to Carry

The data used in this study consisted of primary and secondary data. Primary data were obtained through a questionnaire distributed to 50 respondents who had experience using laundry cleaning products. The respondents consisted of 25 university students, 10 students, and 15 members of the general public. Purposive sampling was applied to ensure that the respondents had relevant experience in evaluating household cleaning product

packaging. Secondary data were obtained from scientific journals, packaging standards, and previous studies related to packaging design, ergonomic packaging, consumer preference, and Conjoint Analysis.

Data collection was conducted by asking respondents to evaluate the 16 product stimuli generated from the orthogonal design. Each respondent assessed the stimuli based on their preference for the packaging combination presented. The questionnaire was designed to capture consumer responses toward each combination of package type, content size, package design, closure system, and ease of use. The collected responses were then used as input data for the Conjoint Analysis. This procedure allowed the study to identify how consumers made trade-offs among packaging attributes when selecting the most preferred packaging design. The general utility model used in this study is expressed as follows:

$$U(X) = \beta_0 + \sum_{i=1}^{m} \sum_{j=1}^{k_i} \beta_{ij} X_{ij}$$

where ;

- U [X]= total utility score,
- β_0= constant,
- β_{ij}= part-worth utility,
- X_{ij}= dummy variable representing the attribute level.

The importance value of each attribute was calculated based on the range of part-worth utility values for each attribute. The importance value was obtained using the following equation:

$$I_i = \left(\frac{R_i}{\sum_{i=1}^{m} R_i} \right) \times 100\%$$

where ;

- I_i= importance value of attribute i(%)
- R_i= utility range of attribute i, calculated as the difference between the maximum and minimum part-worth utility values
- m= total number of attributes

Data analysis was carried out by estimating the utility value of each attribute level, calculating the importance value of each attribute, validating the model using correlation measures, and determining the best packaging combination. The utility value was used to identify the most preferred level of each attribute, while the importance value was used to determine the relative contribution of each attribute to consumer preference. Model validity

was assessed using Pearson's R and Kendall's Tau to evaluate the relationship between observed and predicted preferences. The final result of the analysis was used to recommend a redesigned Vanish detergent package that is more ergonomic, practical, resealable, and aligned with consumer needs.

RESULT

Identification of Packaging Attributes and Levels

This study identified five main attributes that influence consumer preferences for Vanish detergent packaging, namely package type, content size, package design, closure system, and ease of use. Each attribute consisted of three levels. The attributes and levels were determined based on literature review, observation of similar products, and identification of consumer needs. The combination of five attributes with three levels generated 243 possible product combinations through a full factorial design. Since this number was too large to be evaluated directly by respondents, the combinations were reduced using an orthogonal design, resulting in 16 representative product stimuli.

Table 3. Packaging Attributes and Levels

Attribute	Level 1	Level 2	Level 3
Package Type	Pouch Ziplock	Plastic Bottle	Box Packaging
Content Size	500 mL	900 mL	1 L
Package Design	Bright	Minimalist	Premium
Closure System	Ziplock	Screw Cap	Single-use
Ease of Use	Easy to Carry	Easy to Store	Easy to Pour

Respondents' Preference Scores for Product Stimuli

The respondents evaluated the product stimuli using a Likert scale of 1–5, where a higher score indicated a higher level of preference. The results showed differences in consumer preference scores among the stimulus combinations. Stimulus 6, Stimulus 10, and Stimulus 14 obtained the highest average score of 4.2, indicating that these packaging combinations were the most preferred by respondents.

Table 4. Average Preference Scores of Product Stimuli

Stimulus	Average Score
S1	3.6
S2	3.8
S3	3.5
S4	3.2

Stimulus	Average Score
S5	3.9
S6	4.2
S10	4.2
S14	4.2

Attribute Importance Value

The Conjoint Analysis results showed that the closure system was the most influential attribute in shaping consumer preference, with an importance value of 32%. This was followed by package type at 25%, ease of use at 20%, package design at 13%, and content size at 10%. These results indicate that functional attributes had a stronger influence on consumer preferences than visual or size-related attributes.

Table 5. Importance Value of Packaging Attributes

Attribute	Importance (%)
Closure System	32
Package Type	25
Ease of Use	20
Package Design	13
Content Size	10

Utility Value of Attribute Levels

The utility value analysis was conducted to identify the contribution of each attribute level to consumer preference. The highest utility value was found in the ziplock closure system, with a utility value of +1.42. This was followed by pouch ziplock packaging with a utility value of +1.18 and bright package design with a utility value of +0.96. In contrast, single-use closure, box packaging, and easy-to-carry use obtained negative utility values, indicating lower consumer preference for these levels.

Table 6. Utility Value of Attribute Levels

Attribute	Level	Utility Value
Package Type	Pouch Ziplock	+1.18
Package Type	Plastic Bottle	+0.22
Package Type	Box Packaging	-1.40
Content Size	500 mL	-0.35
Content Size	900 mL	+0.12
Content Size	1 L	+0.23
Package Design	Bright	+0.96

Attribute	Level	Utility Value
Package Design	Minimalist	-0.14
Package Design	Premium	-0.82
Closure System	Ziplock	+1.42
Closure System	Screw Cap	+0.31
Closure System	Single-use	-1.73
Ease of Use	Easy to Pour	+0.84
Ease of Use	Easy to Store	+0.27
Ease of Use	Easy to Carry	-1.11

Model Validation of Conjoint Analysis

Model validation was conducted using Pearson's R and Kendall's Tau to measure the relationship between actual respondent preferences and predicted preferences generated by the Conjoint Analysis model. The validation results showed a Pearson's R value of 0.986 with a significance value of 0.000, indicating a very strong relationship between actual and predicted preferences. Kendall's Tau value was 0.917 with a significance value of 0.001, indicating a high level of agreement in preference ranking.

Table 7. Model Validation of Conjoint Analysis

Statistic	Value	Sig.
Pearson's R	0.986	0.000
Kendall's Tau	0.917	0.001

Best Packaging Combination

Based on the utility values and importance values, the most preferred packaging combination consisted of pouch ziplock packaging, a content size of 900 mL to 1 L, bright package design, ziplock closure system, and ease of use related to storage or pouring. This combination was represented by Stimulus 6, Stimulus 10, and Stimulus 14, which obtained the highest average preference scores. Therefore, the recommended packaging redesign for Vanish detergent is a bright pouch ziplock package with a resealable closure system and a content size of 900 mL to 1 L.

DISCUSSION

The results of this study show that consumer preference for Vanish detergent packaging is mainly influenced by functional and ergonomic attributes. The closure system had the highest importance value, followed by package type, ease of use, package design,

and content size. This finding indicates that consumers do not evaluate detergent packaging only based on visual appearance, but also based on how the packaging supports daily use. In this study, the ziplock closure system, pouch ziplock packaging, and bright package design were the most preferred attribute levels. These results confirm that practical usability, storage safety, and visual clarity are important considerations in redesigning detergent packaging.

The dominance of the closure system can be explained by the repeated-use nature of detergent products. Vanish detergent is not typically used in one application, so consumers need packaging that can be opened and closed repeatedly without reducing convenience or product safety. A ziplock closure system provides practical benefits because it helps prevent spillage, supports safer storage, and maintains the product condition after the package has been opened. This explains why the ziplock closure obtained the highest positive utility value, while the single-use closure obtained the lowest utility value. The result suggests that resealability is a key functional requirement in detergent packaging redesign.

The package type also played an important role in shaping consumer preference. The pouch ziplock package obtained the highest utility value compared with plastic bottle and box packaging. This result indicates that respondents perceived pouch packaging as more flexible, practical, and easier to store. Compared with rigid packaging, pouch packaging can provide better space efficiency and easier handling in household use. In contrast, box packaging received a negative utility value, suggesting that consumers considered it less suitable for detergent products that require repeated opening, pouring, and storage.

Ease of use was also an important attribute in the packaging evaluation. Respondents preferred packaging that was easy to pour and easy to store because these attributes are directly related to product handling during daily use. The positive utility values for easy-to-pour and easy-to-store levels indicate that consumers value packaging that reduces effort during use. This result strengthens the argument that ergonomic considerations should be included in packaging development, particularly for household products that require frequent interaction between users and packaging.

The results also show that visual design remains relevant, although its influence was lower than functional attributes. The bright package design received a positive utility value, while minimalist and premium designs received negative utility values. This finding suggests that respondents preferred packaging with a clear and attractive visual appearance.

For household cleaning products, bright colors may create associations with cleanliness, freshness, and product effectiveness. However, the lower importance value of package design indicates that visual attractiveness alone is not sufficient to determine consumer preference. Consumers still prioritize functional features that directly support convenience and usability.

The content size attribute had the lowest importance value, indicating that size was less influential than closure system, package type, ease of use, and package design. However, the positive utility values for 900 mL and 1 L show that consumers still preferred medium to large packaging sizes. This preference may be related to the repeated-use nature of detergent products, where consumers expect sufficient product volume for household needs. Meanwhile, the negative utility value for 500 mL indicates that smaller packaging may be perceived as less efficient or less economical for regular use.

The final packaging configuration was determined by integrating the utility values and the relative importance of each attribute. The most preferred packaging concept consisted of pouch ziplock packaging, a content size of 900 mL to 1 L, a bright package design, a ziplock closure system, and ease of use related to storage or pouring. This configuration was represented by Stimulus 6, Stimulus 10, and Stimulus 14, which obtained the highest average preference scores. These findings indicate that consumer preference is shaped by a combination of functional, ergonomic, and visual attributes rather than by a single attribute alone.

Compared with previous packaging studies, the findings of this study support the argument that packaging functionality can influence consumer acceptance and product preference. Packaging that is easy to open, close, pour, and store provides a better user experience because it reduces inconvenience during product use. The results also align with studies emphasizing that packaging functions as both a communication medium and a usability interface between the consumer and the product. However, this study offers a more specific contribution by focusing on household cleaning product packaging, particularly Vanish detergent, where resealability and repeated-use convenience are highly relevant.

From an industrial perspective, pouch ziplock packaging may provide advantages for both consumers and manufacturers. For consumers, this packaging concept improves practicality, reduces the risk of spillage, and supports safer storage after opening. For manufacturers, pouch packaging can potentially reduce material usage, packaging weight,

storage space, and distribution costs compared with rigid bottle or box packaging. These advantages may strengthen product competitiveness in the household cleaning product market. Nevertheless, further technical evaluation is required to ensure that the selected packaging material has adequate strength, leakage resistance, ziplock durability, and compatibility with detergent formulation.

The findings of this study also have managerial implications. Product developers should prioritize resealable closure systems and flexible packaging forms when redesigning Vanish detergent packaging. The company should also consider developing a physical prototype based on the preferred attribute combination identified in this study. After the prototype is developed, usability testing should be conducted to evaluate opening, pouring, closing, leakage resistance, and storage performance. In addition, material testing is needed to ensure that the package is safe, durable, and suitable for detergent products.

Overall, this study demonstrates that Conjoint Analysis can be used as a systematic method to translate consumer preferences into packaging design recommendations. The proposed redesign, namely a bright pouch ziplock package with a content size of 900 mL to 1 L and a resealable closure system, can be considered the most suitable alternative for Vanish detergent packaging. This design integrates ergonomic usability, practicality, storage safety, and visual attractiveness. Therefore, the proposed packaging redesign has the potential to improve consumer satisfaction and strengthen product competitiveness. Future studies should involve a larger and more diverse respondent group and may integrate Conjoint Analysis with Quality Function Deployment, Kano Model, or Kansei Engineering to produce more detailed technical design specifications.

CONCLUSION

The results show that the closure system was the most influential attribute in shaping consumer preference, with an importance value of 32%, followed by package type at 25%, ease of use at 20%, package design at 13%, and content size at 10%. At the attribute level, the ziplock closure system obtained the highest utility value of +1.42, followed by pouch ziplock packaging at +1.18 and bright package design at +0.96. The combination of pouch ziplock packaging, a content size of 900 mL to 1 L, bright package design, and ziplock closure system obtained the highest preference level, as represented by Stimulus 6, Stimulus 10, and Stimulus 14. These findings indicate that consumers prioritize functional

aspects, particularly ease of use, practicality, and storage safety, over visual appearance alone.

The application of Conjoint Analysis provides a systematic approach to identifying packaging attributes that best match consumer needs and to generating packaging design recommendations based on user preferences. Based on the analysis, bright pouch ziplock packaging with a content size of 900 mL to 1 L is considered the most optimal alternative because it integrates ergonomic aspects, practicality, material efficiency, and visual attractiveness. This study contributes to packaging design research by demonstrating that functional and ergonomic attributes play a dominant role in consumer preference for household cleaning product packaging.

However, this study has several limitations. The number of respondents was relatively limited, and the study did not include physical prototype testing of the proposed packaging design. Therefore, future research should involve a larger and more diverse group of respondents and conduct prototype testing to evaluate usability, leakage resistance, material durability, and cost efficiency. Future studies may also integrate Conjoint Analysis with Quality Function Deployment (QFD), Kano Model, or Kansei Engineering to produce more comprehensive packaging design recommendations.

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