Hamburger packages: Properties for improvement of product evaluation

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Abstract:
Commodity packaging targeted at general consumers is primarily considered a parameter for determining purchasing preferences. Conventionally, studies have focused on the design guidelines of packages that are aimed at improving the purchasing desire of consumers. However, hamburger packages have never been evaluated as a parameter for determining purchasing preferences, perhaps because they accompany a product after its purchase. In addition, packages need to be specifically designed for improving product evaluation rather than package evaluation, since the latter is the product's accessory. The rationale behind designing a hamburger package is unclear, and they seem to be designed by trial and error. Therefore, it is necessary to understand how properties such as shape and size should be considered to improve product evaluation.

In this study, we describe the properties necessary to meet consumers' requirements for improving product evaluation. Thus, we analyzed the relationship between consumer needs and the properties of hamburger packages by using the laddering method. The results of our analysis revealed that the value structure of the hamburger packages is affected by the type of burger. We also reveal the properties that need to be considered when designing these packages.

Keywords
Hamburger package, Value structure, Consumer needs

1. Introduction
Commodity packaging targeted at general consumers is primarily considered a parameter for determining purchasing preferences. Conventionally, studies have focused on the design guidelines of packages that are aimed at improving the purchasing desire of consumers. However, hamburger packages have never been evaluated as a parameter for determining purchasing preferences, perhaps because they accompany the product after its purchase. In addition, it needs to be designed in order to improve the product evaluation rather than package evaluation, because package is an accessory product. The rationale behind designing a hamburger package is unclear, and the packages seem designed by trial and error. Therefore, it is necessary to understand how properties such as shape and size should be considered to improve the product evaluation.

This paper aimed to reveal how to identify the properties of improving product evaluation, and obtain a better perspective for designing the package. First, we identified hamburger characteristics that affect consumer needs. Next, we conducted an investigation based on each identified characteristic to grasp both consumer needs and the properties of hamburger packages. Lastly, we revealed the perspective behind package designing by analyzing the relationship between the hamburger characteristics, the properties of hamburger packages, and consumer needs. The results of this paper offer package designers effective information that they can use when designing the packages.

2. Previous studies and approach in this study
According to the Society of Packaging Science & Technology, Japan (Society of Packaging Science & Technology, 2010), there are eight elements required for selecting the appropriate paper packages. These are protection, effect of enhancing the charm of the enclosed products, display function, economy, safety, convenience, easy packaging, and disposability. Current hamburger packages are designed to fulfill the attributes of protection, safety, economy, and easy packaging. It is necessary to take into account other elements.
when designing hamburger packages to improve product evaluation by consumers.

Several previous studies examine packaging design. For example, Fukushima et al. (2006) proposed a concrete method for packaging designs based on the Kansei evaluation to positively affect consumers’ buying intention. Previous studies on package design focused on the Kansei evaluation at the time of purchasing. However, there is a high probability that the buying intention of hamburgers is not affected by their packaging because consumers have already decided which hamburger they want before checking the packages. Therefore, there is a pressing need to grasp consumer needs that affect not only the evaluation of the packaging design but also the evaluation of the process of having a meal, from purchasing to trash disposal, when we consider the hamburgers’ packaging design. In addition, it is necessary to propose a method to design hamburger packages based on the aforementioned consumer needs.

Quality function deployment (QFD) is one of the methods used to analyze the relationship between consumer needs and quality characteristics of products (Ofuji et al., 1997). QFD is required to prepare a matrix between them. However, it is difficult to determine design value based on the quality characteristics identified by QFD. Properties necessary to achieve consumer needs are considered properties of improving the product evaluation. Gutman (Gutman, 1988) proposed a method to clarify the relationship between consumer needs and product properties, in which he defined the value structure of a product in four hierarchies—“Product attribute,” which represents the character of the product, “Functional benefit,” which is the property that affects the functional aspect, “Emotional/psychological benefit,” which affects the emotional aspect, and “Value,” which refers to consumer needs. Then, Gutman explained the value structure by the laddering method, using which it is possible to identify the product properties leading to customer needs. Thus, this method helps understand the properties necessary for improving product evaluation.

However, packages may not have been evaluated by consumers because they are accessories. Furthermore, hamburger packages have a flexible design, and it is possible that properties not present in the existing package lead to improvement of product evaluation.

In this study, we first identified hamburger characteristics that affect value structures by conducting interviews. Next, we conducted an interview-based investigation using the laddering method to obtain a value structure of hamburger packages. Then, we analyzed the relationship between the hamburger characteristics, the properties of hamburger packages, and consumer needs by preparing a matrix table. Lastly, we revealed the perspective behind designing the package using the aforementioned relationship.

3. Derivation of the properties required to improve product evaluation

3.1 Hamburger characteristics that affect value structures

There are several types of hamburgers. It is probable that the value structure obtained by the laddering method differs depending on the hamburger types. Therefore, we conducted the interview-based investigation to identify the characteristics that affect consumers’ value structures with regard to hamburgers. The outline of the investigation is shown below.

| Respondents: 45 (males and females aged between 10 and 50 years) |
| Sample: Favorite hamburgers |
| Method: Interviewing when respondents are eating hamburgers |
| Question: The impression between purchasing the hamburgers and consuming them |

We requested the respondents to speak any thoughts that came to them between purchasing the hamburgers and eating them. Then, we made a record of their remarks. There is a probability that the hamburger characteristics that were included in their remarks with regard to the packages, such as large size, affect the value structures. Therefore, we analyzed their remarks and identified four hamburger characteristics: “Containing easily spilt hamburger buns,” “Containing slippery ingredients,” “Containing easily dripping sources,” and “Large in size.” It was necessary for this study to design the investigation using the laddering method based on the aforementioned hamburger characteristics and to identify the value structures.

3.2 Implementation of laddering method investigation

First, we evaluated 14 hamburgers that were sold in a hamburger shop, henceforth referred to as Shop X, based on the hamburger characteristics identified in section 3.1 to determine the samples of investigation using
the laddering method. Every hamburger was evaluated on a three-point scale with regard to each hamburger characteristic. Then, we implemented a cluster analysis based on the result of the evaluation and determined 4 hamburgers as the samples of investigation.

We analyzed the relationship between consumer needs and the properties of hamburger packages by the laddering method. Since hamburger packages have a flexible design, such as a box-shaped or bag-shaped, we should develop an investigation that can grasp the properties that do not exist in the current state of the package. Therefore, we conducted the investigation as follows. First, the respondents eat the sample hamburgers. Next, we asked them about their ideal package. Subsequently, we conducted the laddering method from the properties of an ideal package, as identified by the respondents. The outline is shown below.

We derived “Product attribute,” which is one of the four hierarchies of value structure, by analyzing the result of Question (1). In addition, we derived “Functional benefit,” “Emotional/Psychological benefit,” and “Value” that were linked to each “Product attribute” by analyzing the result of Question (2). A similar statement obtained through the investigation was summarized for a unified representation within each hierarchy. Consequently, the value structures of hamburger packages were obtained as shown in Table 1.

| Respondents: Male and female members of society, school-going boys and girls, mothers of elementary school-going children. Eight respondents in each category | Sample : 4 hamburgers of Shop X | Method : Interview | Question : (1) Properties of the ideal package (2) Laddering for the answer of (1) |
|---|---|---|---|

We derived “Product attribute,” which is one of the four hierarchies of value structure, by analyzing the result of Question (1). In addition, we derived “Functional benefit,” “Emotional/Psychological benefit,” and “Value” that were linked to each “Product attribute” by analyzing the result of Question (2). A similar statement obtained through the investigation was summarized for a unified representation within each hierarchy. Consequently, the value structures of hamburger packages were obtained as shown in Table 1.

Table 1 Example of value structures

| Value structure example 1 | Value structure example 2 |
|---|---|
| **Product attribute** | **Functional benefit** |
| **Functional benefit** | Does not drop the ingredients on the floor until opening package |
| **Emotional / Psychological benefit** | Hamburger looks delicious |
| **Value** | Want to eat something that looks delicious |
| **Small gap between hamburger and package** | Easy trash disposal |
| **Not drop the ingredients on the floor until opening package** | Less material |
| **Hamburger looks delicious** | |
| **Want to eat something that looks delicious** | Want environmentally friendly |

Functional benefit signifies the property of hamburger packages and value signifies consumer needs. We understood the relationship between consumer needs and the properties of hamburger packages through value structures.

### 3.3 Properties to be considered when designing packages

The importance of package properties is believed to depend on the appearance probability of consumer needs that can be accomplished by the properties. In order to grasp the properties to be emphasized during package design, we calculated the appearance probability of consumer needs. It should be noted that in the investigation in Section 3.2, we undertook a laddering method for all properties of the ideal package. Therefore, there is a possibility of obtaining the same needs from a respondent more than once. Therefore, we calculated the appearance probability of consumer needs that were obtained by the investigation in Section 3.2 from the ratio of the number of people with needs. The summary of the appearance probability and the relationship between consumer needs and hamburger package properties is shown in Table 2.
Table 2 Appearance probability of consumer needs and relationship between consumer needs and hamburger package properties

| Appearance probability | Consumer needs                                      | Properties of the hamburger packages                                      |
|------------------------|----------------------------------------------------|--------------------------------------------------------------------------|
| 68%                    | Do not want to feel the difficulty at eating       | Does not collapse hamburger                                               |
|                        |                                                    | Easy to take out the hamburger                                            |
|                        |                                                    | The package does not touch the face while eating                          |
|                        |                                                    | Easy to have a hamburger                                                  |
|                        |                                                    | Does not drop the ingredients on the floor                               |
| 35%                    | Want to eat a hamburger while working              | Hands does not become dirty while eating                                   |
|                        |                                                    | Can have a hamburger in one hand                                          |
|                        |                                                    | Does not drop the ingredients on the floor                               |
| 30%                    | Want to leave the store immediately when you have finished eating | No need to wash their hands after eating                                 |
|                        |                                                    | The package does not touch the face while eating                          |
| 25%                    | Want to how to eat is thought beautiful            | Does not drop the ingredients on the floor                               |
|                        |                                                    | Does not collapse hamburger                                               |
|                        |                                                    | Hands does not become dirty while eating                                   |
|                        |                                                    | The package looks beautiful while eating                                   |
| 20%                    | Want to eat something that looks delicious          | The hamburger appears to be delicious from the package                     |
|                        |                                                    | The hamburger does not collapse until opened                              |
| 18%                    | Want to distribute the hamburger immediately       | Easy to determine the kind of the hamburger                              |
|                        |                                                    | Does not drop the ingredients on the floor                               |
| 15%                    | Want to eat it without leaving                     | Easy to eat the lower layers                                              |
| 13%                    | Want to make the garbage small                     | Easy to fold                                                             |
| 10%                    | Want to feel a sense of security with respect to taste | Matches the image of the product appearance                              |
| 10%                    | Want to feel a sense of security for food safety   | Shows ingredients that are used in hamburger                              |
| 8%                     | Want to eat something clean                        | Keeps the hamburger clean                                                 |
| 5%                     | Want environmentally friendly                      | Less material                                                             |
| 3%                     | Want to eat an appropriate amount                  | Can be saved in the middle                                               |

It is possible to design a package that further improves product evaluation if hamburger package properties are determined using Table 2.

3.4 Relationship between properties of hamburger packages and hamburger characteristics

As a result of the investigation in Section 3.1, we found that the relationship between consumer needs and properties of hamburger packages are affected by hamburgers’ characteristics. Therefore, to grasp the relationship between the properties of hamburger packages and hamburger characteristics, first we organized the hamburger characteristics that had been included in the statement obtained by laddering. Then, we identified that the hamburger package property that exists in the value structure that contains the hamburger characteristics, is required for the specific characteristics.

For example, in case of value structure example 1 (Table 1), “Functional benefit” is “Does not drop the ingredients on the floor until opening the package.” This functional benefit is included in the expression related to “Containing slippery ingredients,” which is one of the hamburger characteristics. Therefore, we identified that the hamburger package property “Does not drop the ingredients on the floor until opening the package” is required for the hamburger that has the characteristic “Containing slippery ingredients.” In other words, we judged that there is a relationship between the hamburger package property “Does not drop the ingredients” and the hamburger characteristic “Containing slippery ingredients.” On the other hand, value structure example 2 does not include an expression related to the hamburger characteristics. Therefore, we judged that value structure example 2 is affected by all hamburger characteristics.

We analyzed all value structures that were obtained through the investigation in Section 3.2 in a similar manner to clarify the relationship between the properties of hamburger packages and hamburger characteristics. The matrix between properties and characteristics was prepared by marking “○” when there was a relationship.

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between the properties and the characteristics (Table 3) to grasp the relationship between the two.

For example, when a package of hamburger that has “Large in size” as a hamburger characteristic is designed, it must take into account the hamburger package property “Does not drop the ingredients on the floor until opening the package.”

| Table 3 Relationship between properties of hamburger packages and hamburger characteristics |
|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| No.   | Properties of the hamburger packages                  | All hamburgers | Containing easily split hamburger buns | Containing slippery ingredients | Containing easily dripping sources | Large in size |
| 1     | Less material                                         | ○              |                                   |                                   |                                   |               |
| 2     | Easy to determine the kind of the hamburger          | ○              |                                   |                                   |                                   |               |
| 3     | The package looks beautiful while eating              | ○              |                                   |                                   |                                   |               |
| 4     | Easy to fold                                         | ○              |                                   |                                   |                                   |               |
| 5     | The hamburger appears to be delicious from the packages | ○            |                                   |                                   |                                   |               |
| 6     | Keeps the hamburger clean                            | ○              |                                   |                                   |                                   |               |
| 7     | Shows ingredients that are used in hamburger         | ○              |                                   |                                   |                                   |               |
| 8     | Easy to take out the hamburger                        | ○              |                                   |                                   |                                   |               |
| 9     | Matches the image of the product appearance          | ○              |                                   |                                   |                                   |               |
| 10    | The package does not touch the face while eating      | ○              |                                   |                                   |                                   |               |
| 11    | Does not drop the ingredients on the floor           | ○ ○ ○ ○       |                                   |                                   |                                   |               |
| 12    | Easy to eat the lower layers                          | ○ ○            |                                   |                                   |                                   |               |
| 13    | The hamburger does not collapse until opened          | ○ ○ ○          |                                   |                                   |                                   |               |
| 14    | No need to wash your hands after eating              | ○ ○ ○ ○       |                                   |                                   |                                   |               |
| 15    | Hands do not become dirty while eating               | ○ ○ ○ ○       |                                   |                                   |                                   |               |
| 16    | Easy to have a hamburger                             | ○ ○            |                                   |                                   |                                   |               |
| 17    | Can have a hamburger in one hand                     | ○ ○ ○ ○       |                                   |                                   |                                   |               |
| 18    | Does not collapse hamburger                           | ○ ○ ○ ○       |                                   |                                   |                                   |               |
| 19    | Source does not stick to the face                    | ○ ○ ○ ○       |                                   |                                   |                                   |               |
| 20    | Can save a hamburger                                 | ○ ○ ○ ○       |                                   |                                   |                                   |               |

3.5 Perspective for designing the packages using the properties of hamburger packages

It is vital for hamburger shops to design hamburger packages that fulfill consumer needs. We set forth both relationship between consumer needs and hamburger package properties (mentioned in Table 2) and relationship between properties and hamburger characteristics. Using both Tables 2 and Table 3 when designing the package makes it possible to design an appropriate package for each type of hamburger. This section shows perspective for designing the packages using Table 2 and Table 3.

First, it is necessary to identify the characteristics that the targeted hamburger has. Next, we grasp the package properties that correspond to the targeted hamburger characteristics using Table 3. We need to select the properties marked “○” in the column for both all hamburger and specific characteristics of the targeted hamburger in Table 3. Lastly, we confirm the appearance probability in Table 2 in order to identify the important properties. Then, it is necessary to identify the properties that correspond to the consumer needs of high appearance frequency using Table 2. There is a pressing need to improve the targeted hamburger package by taking into account the identified properties.

The result of applying “Containing easily split hamburger buns” as the characteristic is shown below as an example. First, the characteristic of the targeted hamburger was identified as “Containing easily split hamburger buns.” Next, we derived the package properties that correspond to the hamburger characteristic “Containing easily split hamburger buns,” such as “Does not drop the ingredients on the floor until opening the package” and “Easy to take out the hamburger,” from Table 3. Lastly, we identified the important properties. For example, we understood that consumer needs “Do not want to feel the difficulty at eating” has the highest appearance frequency. Therefore, we judged that the hamburger package properties “The package does not touch the face while eating,” “Easy to take out the hamburger,” and “Does not drop the ingredients on the floor until opening the package” were the most important among some of the properties that corresponded to “Containing easily split hamburger buns” because the aforementioned properties corresponded to the consumer need “Do not want to feel the difficulty at eating.” We prepared Table 4 to grasp both the properties that corresponded to the hamburger characteristic “Containing easily split hamburger buns” and the relationship between these properties and consumer needs.
The properties of hamburger package, Kajihara et al.

Table 4 Properties needed when designing a package for hamburger with easily spilt ingredients

| Appearance probability | Consumer needs | Properties of the hamburger packages | Characteristics |
|------------------------|----------------|--------------------------------------|-----------------|
| 68% Do not want to feel the difficulty at eating | The package does not touch the face while eating | All hamburgers | Containing slippery ingredients |
|                        | Easy to take out the hamburger | ○                           | ○               |
|                        | Does not drop the ingredients on the floor | ○                           | ○               |
| 35% Want to eat a hamburger while working | Does not drop the ingredients on the floor | ○                           | ○               |
| 25% Want to how to eat is thought beautiful | Does not drop the ingredients on the floor | ○                           | ○               |
|                        | The package looks beautiful while eating | ○                           | ○               |
| 20% Want to eat something that looks delicious | The hamburger appears to be delicious from the package | ○                           | ○               |
|                        | The hamburger does not collapse until opened | ○                           | ○               |
| 18% Want to distribute the hamburger immediately | Easy to determine the kind of the hamburger | ○                           | ○               |
| 15% Want to eat it without leaving | Does not drop the ingredients on the floor | ○                           | ○               |
| 13% Want to make the garbage small | Easy to eat the lower layers | ○                           | ○               |
| 10% Want to feel a sense of security with respect to taste | Easy to fold | ○                           | ○               |
| 10% Want to feel a sense of security for food safety | Matches the image of the product appearance | ○                           | ○               |
| 8% Want to eat something clean | Keeps the hamburger clean | ○                           | ○               |
| 5% Want environmentally friendly | Less material | ○                           | ○               |

The package design with the properties required to achieve consumer needs, as shown in Table 4 are considered to improve the evaluation of hamburgers that have easily spilt ingredients. By using Table 4 when designing a package, designers can efficiently propose the package design that improves the products evaluation.

4. Discussion

The package design of many products, such as pet-bottle packages, helps consumers to decide whether they should buy the products or not. However, the buying intention of hamburgers is not affected by their packaging as consumers have already decided upon the hamburger that they want before checking the packages when purchasing. Therefore, it was necessary to identify the factors that affect the evaluation of not only package design but also having a meal. To obtain the value structures, we conducted the investigation using the laddering method while the respondents were eating hamburgers. There is a high probability that consumers evaluated the satisfaction of having a meal based on their sense of values. The method of investigation deployed in this paper aids in understanding the relationship between consumers’ sense of values and the properties of hamburger packages.

In addition, we analyzed the relationship between the properties of hamburger packages and hamburger characteristics. The requirements for hamburger package design differ according to the type of hamburger. This paper makes it possible to design customized packages for each type of hamburger.

5. Conclusion and future issues

In this study, we clarified the package properties that can improve product evaluation. Moreover, we revealed the perspective behind designing the packages on the basis of identified package properties. We first identified hamburger characteristics that affect value structures by conducting interviews. Next, we conducted an interview-based investigation using the laddering method to obtain a value structure pertaining to hamburger packages. Then, we analyzed the relationship between the hamburger characteristics, the properties of hamburger packages, and consumer needs by preparing a matrix table.

Further study is needed both to propose a method to reduce the load of investigation in order to perform a survey on many people, and to evaluate the package design.

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