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Requirements for a Gastronomic Reusable Glass System in Germany

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Abstract

The entry into force of the Single-Use Plastics Act on 07/03/2021 and the future obligation for gastronomic establishments to use reusable packaging from 01/01/2023, will set the course for reducing single-use consumption in Germany. The current research literature primarily highlights reuse systems with plastic, but little is known about a reuse system with glass as a material. The requirements for such a reusable system in Germany have thus hardly been researched up to now. Therefore, the purpose of this paper is to work out the requirements for a gastronomic reusable glass system in Germany.

A mixed-method approach was used. In a pre-study with 14 experts[1] individual product and services requests for the reusable glass system have been identified. Based on a survey among 502 guests in the gastronomic sector hypothesis generated by the literature and the pre-study have been tested. In a survey among 102 restaurateurs requests for the gastronomic reusable glass system haven been categorised using the Kano model.

The research highlights the necessity of a high variety of sizes for food and drinks, the stability, the stackability, the easy cleaning, fracture safety, freedom from microplastic of reusable containers. In addition, great importance is attached to simple handling and the consideration of guests' needs concerning the reusable glass system. Accessories such as reusable cutlery and reusable straws are to be offered as part of a reusable system. Another requirement was the automated reordering of reusable containers.

Keywords: reusable system, single-use plastics act, sustainability

1. Introduction

One credit card per day - that is the amount of microplastic ingested by each person per week (WWF, 2020). The useful life of a to-go cup is 15 minutes on average, but the environment takes decades for the plastic to decompose (Heinrich-Böll-Stiftung & Bund für Umwelt und Naturschutz, 2019). The negative environmental impacts associated with the life cycle of plastics and plastic packaging are steadily increasing due to rising waste volumes and the non-functioning circular economy system. In the process, the lifetime cost of plastic produced in 2019 is more than the gross domestic product of India. The entry into force of the Single-Use Plastic Act on 07/03/2021 and the future obligation for gastronomic establishments to use reusable packaging from 01/01/2023 will set an important course for reducing single-use plastic consumption in Germany (Bundesregierung, 2021). The relevance of reusable packaging in the German hospitality industry is particularly evident in the increase in out-of-home consumption (Umweltbundesamt, 2019; Umweltbundesamt, 2018). Food packaging for to-go consumption of food and beverages increased by a factor of 2.7 in Germany between the years 2000 and 2017. This trend is supported by changes in consumption habits, such as rapid food preparation and less living space, which at the same time goes hand in hand with low storage capacity (Umweltbundesamt, 2019). Another trend that is constantly being observed worldwide is consumer demand for reusable solutions (World Economic Forum 2021; Behrendt & et al 2021). Such developments, coupled with the legal framework, are pushing the hospitality

industry to address the issue of reusable packaging. A prerequisite for the acceptance of such a solution is the fulfilment of various requirements, because only then does the acceptance of restaurateurs and guests increase.

While the use of plastic, in the form of microplastics, in conjunction with food can result in both health hazards and environmental damage, the use of glass as a material does not have any negative consequences in the form of such damage (LIFE e.V. & et al 2021). The current research literature focuses primarily on reusable systems using plastic, but little is known about a reusable system using glass as a material. Thus, the requirements for such a reusable system have hardly been researched so far.

For this reason, the research question of this paper is: "What are the requirements of a gastronomic reusable glass system in Germany?" The research question can be justified on the basis of the above-mentioned points by social as well as scientific relevance.

In chapter 2 the methodical approach and findings of the pre-study concerning the individual product and services requests for the reusable glass system are shown. In chapter 3 the methodical approach and findings of the statistical test of the hypothesis building on the survey among 502 guests of the hospitality industry are described. In chapter 4 the methodical approach and categorisation of requests for the reusable glass system according to the Kano Model are presented using a survey among 102 restaurateurs. Using the findings of the previous chapters chapter 5 presents recommendations for setting up a gastronomic reusable glass system in Germany. Finally, chapter 6 describes the limitations of the studies and need for further need for research.

2. Methodical Approach and Findings of the Pre-Study

The mixed-methods approach is implemented through a two-stage design in the form of a pre-study model, in which implementation occurs sequentially, so that the qualitative survey is conducted first, followed by the quantitative empiricism in the form of two surveys in online format. The goal of the qualitative survey is to identify the requirements of various stakeholders. The results of the preliminary study form the basis for the Kano questionnaire[2] development, which is conducted in the form of a quantitative online survey. After the evaluation of the Kano questionnaire, the product characteristics of the Kano category mentioned can be classified. This can be justified by the fact that the subjectively perceived product characteristics exert an influence on the purchase decision, which is why a classification and differentiation of these characteristics is necessary (Helm & Steiner 2008; Mödritscher & Sternad, 2018).

The questions of the preliminary study were sent to the experts in Germany by mail in the period from 06/11/2021 to 08/25/2021. This large time window resulted primarily from the fact that the reopening of the gastronomic establishments within the Corona pandemic was considered. Due to the selection of the data and the existing research gap in the literature, the inductive category development according to Mayring was chosen as the evaluation method. Eleven restaurateurs, including a butcher and two retailers, who are in daily contact with disposable and reusable packaging were included in the analysis. The QDA software MAXQDA was selected for the evaluation of the results. From the experts' point of view, the following points were considered important:

- the size and shape of the reusable containers,
- the visual attractiveness,
- the stackability,
- the leakage resistance,
- the fragility,
- the scratch resistance,
- no release of microplastics,
- automated reordering,
- the training of employees,
- and the necessary accessories to a reusable system.

These points were used to design the questionnaires for the surveys among guests and restaurateurs in the gastronomic sector.

3. Methodical Approach and Findings of the Survey Among Guests in the Gastronomic Sector

In order to answer the research question from the viewpoint of guests seven bivariate correlation hypotheses were put forward based on the literature.

As already mentioned, consumers are increasingly distancing themselves from disposable products. In particular, the waste problem that arose regarding disposable products during the pandemic has contributed to a change in thinking (World Economic Forum, 2021). Furthermore, the interest in reusable products is increasing among

consumers, which can be attributed to a higher level of awareness among the population regarding the environment (Hauer & et al, 2020). Habitualization of purchasing decisions can lead to repeated purchases of the same products (Kaas & Dieterich, 1979), so that the first hypothesis is as follows:

Hypothesis 1: If a reusable system with glass has already been used for to-go food and beverages, it is more likely to be used again in the future.

Consumers evaluate packaging material according to the circular idea, the natural appearance of the material and the design (Otto & et al, 2021). Clients see an appealing design of the reusable packaging as desirable. There is a connection between the packaging design and the purchase decision (Behrendt & et al, 2021). The attractiveness of a product can be increased by the packaging (Fernqvist & et al, 2015). Thus, for many consumers, the packaging plays a decisive role in the purchase of food. The hypothesis is thus:

Hypothesis 2: The more appealing the appearance of a reusable container, the higher is the probability of using a reusable system with glass.

A specially conducted study in 2021 with 504 participants showed that the consumption of coffee from glass containers is preferred over containers made of plastic and stainless steel. It is assumed here that this case can be transferred analogously to food. The hypotheses are therefore:

Hypothesis 3: The greater the difference in enjoyment of beverages from glass packaging compared to plastic packaging, the higher the likelihood of using a reusable system with glass.

Hypothesis 4: The greater the difference in enjoyment of food from glass packaging compared to plastic packaging, the higher the likelihood of using a reusable system with glass.

The change in the material in the application can lead to irritation among consumers (Hennchen & et al, 2020). Moreover, glass is a fragile material. Accordingly, the hypothesis is as follows:

Hypothesis 5: The greater the concern about the fragility of glass, the less likely it is to use a reusable system with glass.

70% of respondents to a study by McKinsey said they would be more willing to pay if the items were free of environmentally harmful materials, such as plastic particles (McKinsey, 2021). Participants in a Swedish study conducted in 2015 stated that plastic as a packaging material was associated with lower quality and that it was also harmful to the environment (Fernqvist & et al 2015). According to Süssbauer, Wenzel and Müller (2020), consumers' health awareness is related to reusability. Based on this, the hypothesis is:

Hypothesis 6: The greater the degree of awareness regarding the harmful effects of plastic on health, the greater the likelihood of using a reusable system with glass.

The perceived recyclability of food packaging represents an important factor in consumer purchasing behaviour (Popovic & et al, 2019; Venter & et al, 2011). Therefore, the hypothesis is:

Hypothesis 7: The greater the role of sustainability in a person's life, the more likely they are to use a reusable system with glass.

When designing the questionnaires, care was taken to use simple and easy-to-understand language to minimize cognitive effort on the part of the participants. The response mode of the guest survey was designed in a closed format and provided with a Likert scale to obtain comparable answers and to reduce a possible excessive demand on the part of the participants. The positive expression on the Likert scale was placed on the left, since the reading direction of the German language is from left to right. The number of gradations in the Kano survey was deliberately limited to a maximum of five to achieve sufficient differentiation on the one hand and not to overtax the participants on the other. In addition, the nominal answer options were supplemented by the category "no answer" or "don't know" to prevent a possible dropout. In the guest questionnaire, the question about vessels for food and beverages was differentiated, as different requirements can be made.

To generate responses for the guest survey, the online survey was forwarded to friends and acquaintances via social media in the form of a snowball system. Data collection took place from September 25 to October 18 2021. The total sample is 502 participants. Of those who participated, 175 were male and 320 were female, representing an imbalance in favour of women. The remainder did not provide any information. Most of the participants had an academic degree. 74.62% of the participants with an academic degree could imagine themselves likely or very likely to use a reusable glass system. 75.8% of respondents are between 19 and 45 years old, with the most frequent age group being 26 to 35 years old.

The present study includes an analysis to determine the correlative relationship between the dependent and independent variables in the hypotheses generated above.

The correlation analysis is used for the interference statistical test of the correlation hypotheses. With the help of the statistical results, the hypotheses are to be tested and, if necessary, rejected or accepted. For a well-founded

assessment of normal distribution, the skewness and kurtosis are considered and the Kolmogorov-Smirnov test is applied. These showed that in no case a normal distribution can be spoken of, so that non-parametric procedures are applied. Due to the presumption of effects, a one-sided test is carried out.

Hypothesis 1: If a reusable system with glass has already been used for to-go food and beverages, it is more likely to be used again in the future (accepted).

The use of a Chi² test is not possible in the present case, since not all cells have a minimum frequency of five. Because of this, the Cramer-V was chosen. In our analysis Cramer-V has a value of 0.197 with an approximate significance (p) of 0.000878, which indicates a correlation. A positive correlation is perceived, which thus leads to the acceptance of the hypothesis.

Hypothesis 2: The more appealing the appearance of a reusable container, the higher the probability of using a reusable system with glass (not accepted).

The application of Spearman-Rho (rs) and Kendall-Tau-b (τ) rank correlation coefficients require at least ordinal scales, which are given in the present cases. After applying these, rs = 0.029 with p = 0.259, τ = 0.025 with p = 0.257, from which it can be concluded that there is a positive correlation, but it is not significant, which means that the hypothesis cannot be accepted.

Hypothesis 3: The greater the difference in enjoyment of beverages from glass packaging compared to plastic packaging, the higher the likelihood of using a reusable system with glass (accepted).

The rank correlation coefficients Spearman-Rho rs = 0.226 with p = 1.5708E-7 and Kendall-Tau-b τ = 0.203 with p = 1.7092E-7 could be determined a positive significant correlation, allowing to accept the hypothesis.

Hypothesis 4: The greater the difference in enjoyment of food from glass packaging compared to plastic packaging, the higher the likelihood of using a reusable system with glass (accepted).

A positive relationship is hypothesized between the perceived difference in enjoyment of glass food packaging and the likelihood of using it. Spearman and Kendall rank correlation was chosen to statistically test this hypothesis. It resulted in rs = 0.286 with p = 3.6746E-11 and τ = 0.25 with p = 7.7712E-11, indicating a significant positive relationship, justifying the acceptance of this hypothesis.

Hypothesis 5: The greater the concern about the fragility of glass, the less likely it is to use a reusable system with glass (accepted).

Statistical testing of this hypothesis showed Spearman rank correlation rs = -0.321 with p = 1.0329E-13 and according to Kendall τ = -0.275 with p = 1.5828E-13, which allows the hypothesis to be accepted.

Hypothesis 6: The greater the degree of awareness regarding the harmful effects of plastic on health, the greater the likelihood of using a reusable system with glass (accepted).

The rank correlation coefficients, when statistically calculated, revealed rs = 0.169 with p = 0.000069 and τ = 0.146 with p = 0.000068. Accordingly, the hypothesis testing revealed that, as previously hypothesized, there is a significant positive relationship between these two variables. Thus, the hypothesis can be accepted.

Hypothesis 7: The greater the role of sustainability in a person's life, the more likely they are to use a reusable system with glass (accepted).

Rank correlations revealed rs = 0.332 with p = 1.1106E-14 and τ = 0.305 with p = 2.4641E-14. Thus, testing the hypothesis reveals a significant positive correlation between sustainability awareness and the likelihood of using a reusable glass system, allowing the hypothesis to be accepted.

To distinguish hypothetical statements from real empirical values with a reusable glass system, the data was divided according to the positive characteristics of a returnable glass system that had already been used. The same Spearman-Rho and Kendall-Tau-b correlation calculations were performed as in the upper case. The Jacob Cohen effect size of the Spearman-Rho and Kendall-Tau-b correlation coefficients were considered. This could be classified as higher for the split data set with the experience values with returnable glass than for the entire data set No higher classification of the effect strength could be detected for the hypothesis of sustainability awareness.

4. Methodical Approach and Findings of the Survey Among Restaurateurs (Kano Model)

The Kano model was developed by Professor Noriaki Kano (Crostack & et al, 2010; Mkpojiogu & Hashim, 2016). Kano not only relied on the expressed desires of customers, but attempted to develop a deeper understanding of the unexpressed, latent customer needs. The Kano model thereby adopts the multi-factorial structure of the satisfaction construct, whereby product criteria can be identified which exert the greatest influence on customer satisfaction (Sauerwein, 2000; Hölzing, 2008). These can be assigned to three essential categories.

First, basic characteristics are defined as must-have criteria which, if not fulfilled, give rise to a negative perception of quality among consumers. Customers therefore take these features for granted (Bruhn 2016; Atlason & Giacalone, 2018). Positive differentiation from the competition is hardly possible with this characteristic (Sauerwein, 2000; Bruhn, 2016). Second, performance characteristics in terms of perceived quality are proportional to the degree of fulfilment, so that they are clearly articulated by the customer. This results in target criteria (Bruhn, 2016). Third, the desire characteristics affect the product satisfaction of the consumers most strongly. However, these are not explicitly expressed or expected. The fulfilment can lead to over-proportional satisfaction of the customers; non-fulfilment however not to dissatisfaction. With indifferent attributes no influence on the customer satisfaction exists, so that the fulfilment and non-fulfilment of the product requirement decouple. Rejection attributes have an inverse causal relationship. Here, non-fulfilment leads to satisfaction and fulfilment to dissatisfaction (Sauerwein, 2000).

In the Kano questionnaire for the survey among restaurateurs, the Kano questioning technique was used. In the Kano questioning technique, subjects are first asked for their opinion regarding the presence of a feature. The counter-question is then formulated, asking whether the characteristic is present or not. The product characteristics resulted from the preliminary study and were first divided into product-related characteristics, followed by service-related characteristics. Based on the results of the pre-study the questionnaire begins with the characteristic of visual attractiveness, then moves on to stackability, leak resistance, fragility, scratch resistance, release of microplastics, automated reordering and ends with the characteristic of training.

The total sample is 102 participants. The research unit consists of restaurateurs and owners of non-packaging stores with the characteristics of the type of business. 59 of the respondents were owners of non-packaging stores. The remaining sample came from the hospitality industry, which includes restaurants, hotel restaurants, cafés, ice cream parlors and caterers.

To find out whether the product requirements increase satisfaction or merely avoid dissatisfaction, the satisfaction coefficients are considered for this purpose. Figure 1 was created to provide an overall view. The abscissa shows the satisfaction coefficient (CS+) and the ordinate the dissatisfaction coefficient (CS-). The black dividing lines can be derived from the mean values of the respective coefficients, resulting in four fields.

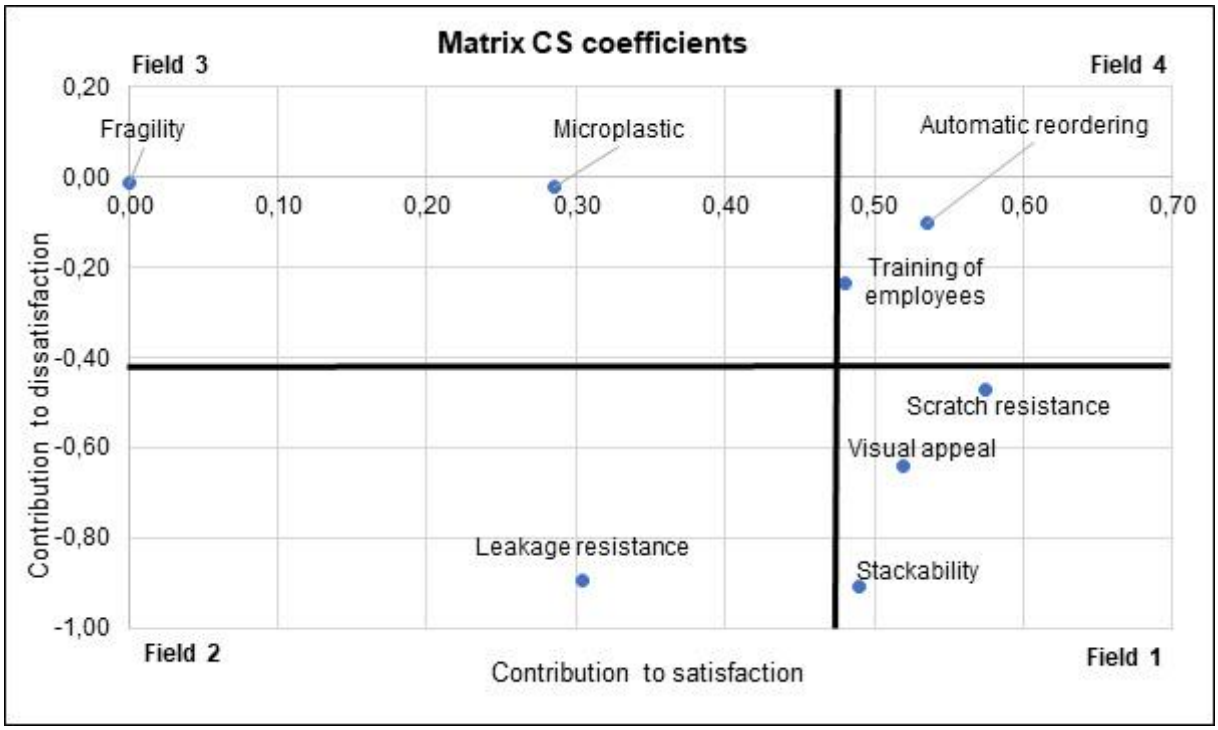

Figure 1. Matrix CS coefficients

The further the product requirement is below the dividing line, i.e. in fields 1 and 2, the greater its contribution to dissatisfaction. Accordingly, “stackability” makes a considerably greater contribution to dissatisfaction than “leakage resistance”. “Stackability”, if not present, causes the greatest dissatisfaction, whereas “scratch resistance” causes the greatest satisfaction. Field 4 contains requirements with above-average potential for

generating satisfaction. “Automatic reordering” thus contributes more to satisfaction than “visual appeal”. The product requirement of “training of employees” is located close to the dividing line, but is still assigned to an increased satisfaction foundation. Field 3 shows all product requirements, which contribute below average to the satisfaction as well as dissatisfaction foundation. In this field, the rejection characteristics “fragility” and “microplastic” can be found, which show that they hardly contribute to satisfaction or dissatisfaction.

The data set was subdivided into segments for a closer look at the results. Accordingly, the data set was divided into the industry group “hospitality” and “unpacked stores”[3]. The data set was also filtered according to the characteristic “already used a reusable system with glass”. If all the evaluated (filtered) data sets are considered, all the requirements can be placed in the same category, with the exception of “visual attractiveness”, “automatic reordering” and “employee training”. The “visual attractiveness” can be categorized as desire characteristics for the entire dataset and the dataset segmented by unpackaged stores, but for the filtered dataset by reusable systems with glass already in use and the hospitality segment, as a basic characteristic. Looking at the satisfaction coefficients of “visual appeal”, it can be seen that it contributes to the generation of satisfaction. Likewise, the absence of this characteristic causes dissatisfaction, so this requirement should be considered as a basic characteristic. The requirement of “automatic reordering” can be categorized as an indifferent characteristic in the entire data set and in the filtered data set of reusable systems with glass, whereas in the segments of hospitality and non-packaging stores it can be categorized as a desire characteristic. Since the requirement for “automatic reordering” contributes greatly to satisfaction, it should be located as a desire feature. The “training of employees” was only considered as an indifferent characteristic in the filtered data set according to unpacked stores, otherwise it was categorized as a desire characteristic. Since this characteristic contributes to satisfaction, it should be considered a desire characteristic.

5. Recommendations

5.1 Rental of Accessories Which Are Necessary for the Consumption of to Go Food and Beverages

Accessories such as reusable cutlery and reusable straws are to be offered in a reusable system with glass, so that disposable items are reduced in this area and restaurateurs are offered a solution in relation to the single-use plastic law of 07/03/2021. The said law prohibits single-use plastic straws. The Kano survey showed that 19 respondents would require reusable straws and another 36 respondents would require reusable cutlery. Individual responses include a felt sleeve, a lid for drinks and, on several occasions, a reusable transport box. The future task is to find out what the mass demand for these items is. A felt cover as heat and breakage protection would thus be conceivable. However, cleaning these items proves to be more time-consuming, as restaurateurs must additionally clean them in the washing machine or hire an external cleaning company for this purpose. It therefore remains to be seen whether restaurateurs and/or guests are prepared to bear these additional costs. Nevertheless, there is the possibility of offering such a felt coat as a purchase item for guests, which does not have to be exchanged for a deposit and thus does not incur any cleaning costs.

5.2 Implementation of an Automated Reordering of Reusable Containers

Another service requirement is the automated reordering of reusable containers, which saves restaurateurs a considerable amount of time and effort. An app with QR codes on the jars can be used to implement automation. The QR code of the jars is scanned with the app during serving and return. The recorded data can be used to record the stock of returnable glasses for each gastronomic operation. In addition, the restaurateur has the option of setting both a minimum and a target quantity in the app. As soon as the minimum quantity is not reached, the difference to the target quantity is automatically reordered. The Kano survey also revealed that the requirement in question contributes in particular to customer satisfaction and can therefore be regarded as an enthusiasm feature. It is therefore not a must-have criterion. Among other things, the preliminary study revealed a desire on the part of restaurateurs for rapid availability of reusable containers in order to counteract possible bottlenecks. In addition, the desire for self-collection of the reusable containers was expressed for cost reasons. However, this would only make sense for restaurateurs who are located near the reusable container warehouse.

5.3 Installation of a Dense Return Network

A dense return network must exist for the return of reusable containers to achieve a high level of acceptance and convenience among guests. The results of the preliminary study are thus congruent with the literature. In addition, the study by Ertz et al (2017) concludes that consumers prefer to refill a water bottle themselves. Asking a salesperson separately about refilling a water bottle is perceived as more inconvenient. For example, a return box can be set up within the catering establishment where the return is possible without human interaction. These return boxes can also be placed in supermarkets, train stations, workplaces and other highly frequented locations.

5.4 Training of Employees and Business in the Gastronomic Sector

In addition, the employees of the businesses to be implemented are to be trained so that they can explain the new

type of reusable system and actively offer it to guests. Ultimately, this should lead to greater acceptance among consumers through information. In the Kano survey, this requirement was identified as an enthusiastic feature. For a cost-effective and easy-to-multiply solution, the training should be made available online in the form of videos and a downloadable summary. The following content shall be part of the training:

- The operation and process of the reusable system.
- The advantages of the operation when using a reusable system with glass.
- The tasks of the employees in handling the reusable containers.
- The guest communication and information about this reusable system.
- The advantages of glass and the disadvantages of plastic.

6. Limitations and Need for Future Research

In particular, the participants' statements on the likelihood of using a reusable glass system in the future should be viewed critically, as subjects may have made untrue statements due to social desirability regarding sustainable action. Although this behaviour could be reduced by the lack of social interaction during the survey, a response behaviour adapted to this cannot be completely ruled out.

According to Cohen (1988), the calculated correlations show only a weak correlation in most cases and thus a low effect size. The results of the guest survey do not indicate a causal relationship. To show causal relationships of the hypotheses, a cross-lagged panel design would be appropriate, in which data are collected at two different time points. By comparing the results at the respective measurement times, a clearer statement might be possible.

Problems arose regarding the response of restaurateurs as the research unit for the Kano survey. In addition, only limited resources and a limited time period were available to recruit participants. Consequently, the present work is limited by a small sample, which means that the results cannot be considered representative. Furthermore, it was not possible to verify that all subjects met the inclusion criteria. It should be noted that no butchers participated in the Kano survey, but more than 50% subjects from non-packaging stores did. For this reason, a segmented analysis was carried out in order to exclude any possible bias in the results.

Another problem is the length of the Kano questionnaire, which could lead to fatigue among respondents after a certain time. Due to the fact that a product requirement was queried on the basis of two questions and was therefore associated with a relatively high effort, only a small number of product properties could be queried in the Kano survey.

In addition, it should be noted that the fragility of the reusable containers with glass was perceived as a rejection feature by the test subjects, but glass is used for food and beverages by every guest at home and by every restaurateur in-house. Furthermore, the release of microplastics from the reusable containers was also seen as a rejection feature, yet almost every existing reusable system uses reusable plastic containers. However, microplastics can be secreted when cutting in these containers.

The action implications for the adoption of advertising measures by the reuse system provider are based on individual statements from the preliminary study conducted and should therefore be viewed with caution. Future research should survey many test persons in order to be able to make generalized statements in this regard. This also applies to statements regarding the other accessories, such as the lid and the reusable transport box. This requirement should also be investigated more closely in the future. In the present work, only a partial consideration of the requirements took place, as well as the classification of these requirements into categories. The latter refer thereby to basis, achievement, enthusiasm, rejection or indifferent characteristics. In this case the consideration of further requirements and their categorization would be meaningful. The requirements identified for break resistance and low thermal conductivity can only be implemented to a limited extent due to the material glass. Although the present work opens up possible solutions, further consideration would also be useful at this point. A cost-benefit analysis could be carried out, for example on shatterproof glass. Furthermore, it could be investigated what a protective jacket might look like in concrete implementation. To substantiate the findings of the guest survey, an additional empirical investigation would be required with regard to causality.

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[1] In this article, the masculine form is used for ease of reading. However, the comments apply equally to all genders: male, female and diverse.

[2] The Kano model and questionnaire are explained in chapter 4.

[3] In general, unpacked stores focus on a zero-waste business by avoiding and reducing unnecessary packaging waste. They develop and offer systems that enable businesses and individuals to reuse and refill. One possible system could be a reusable glass system instead of single-use plastic system for food.