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Determining Attributes for Discrete Choice Experiments in Consumer Research

Pedro Longart¹

Abstract

Attribute development for Discrete Choice Experiments (DCEs) through qualitative research is a shallowly covered area. Particularly, research is scant in terms of detail about attribute reduction and development. First of all, the paper reviews the literature and justifies DCEs as an appropriate method for determining consumer preferences, with particular focus on services. The researcher conducted a DCE on preferences for restaurants for leisure purposes. Whilst finding there was not a clear guidance, the author proposes a clear methodology for guiding DCE researchers regarding the determination of attributes in consumer research, particularly in the service industry. The case study of restaurant attribute development is used. In this context, the first stage consisted in a thorough review of the literature combined with a thematic analysis of six focus group interviews conducted in the South East of the UK. Attribute reduction took place through constant comparison analysis and the method is comprehensively explained in the paper. The study also looked for control variables and found that occasion for eating out is a very salient variable to be tested in the following DCE which consisted in an Adaptive Choice Based Conjoint online survey (Santooth Software). It was found that combining literature review with focus group interviews results in richer attributes because they are based on more complex and nuanced data. Finally, a proposal with nine steps for attribute development is provided.

Keywords: Discrete Choice Experiments; Consumer Preferences; Attribute development; Conjoint Analysis, Attribute Reduction

Introduction

The derivation of attributes in conjoint analysis (CA) studies could be provided by qualitative studies. These attributes must be formulated clearly and concisely, and qualitative work is fundamental for ensuring this (Mays and Pope, 2000; Kuper et Kuper, Lingard and Levisson, 2008; Kløjgaard, Bech and Søgaard, 2012). On the other hand, these studies can improve the content validity of CA studies or discrete choice experiments –DCEs– (Mangham *et al.* 2009). These qualitative studies have taken the form of literature reviews, focus group interviews and in-depth individual interviews with decision makers. Many empirical studies conducted them, to name a few and in different contexts, i.e., Kruk *et al.* (2010); Lagarde and Blaauw (2009); Huybers (2003).

The author of the research embarked upon the task of understanding the factors that influence the selection of a restaurant when deciding where to eat out and to highlight the main attributes that a restaurant should have for consideration and further selection. The research focused on studying eating out as a social leisure activity. An initial consideration of attributes from the literature resulted in listing thirty-nine (39) attributes. When investigating how attributes were ascertained in the field of consumer research, and particularly in the service

¹ Pedro Longart, Higher Colleges of Technology, United Arab Emirates. E-mail: pedrolongart@hotmail.com



industry, information was very limited, hence the need to rely mainly on papers related to Health Economics, a field in which DCEs have become increasingly popular (Coast, Al-Janabi, Sutton, Horrocks, Vosper, Swancutt and Flynn, 2012). As proof of this popularity, Clark, Determan, Petrou, Moro and de Bekker-Grob (2014) compiled 179 health-related DCEs in the period 2009-2012. However, economic studies of health and social care interventions are quite different from consumer research studies. The latter normally elicit fewer attributes. Notwithstanding this, in Health Economics the reduction of attributes is also necessary, with inadequate information (Webb et al, 2021). There are important exceptions to this in health economics, for example, Helter and Boehler 2016 and Obadha *et al*, 2019. These contributions in healthcare can also be useful for consumer research studies as well, and for that reason, worthy of discussion in this paper. The author deemed convenient to find a method to elicit attributes in the context of restaurants and later found that this method could be shared to enlighten consumer researchers and address Webb et al's (2021) about the lack of information on this topic.

Despite the fact that qualitative work is highly recommended (Salkeld, Ryan and Short, 2000), most researchers have examined very briefly how to conduct such preliminary step towards a DCE. Coast and Horrocks (2007, p. 25) summed it up like this: "There is little evidence of rigor in the qualitative work associated with attribute development. No detail is presented about sampling, data collection or analysis". These authors also highlighted the lack of reflection about reduction of attributes to a manageable size (a size that decision-makers could feasibly evaluate) takes place. More recently, Vass, Rigby and Payne (2017) conducted a study of 254 healthcare DCEs and found that there is a lack of detail regarding the qualitative component of the DCE. Hence, there is very little guidance on how this should be approached.

This discussion paper has the aim of proposing a method for determining attributes and levels in the field of consumer research using a sequential approach in which a qualitative study informs additional quantitative analysis as in the case of the papers reviewed by Vass *et al*. (2017). Its first objective is to develop a discussion that proposes CA and DCEs as a method to ascertain consumer preferences. However, this paper does not pretend to be a comprehensive literature review of previous studies. In the field of Health Economics, once more, there are papers that have achieved that, i.e. Soekhai, de Bekker-Gob, Ellis and Vass (2019), amongst them. The paper just presents a clear explanation of the methods available to consumer researchers and the advantages of DCEs over other approaches. The second objective is focused on providing a clear-cut technique for eliciting attributes and reducing the number of them, which will guide researchers on a clear approach to attribute development.

Investigating consumer preferences

There are two main approaches for collecting data for investigating consumers' preferences: revealed preference data and stated preference data. Revealed preference data is factual and of a historical nature. This means that a researcher would delve into the selection of restaurants and from that selection determine restaurants with certain attributes. Stated preference data refers to data collected before a consumer makes a hypothetical or real selection. It is current and relies on using a survey as the strategy for data collection. There are several approaches for stated preference data collection and analysis. Revealed preference



data is a method for comparing two stated preference approaches (Merino-Castello, 2003). Ben-Akiva, McFadden and Train (2019) posited that ascertaining stated preferences is a challenging task. These renowned authors argued that measurement methods in experimental data should have equal predictive power as preferences drawn from market data. However, if reliability of methods is assured, using stated preferences is a preferred method for two main reasons. Its results are more current as data collected may be dated and the target market may be different from the one the researcher is interested in investigating. Secondly, it is easier to ascertain several aspects or attributes of the decision that were appealing to the respondent. For example, the researcher can establish that consumers selected a particular restaurant more than any other but delving into the attributes of that restaurant which may have influenced the decision is extremely complex.

Now there are several approaches to study stated preferences. Two major groups emerge, single criterion and multi-criteria (multi-variate) methods. This paper delves into the latter, but an examination of single criterion is also necessary because of its popularity. Traditional surveys use that model, in which the respondents see only one scenario. The preference could be stated dichotomously, Will you select a Michelin-star restaurant regardless of price? Obviously, the choice could be either yes or no. Otherwise, the respondents could state their preferences by choosing a number, presented in a scale, i.e., a 5-point scale, ranging from “strongly disagree” (1) to “strongly agree” (5). It is very difficult to determine what is really important for consumers using the single criterion method because of its lack of discriminatory power. Respondents’ answers normally indicate that all attributes or characteristics of a product or service are important (Garver, Williams and LeMay, 2010). It is apparent that respondents would agree with the researcher with the inclusion of that attribute. The respondent may ask him or herself, “If it is here, then it must be important.” Degrees of importance of an attribute cannot be quantified accurately either (Ramirez, Wu, and Beale, 2016). Additionally, by assessing features in isolation, the response is not accurate, as a hypothetical scenario consists of assessing all features combined (Merino-Castello, 2003; Sutherland and Canwell, 2004).

Figueira, Greco, and Ehrgott (2005) offered a classification of multiple criteria decision making, and distinguished two categories of methods: Multiple Attribute Decision Making (MADM) and Multiple Objective Decision Making (MODM). The second is better suited for this paper. This is because it involves the selection of the “optimal” alternative from a pool of preselected alternatives (Hwang and Masud, 2012; Popovic, Kuzmanovic and Savic, 2018). For MADM, there are three main methods: Contingent valuation (CV), Analytical Hierarchy Process (AHP) and Conjoint Analysis (CA).

CV uses the survey approach to allocating economic value to goods or services that consumers are not familiar with (Carson, 2001). This is related to measuring Willingness to Pay (WTP) that can be used for non-market goods, for example, green electricity (Xie and Zhao, 2018). Henceforth, its use is very limited for determining stated preferences. On the other hand, other authors like Rakotonarivo, O. S., Schaafsma, M., & Hockley, N. (2016) prefer the use of DCEs for the valuation of goods over CV.

The AHP method consists of a subjective assessment of several choices, compared with multiple criteria, which is then organised into a hierarchical structure (Popovic *et al.*, 2018). Saaty (2008) showed that the hierarchy can be built starting with the levels of the attributes,

or by the attributes themselves (top-down). This is done by building a matrix, with the pair-wise comparisons of either attributes or levels of attributes. This is the example provided by Saaty (2008): highest level (goal: select the best job after a PhD). First hierarchy of attributes (aka criteria): Flexibility, opportunities, security, reputation and salary. Some attributes can have a second tier of attributes (aka sub-criteria). For example, flexibility could have the attributes: location, time and work. Location could have international company, domestic company, college, state university as sub-criteria. The weight of the attributes is determined as a means of comparing the relative importance of an attribute. Pairs of attributes are compared. For instance, respondents compare between flexibility and opportunities. If they have the same importance, 1 is allocated, if opportunities is four times more important than flexibility then the score is $\frac{1}{4}$, and so forth. Regarding the second method (starting from the bottom – levels of attributes - and moving up – attributes-), Helm, Steiner, Scholl and Manthey (2008) provided an example of how to ascertain preferences with this method. The highest level could determine preference for the best mountain bike. The next level is attributes. To establish the attributes and levels, the researchers used expert panels like in many AHP studies. In this case, the attributes for mountain bikes are: Weight, suspension, colour, seat. The last tier of the hierarchy is the levels, i.e., comfortable or racy, for the attribute seat. The questionnaire would look like this:

Compare these two types of seat: A. Comfortable B. Racy							
A is better than B ☐				B is better than A ☐			
How much better?							
Indifferent	Weakly Better		Strongly Better		Absolutely better		
☐	☐	☐	☐	☐	☐	☐	☐

Figure 1. Example of questionnaire in AHP (adapted from Saaty, 2008)

The final method for investigating stated preferences is CA, in which DCEs are part of the CA family of methods. Danner, Vennedey, Hilgsmann, Fauser, Gross & Stock (2017) established the main differences between AHP and DCE methodologies. AHP normally uses the terms criteria and sub-criteria; DCEs use attributes and levels. The key difference in DCEs is that respondents choose –normally - from the whole profile, not in pair-wise fashion as in AHP. That means evaluating all the attributes and levels, as they would do in a real life situation. This is the main advantage of CA/DCE against AHP. There are several other reasons for preferring DCEs for consumer stated preferences. Amongst them:

1. They provide information that may not be elicited in traditional surveys (Manalo, 1990)
2. The scenarios for CA are built from the basis of the level of the attributes. These entail a clear description for respondents, making it more realistic (Ijzerman, Van Til, and Bridges, 2012).
3. CA is more robust for simple situations (Helm *et al.*, 2008). AHP seems better suited for situations in which expert input is necessary. Consumer situations seem simpler and thus DCEs seem better suited.



4. Ijzerman, Van til and Snoeck (2008) found that respondents (patients, in their case) found AHP hard to understand.
5. DCE tasks are more intuitive (Danner *et al.*, 2017).

CA in marketing research practice

Technically speaking, traditional CA differs from DCEs (Louviere, Flynn and Carson, 2010). However, most literature, marketing research practitioners and software providers, e.g., Sawtooth Software, refer to DCEs as part of CA. The author concurs with the arguments of Louviere *et al.* (2010), and this paper focusses only on DCEs. However, for practical purposes, the paper has used the term CA as an umbrella term that includes DCEs from the onset. DCEs are based on Random Utility Theory (RUT). RUT is a well-tested body of theory and started with Thurstone's (1927) study of application in the measurement of psychological values. Thurstone studied the measurement of psychological values (utilities). A consumer can have utilities of, let's say, 0.6 for brand A and 0.4 for brand B. Obviously, he/she needs to choose just one. The choice with the highest utility at the precise moment when the consumers make their decisions determines which brand the consumer will pick (McFadden, 1986).

In DCE, attributes must be determined prior to its testing, that is called attribute development. This has been termed "attribute validation method" (Apostolidis and MacLeay, 2016). In the field of Health Economics, Coast, Swancutt and Sutton (2012, p.31) bemoaned the fact that "attribute development tends to be poor, with information generally being excessively brief". DCEs in the field of consumer research reveal the same pattern and these are some recent examples:

"Findings from the secondary research and literature review were used to develop a scoping survey. The purpose of the survey was to assess respondent understanding and importance of attributes. This helped with further refinement of attributes" (Tait, Saunders, Dalziel, Rutherford, Driver and Guenther, 2014).

"Starting with an initial set of attributes, we reduced their number through pre-studies and pre-tests, following the procedures suggested by Coast *et al.* (2012). Through an expert interview and additional interviews with external stakeholders and consumers, we then identified the most relevant attributes" (Sagebiel, Müller and Rommel, 2019)

"The attributes of the DCE are based on our formative qualitative work (content analysis) that elicited a larger number of attributes. A list of twelve attributes that are important to consumers was developed from a recent structured content analysis. Among these 12 attributes, we found 9 relevant attributes, using pre-determined certain criteria (Kistler, Ranney, Sutfin, Chrzan, Wretman, Enyioha, Meernik, Berman, Zarkin, and Goldstein, 2019)"

In the product context, some authors use Delphi-style questionnaires or expert opinions (Palma *et al.*, 2013; Williamson *et al.*, 2016; Ribeiro *et al.*, 2020). This is deemed suitable as well for service contexts, particularly in innovative service concepts when customers are not too familiar with the service.

Qualitative pre-testing is another term for attribute validation. Johnston, Boyle, Adamowicz, Bennett, Brouwer, Cameron, Hanemann, Hanley, Ryan, Scarpa, Tourangeau, and Vossler (2017), argued that qualitative pre-testing is necessary when developing a stated preference survey. These authors recommended rigorous methods that may include 4-6 focus group interviews (normally) or other method, i.e. in-depth interviews. Vass *et al.* (2017, p. 306) found that the authors who conducted qualitative research before a DCE perceive “a lack of explicit guidelines for qualitative research methods alongside DCEs”. Likewise, Coast *et al.* (2012) suggested that any DCE study should contain a rationale for the method used to develop attributes and suggested some basic guidelines. This paper proposes this rationale and recommends DCE researchers to follow the full recommendations of Coast *et al.* (2012) and Johnston *et al.* (2017).

Vass *et al.* (2017, p. 303) found that 96% of the authors in their study provided the following purposes for conducting qualitative research before a DCE:

“To identify attribute and/or levels (61%)”.

“To validate attribute and/or levels selected through other methods (27%)”

“To check terminology and descriptions (8%)”

These authors do not consider the elicitation of attributes and levels through literature review as methods of qualitative research. They seem to indicate that literature reviews fall under “other methods”. They considered focus groups, interviews, or free-text comments (as part of questionnaires). This paper proposes a method that attempts to serve the three purposes stated by Vass *et al.* (2017). This method may be used in marketing research. For clear illustration, the example of developing restaurant attributes is used. It can also be seen as a step towards clear guidelines for the reporting of qualitative research methods, an area in which Vass *et al.* (2017) considered there was a lack of clarity.

Proposed method for attribute development

Content Analysis of the literature.

In a study of 114 DCEs, Vass *et al.* (2017) found that only 11% provided some detail about the qualitative phase of the DCE. The most popular method was content analysis (5 studies, 4%). The author proposes that content analysis should be the starting point of the qualitative analysis. It consists of conducting a thorough literature review of attributes, such as the study conducted by the author on restaurant attributes. However, it should be noted that a literature review may refer to studies conducted several years ago, or to other contexts. On the other hand, there may be copious research on the topic, hence a preliminary observation could result in an unduly large number of attributes. DCEs require to be presented with a limited number of attributes, then the need for attribute reduction. This can be achieved by conducting primary research on consumers to compare the literature review with the results of primary research, i.e., focus group interviews-. Another key aim of focus groups is to find out what control variable(s), or covariates, can affect the relationship between the dependent variables (attributes and levels of attributes) and those variables. Obadha *et al.* (2019) suggested that theoretical arguments from the literature review is an alternative method to primary data collection such as focus group discussions. Arguably, the author proposes that the starting



point should always be the literature review, assuming that the literature is based on empirical studies in the context of study.

Focus Group Interviews

Bristol and Fern (1996) discovered that participants in groups find the experience more stimulating. The latter point moves the balance of the argument towards the appropriateness of group interviews to achieve the research objective of ascertaining or validating attributes. This is because the nature of a decision like eating out involves the encouragement of discussion and active participation. In this case, the focus groups enhance spontaneity, interaction and encourage respondents to open themselves to others and share their views (Sofaer, 1999; Tausch and Menold, 2016). For attribute development, a focus group is a technique with ample applications, particularly for commercial purposes (Sayadi, Errach and Parra-Lopez, 2017).

It is also natural to prefer focus groups to personal interviews in the case of restaurant selection, as it simulates the act of eating out, in which we meet and talk. In this line of thought Agar and McDonald (1995, p. 80) described focus groups as ‘somewhere between a meeting and a conversation’. Eliciting attributes when eating out should be rich and look into the complex aspects of the decision, something that a focus group surely captures (Kamberelis and Dimitriadis 2011). Overall, in quantitative research where scientific hypotheses need testing, a focus group is an appropriate, stimulating research method to precede the quantitative stage (Calder, 1977). The author conducted four focus group interviews with respondents that qualified due to some pre-determined criteria.

Analysing qualitative data using Thematic Analysis

Thematic Analysis, the foundational method for qualitative analysis has flexibility as one of its main advantages (Braun and Clarke, 2006). This is an important advantage for eliciting themes that may lead to attributes and levels, particularly important in developing initial themes. Vass *et al.* (2017) referred to the term “thematic synthesis” as another possibility to analyse qualitative data for attribute development. Thomas and Harden (2008, p.2) argued that the pursuit of synthesis in qualitative research means “stepping into more complex and contested territory”. The author suggests that authors may use thematic synthesis as a more elaborate version of thematic analysis. However, for the sake of simplicity thematic analysis is illustrated here.

Interestingly, Braun and Clarke (2019) introduced the notion of iterations of thematic analysis. This is very pertinent to attribute development. These authors argue that meaningful knowledge production is attained through these iterations. These iterations, in turn, encode epistemological assumptions. This paradigm is reflected in the considerations of the method for attribute development to be proposed in this paper. This reinforces the idea that the development of themes (in this case attributes) should be rigorous and methodical (Nowell, Norries, White and Moules, 2017). When ascertaining attributes and levels, it is necessary to conduct a semantic analysis such as in this research. Thematic Analysis is also flexible enough for that purpose (Esfehiani and Walters, 2018). Indeed, the method delves with nuances in the data, both of explicit and implicit nature (Guest, MacQueen and Namey, 2012).

Attribute development can be context-based. In this case it could mean that attributes may depend on the occasion for eating out or the type of restaurant to choose. The definition of a control variable is of paramount importance in many contexts. This control variable in consumer research can be defined as a variable that the marketer can manipulate (Czellar, 2003). It was found that in the context of eating out, the centrality of occasion is repeatedly discussed in the literature (June and Smith, 1987; Kivela, 1997; Mehta and Maniam, 2002; Longart, Wickens and Bakir, 2016). This confirms the assertion that consumption varies according to the occasion (Reynolds and Gutman, 1988). There are two approaches regarding the consideration of context for attribute development. The first approach is to provide a clear context at the start. For example, the respondent should be requested to make choices of a restaurant for a romantic dinner or to choose a place to buy a suit for work (as opposed to a celebration). The second approach will be to develop a large number of attributes in the qualitative stage. Later, in the DCE, the respondent can be given the choice to reduce the number of attributes to consider. The researcher used Adaptive Choice Based Conjoint (Sawtooth Software ©) as the software of choice. ACBC allows the respondent to reduce the number of attributes to consider and this facility is very useful for attribute reduction.

Applying the constant comparison method

First, the attributes from the literature were analysed and classified into categories of attributes. The process for determining the categories of attributes followed the model proposed by Longart, Wickens and Bakir (2018). A process of refinement of those attributes followed. However, this term seems too vague as explained by Boeije (2002, p. 393): “the literature does not make clear how one should go about constant comparison, nor does it address such issues as whether types of comparison can be distinguished”. An exception is the process of several refinements described by Dye, Schatz, Rosenberg, and Coleman (2000) using the analogy of a kaleidoscope of data. It is important to note that the approach used by Dye *et al.* (2000) is an enlightening constant comparison analysis tool rather than an entirely new technique. This process has been developed even further, and it is called iterative categorisation (IC). Iterative categorisation is a systematic technique that “supports common analytical approaches such as thematic analysis, framework, constant comparison, analytical induction, content analysis...” (Neale, 2016). In the case of complex data, it is suggested that using this technique could lead to more insightful results. For simplicity, the researcher used the constant comparison method for attribute development instead. This meant comparing the attributes from the literature review with the attributes developed from the focus group. The categorisation of attributes as a previous step can aid in identifying which attributes are more important to consider. In the case of eating out there are several models that deal with restaurant attributes. A comparison of these models will result in a considerable number of attributes, many of them semantically similar. These attributes can be divided into sets. For selecting attributes, the first step is to follow the principle of inclusion-exclusion, a counting technique relevant to attribute development. With this technique, elements of a specific set are counted so that they satisfy some criteria. It is important to note that elements are not always mutually exclusive (Talwanga, 2008). Some articles have shed light on using the principle of inclusion-exclusion in attribute development. A notable and recent paper by Aij and Teunissen (2017) explained the process comprehensively. In the count of attributes, attributes from the literature review and the focus group interviews should be aggregated. A word of caution is necessary here. The principle of inclusion-exclusion applied to attributes



should be approached as an interpretivist endeavour, based on the researchers' interpretation of data (Sandelowski, 1993). Nonetheless, the process should be transparent and fully justified. Some attributes, emerging from the focus group may not feature in the literature review, but should be included (Miles and Huberman, 2014). This is a normal occurrence as primary data has more currency. The inclusion rule should be applied carefully by the researcher. If an attribute only emerges from interviews, it should not be discarded as it could show a trendy attribute, worth of investigation. Comparing findings from both primary and secondary research allows for a greater accumulation and richer comparison from different studies (Zhang and Wildemuth 2009). The author suggests that the process should be iterative for enhanced clarity and simplicity, without overwhelming details (Tesch, 2013).

Attribute development and reduction: the case study of restaurant attributes.

Attribute development

The combination of literature review with focus group interviews allowed for the identification of key attributes that would have been overlooked by traditional exploratory approaches. For example, in the literature, there are confusing terms with regard to what a restaurant looks like; some define it as interior (Anderson and Mossberg, 2004), and it should not be confused with ambiance which is a broader term than appearance which entails only a visual perspective. Some respondents in the focus groups elicited the term appearance (not found in the literature in this particular context) and some connected it with the term cleanliness. The attribute cleanliness-hygiene has been mentioned in the literature and is one of the elements of the meal experience model (Campbell-Smith, 1967). Some studies have found that cleanliness is not critical for the decision to select a restaurant. Nonetheless, respondents elicited the attribute in the interviews. Because of that, it was decided to combine it into the attribute "restaurant appearance and cleanliness" which resulted in its being an important attribute when tested in the quantitative stage. In addition, the qualitative stage allowed for having clearer terms for the attributes and features of the attribute that were elicited in the analysis made up part of the levels of the attribute. For example, attributes related to location were "parking", "convenience" or "location". The levels of the attribute "location" were elicited from the focus group interviews and these were parking and public transport availability as features of "location". Likewise, in terms of service-related attributes, another category of attributes, the literature refers to terms like "speed of service" (Law, To and Goh, 2008, Harrington *et al.* 2013), "waiting time" (Canarozzo-Tinoco and Duarte Ribeiro 2010) or "less time in serving" (Upadhyay, Singh and Thomas 2007). The focus group referred to "waiting time for seating" and "waiting time to be served food". The term "timing" was preferred, as it seems to encompass all of this. It is more precise than "less time" (not necessarily what customers may be looking for) or speed because a meal in a restaurant is not deemed to be about speed but correct timing (here the researcher acknowledges his own input in the data based on his restaurant experience).

Attribute reduction

In the context of health economics, Marshall, Hauber and Cameron (2010) found that studies used between three and seven attributes with four levels. More generally, typical discrete choice studies in practice would not cover more than twelve attributes with a maximum of seven levels (Sawtooth Software, 2009). That is why, a reduction of attributes in the qualitative

stage was fundamental for an efficient DCE design. The combination of the methods enhanced constant comparison analysis, including literature review and attribute reduction in the DCE, thus outperforming traditional exploratory approaches due to its thoroughness. This is because it balances “the complex and nuanced findings produced by qualitative research and the reductiveness associated with attribute development” (Coast *et al.* 2012). In order to offer a clear illustration of the method, the example of one category of restaurant attributes is provided in table 1. Table 1 shows the attributes from various empirical studies (literature review) about these attributes.

Table 1. Food and drink related attributes: literature review summary

Law (2008)	Harrington <i>et al.</i> (2010)	June and Smith (1987)	Lewis (1980,1981)	Anderson and Mossberg (2004)	Auty (1992)	Cannarozo-Tinoco and Duarte-Ribeiro (2012)	Upadhyay <i>et al.</i> (2007)
Portions	Food safety	Liquor availability	Menu variety	Food	Food type	Food attributes	Menu
Variety	Variety	Food quality	Food quality	Fine cuisine	Food quality	Drink attributes	Innovative recipe
Quality						Menu	Specialised cuisine
Presentation						Wine list	Only vegetarian
						Portion sizes	

These attributes were then compared with the focus group (column 1 in Table 2).

Table 2. Process of refinement of restaurant attributes

Focus group	DATA REDUCTION (Constant Comparison analysis)	COMBINING ATTRIBUTES (Constant Comparison analysis)	FURTHER REDUCTION WITH DOMAIN ANALYSIS	FINAL REDUCTION AND RENAMED AS (DOMAIN ANALYSIS)	Discard option (*)
Variety of food	Variety	Options (vegetarian, specials)	Variety of menu and options (vegetarian, specials)	Menu options (Variety of dishes)	FIXED
Presentation	Presentation	Cuisine type (authenticity, innovativeness)	Savouriness and freshness (quality) Combination of favours (quality)	Quality of food	FIXED
Portion sizes	Innovative (unusual)	Variety of menu	Liquor availability	Range of beverages	(*)
Vegetarian options	Portion sizes	Portion Sizes	Presentation	Presentation of food	(*)
Alcohol availability	Liquor availability	Presentation	Portion sizes	Portion sizes	(*)



Nutritional aspects	Type of cuisine (authenticity)	Savouriness and freshness (quality)
Authenticity	Vegetarian options	Combination of flavours (quality)
Freshness (quality)	Specials availability	Liquor availability
Combination of flavours (quality)	Savouriness (quality)	
Savouriness (quality)		
Unusual		
Specials		

Several studies recommend a variety of quantitative methods for attribute reduction. Essers *et al.* (2010) used a questionnaire with Likert scales that respondents in focus groups had to answer. The questionnaire can also have simple rank ordering questions applied to focus groups (Morgan *et al.*, 2000). Webb *et al.* (2021) used Best-Worst scaling as a strategy to reduce the number of attributes. Three stages of reduction are proposed in table 2. The final reduction shows five attributes. For the further quantitative stage, respondents can further reduce the number of attributes, hence, the author used the term “fixed” for attributes that all respondents will consider. The term “optional” is used for attributes that respondents can choose whether or not to include in the final consideration list. That can be seen in the last column as the “discard option”. The asterisk symbol * indicated an “optional” attribute. Otherwise it is termed “fixed” and the respondent cannot discard it in the questionnaire previous to the DCE. For example, the literature review and focus groups included the attribute “variety of dishes”. Furthermore, “variety of dishes” is an attribute in which ascertaining levels is more straightforward. For instance, it can range from high variety to low variety. Because of these two factors that simplify ascertaining levels, and the fact of their inclusion in both literature and focus groups, the researcher decided to keep it as a “fixed” attribute. “Food quality” was mentioned as the most important attribute in the literature and, in the focus group, there was even more detail about what was meant by food quality (freshness, savouriness, etc.) hence this was the other “fixed” attribute. As per the other “optional attributes”, “presentation of food” seemed a salient attribute and so was the attribute “portion sizes”. The attribute “beverages” was mentioned as “availability of beverages”; it was deemed necessary to change the term availability because of its dichotomous nature (available or not available) to “range of beverages” as it allows for the development of several levels as in the case of menu variety. The final list of attributes counted fourteen (14) attributes –of which five are fixed-; there were nine optional, from which respondents could select five (5) for consideration in the quantitative stage.

The author suggests that this level of detail should be provided in studies conducting qualitative research as a previous step of a DCE for enhanced clarity and transparency.

The author’s proposal for consumer researchers.

Step 1: Define the goal and the context of the research. The example given here is the selection of a restaurant for leisure. Then, define the control variable. In this case, occasion for eating out. This provides a clear picture for the respondent.

Step 2: Define categories within attributes, using a pre-determined model or data emerging from the interviews. This helps for attribute identification and further selection. In this case, the classification of attributes of Longart *et al.* (2018) was the basis for selection.

Step 3: Conduct a comprehensive review of the literature regarding attributes and compile a full list of attributes. You need to account for possible regional or cultural differences in the particular context. Do not discard any attribute at this stage.

Step 4: Conduct qualitative research (focus groups, personal interviews, expert panels, etc.).

Step 5: First data reduction stage. Compare the results of the interviews against the literature. Discard those hardly discussed in the literature and not mentioned in the interviews. However, do not use counts as the basis for selection, but an interpretive approach (this also applies to steps 6 and 7).

Step 6: Secondary data reduction stage. Try to combine attributes wherever possible. If that is not possible reconsider the number of attributes, and follow the recommendations (normally do not exceed 12 attributes). Use constant comparison analysis.

Step 7: Third data reduction stage. Look at the resulting attributes from step 6. Attempt further combinations if these are possible, otherwise go to step 8.

Step 8: Semantic analysis. This is about rewording attributes. The researchers, peers or experts can conduct this analysis. Derive the final list of attributes.

Step 9: (optional, further reduction using a questionnaire): You need to decide the size of the full profile to present to respondents. In this case, it was 10 attributes (20 concepts), but you can decide for a smaller number. If your DCE software allows for further reduction, through a questionnaire, decide which ones will be “fixed” (presented to all respondents) and which will be “optional” (selected by the respondent) for further consideration in the DCE.

Conclusions

In the first place, the author agrees with the argument of Coast *et al.* (2012) that combining literature review with focus group interviews results in richer attributes because they are based on more complex and nuanced data. Coast *et al.* (2012) also stated that even with qualitative methods, attributes may be misspecified. In order to avoid this, it is recommended that researchers conduct a thorough and complete literature review. Nonetheless, there is always a discretionary element when including the attributes to be tested. In that respect, having the possibility of reducing the number of attributes at a preliminary stage in the questionnaire aids attribute validation, but still does not eliminate that risk. In the example of restaurant attributes, the inclusion of range of drinks in the DCE resulted in an attribute with remarkable low importance for all occasions. It is suggested that for more accurate development of attributes an exploratory quantitative stage could take place. Results from this exploratory quantitative stage may be considered alongside the results of the qualitative stage. In addition, as in the study of Abihiro *et al.* (2014) a panel of experts could also be part of the qualitative stage. This is because these experts may add currency to attributes that are trendier.

It is agreed that as pointed out by Coast *et al.* (2012), there is a contrast between the usual expansive nature of qualitative analysis and the necessary reductiveness of attribute development. Nonetheless, it appears that the method proposed, based on the application of



the constant comparison method, offers a first contribution with regard to this effort, but obviously much more work is necessary.

To some extent, this paper materialises the aspiration of Coast *et al.* (2012) about determining market segments for DCE experiments. In the study, the control variable of “eating out occasion” appeared particularly relevant. This was validated in the quantitative stage in which significant differences in preferences were found for different occasions.

This paper offers the following contributions to marketing research and in particular to DCEs:

1. It offers a reader-friendly justification of why DCEs should be used when studying stated preferences, and compares alternative methods. It is aimed at novice DCE researchers.
2. The paper offers a rigorous but practical procedure for the reduction of attributes, using a constant comparison method developed by Dye *et al.* (2000).
3. The rich development of attributes combining the results of the literature review with the attributes elicited from the focus group interviews resulted in a comprehensive list of attributes. This method provides the basis for having a wider base of attributes that need further refinement and reduction.
4. The method also proposes employing questionnaires for further attribute reduction when the resulting number is unduly long for a full profile consideration. The literature recommends a number of methods including Likert Scales or Best Worst-Scaling. The author suggests that it is more straightforward to use the option in the DCE software for the elimination of attributes.

Finally, this paper is considered a further contribution to the works of Coast *et al.* (2012), Helter and Boehler, 2016 and Vass *et al.* (2017). It has aimed to answer some of the questions raised in these papers and makes a clear proposal for the rationale of attribute development in the specific context of consumer research, particularly in the service industry, extending it from the restaurant industry, which was used to illustrate the points.

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