Understanding preferences of German flower consumers: the desire for sustained beauty

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Abstract

Purpose – The purpose of this paper is to provide insights for flower retailers, horticultural practitioners and marketing managers into the prioritisation of cut flower attributes by German residents.

Design/methodology/approach – Applying a best–worst scaling approach, this analysis identified the relative ranking of importance amongst product attributes relevant to German consumers when buying fresh cut flowers. A latent class analysis determined four flower consumer segments for further study. The study builds on a sample of 978 consumers and is consistent with the most recent German census in terms of age, gender, income and federal state.

Findings – The best-worst analysis showed that intrinsic flower attributes, in particular appearance, freshness and scent were found to be more important to German consumers than the extrinsic attributes studied, namely, price, country of origin and a certification indicating fair trade. The latent class analysis determined four consumer segments that desire either budget, luxury or ethical flowers or more information about flowers. For all identified consumer segments, appearance was the attribute of greatest importance. The segments that desired luxury or ethical flowers, as well as the segment that desires more information were interested in appearance, but also had relatively large shares of preferences dedicated to flower freshness guarantees. The preference for freshness guarantees in addition to appearance may be interpreted jointly as a desire for not only beautiful and aesthetically pleasing flowers, but for sustained beauty.

Originality/value – Internationally, the study fills a research gap by exploring consumer's relative preference for cut flower attributes. In contrast to existing studies on consumer preferences for flowers in Germany, the present study builds on a sample that was targeted in terms of age, gender, net household income and federal state to the most recent German census.

Keywords Latent class analysis, Best-worst scaling, Cut flowers, Flower marketing

Paper type Research paper

Introduction

Fresh cut flowers are meant to beautify living and business environments and have long held sentimental value for consumers around the world. Besides personal use, cut flowers serve as gifts expressing affection, thankfulness, sympathy or status (Palma *et al.*, 2011; Rihn *et al.*, 2011; Huang and Lin, 2015). Flowers are present at nearly all culturally significant or personally meaningful events, including births, weddings and funerals (Shoemaker and Relf, 1994).

From an economic standpoint, when considering production and trade, flowers are an important product for many developing countries, such as Kenya and Ethiopia, for advanced developing countries, e.g., Brazil (Bundesministerium für Ernährung und Landwirtschaft (BMEL), 2017), as well as developed countries such as the USA (Yue and Behe, 2008; Palma and Ward, 2010; Rihn *et al.*, 2014), the Netherlands (Tavoletti and te Velde, 2008) and Germany (Gabriel and Menrad, 2013; Krause *et al.*, 2014; BMEL, 2017). In Germany, the overall size of the market for fresh flowers and other ornamental plants was 2.2 million euro in 2017 (BMEL, 2017, p. 48). Domestic flower production in Germany is fairly small and therefore the German market relies heavily on imports from other countries (BMEL, 2017, p. 49, Zentrum für Betriebswirtschaft im Gartenbau, 2014, p. 1; Dirksmeyer and Fluck, 2013). Cut flowers are imported mainly from the Netherlands, the major trade hub of cut flowers, and from developing countries, such as Kenya, Ethiopia and Ecuador (BMEL, 2017, p. 49, UN Comtrade, 2017).

Flowers, similar to other consumer goods, are comprised of various product attributes, which may have varying levels of importance for consumers. For example, attributes of cut flowers that consumers may be interested in include colour, shape, scent, type of flower and length of shelf life (Huang, 2007; Yue and Hall, 2010; Yue, Dennis, Behe, Hall, Campbell and Lopez, 2011). Compared to other agricultural products flowers are similar in their nature. Flowers are as perishable, as are many food products, and in analogous manner, consumers may be not only interested in product attributes related to the physical aspects of flowers (intrinsic attributes, e.g. appearance and scent). Intrinsic attributes are attributes inherent to the flower (Espejel *et al.*, 2007). Consumers will also consider attributes related to the product but not to the flowers' physical properties, which are called extrinsic attributes (e.g. price and packaging) (Bernués *et al.*, 2012; Espejel *et al.*, 2007). Extrinsic attributes are often related to the production and trade of flowers. For agricultural products, consumers tend to be most interested in attributes related to the production process (Olynk *et al.*, 2010; Sackett *et al.*, 2013).

Consumer preferences for cut flower attributes have been intensively studied in the USA, resulting in appearance, price, branding, product labelling, longevity and country of origin as important product attributes (Behe *et al.*, 1999; Yue and Behe, 2008; Rihn *et al.*, 2014). Many of these prior studies focussed exclusively on one attribute. However, when consumers decide on purchases, they have to consider product alternatives containing bundled product characteristics, which forces them to make trade-offs (Tonsor, 2011). As a consequence, product attributes, typically considered individually prior studies, need to be considered in bundles to better understand consumer preferences.

Preferences of German flower consumers are not yet well documented. German consumers spend approximately 37 euro per capita on cut flowers annually (BMEL, 2017, p. 55), but deeper insights into their buying behaviour are limited. Recent studies classified German consumers and their plant shopping behaviour, but so far have not taken attribute preferences for cut flowers into account (Gabriel and Menrad, 2013). Therefore, it is unclear whether the market provides flowers closely matching consumers' needs and wants or not. The goal of this research is to understand the trade-offs that German consumers make between product attributes when purchasing cut flowers. Exploring the relative importance consumers place on flower attributes can facilitate informed decision making by flower producers and retailers alike.

Previous analyses of consumer demand for flower attributes

Prior studies of consumer behaviour explore the importance of particular product attributes when choosing flowers and explore how demographic factors may be related to these preferences. Attributes found to be influencing consumer's choice are flower appearance (Hudson and Griffin, 2004; Yue and Behe, 2008), scent (Behe and Wolnick, 1991; Behe *et al.*, 1992), packaging (Hall *et al.*, 2010), country of origin (Hoffmann, 2000; Van Loo *et al.*, 2011), longevity (Rihn *et al.*, 2014), flower certification (Michaud *et al.*, 2013) and price (Yue, Hurley and Anderson, 2011; Michaud *et al.*, 2013). However, while each of these attributes is important to some segment of consumers, the relative levels of importance amongst these attributes are expected to vary across individuals.

The importance of flower appearance has been well researched. Flower colour is particularly essential for consumers (Berghage and Wolnick, 2000; Hudson and Griffin, 2004; Yeh and Huang, 2009; Yue and Behe, 2008). Several US studies found flower appearance to be closely related to consumers' socio-demographic background. Gender, income and age helped to explain differences in colour preferences (Yeh and Huang, 2009; Yue and Behe, 2008). Various studies emphasised that consumers prefer multicolour over monocoloured flowers (Berghage and Wolnick, 2000; Hudson and Griffin, 2004).

With respect to flowers, scent is of importance, since scent is naturally inherent to many flowers, and its absence may lead to consumer dissatisfaction. Behe *et al.* (1992) analysed consumer purchases of floral products in Ohio (USA) supermarkets and showed scent to be an important factor; Ohio consumers favoured flowers with scent over those without. In addition, consumers smelled flowers before purchasing.

As flowers are a fragile product, packaging is a critical product attribute. Floricultural products are often packaged in plastic materials such as plastic foil or containers since flowers need to be kept stable and safe during transport and storage, until they reach the end-consumer (Hall *et al.*, 2010). Besides protection, packaging is a factor in the attractiveness of a product. In this respect, packaging materials and colours play an important role (Underwood *et al.*, 2001; Orth and Malkewitz, 2008; Hota and Charry, 2014; Magnier and Crie, 2015). This is particularly relevant since flowers are often purchased as gifts (Huang, 2007). Because some types of retail, e.g., supermarkets and discounters, lack consumer advice from a florist, packaging has the role of attracting consumers and providing product information (Hota and Charry, 2014; Khan *et al.*, 2017).

Product labelling, including the country of origin, may be perceived as a quality indicator by some consumers, in addition to providing basic information to prospective purchasers (Insch and Florek, 2009). Hudson and Griffin (2004) and Yue, Hurley and Anderson, 2011 identified plant origin as an important product attribute for flowers. Similar to other products for which local production is preferred, both US studies cited showed that consumers preferred ornamental plants produced in their state or country compared to other origins. These findings correspond with recent studies dedicated to other agricultural products, such as meat, oil, wine and coffee, providing further evidence that consumers usually favour the product originating where they reside (Verbeke and Roosen, 2009; Van Loo *et al.*, 2011).

Hoffmann (2000) focussed on the importance of country of origin labels of food items and socio-demographic differences, identifying gender, income and attitudes as main influencing factors. Women, as well as low income consumers, tended to focus more extensively on country of origin than men and high income consumers. In the context of country of origin research the so called "affective component" must be taken into account. The "affective component" refers to a country's image that may influence the product image (Hoffmann, 2000; Klöckner *et al.*, 2013). Consequently, even if consumers are not familiar with the product, they have positive or negative expectations towards the product based on where it was produced. Accordingly, country of origin is an important aspect in cut flower purchases for at least some shoppers.

Besides flower origin, certifications indicating fair production and trade of cut flowers have increased in relevance for consumers. Market data show that since 2011 the turnover for cut flowers which were certified by the organisation "Fairtrade Germany" and sold in Germany increased from 29.69 million euro to 118.83 million euro in 2014 (Statista, 2016a). Consumer preferences for flowers with a certification indicating fair trade are up to present unexplored; studies rather focussed on environmental or sustainability labels (Michaud *et al.*, 2013; Campbell *et al.*, 2015; Yue *et al.*, 2015). However, research on food products, such as chocolate, bananas and coffee, showed fair trade and ethical consumption to be important consumer concerns (Carrigan *et al.*, 2004). Consumers are willing to pay higher prices for several agricultural products with certifications indicating fair trade (Chen and Huddleston, 2009; Ma *et al.*, 2012; Koppel and Schulze, 2013; Carrington *et al.*, 2014).

As cut flowers are a particularly perishable product, freshness and longevity are critical attributes. The vase life of cut flowers can range from 5 to 14 days (Fanourakis *et al.*, 2013; Rihn *et al.*, 2014). Dennis *et al.* (2005) explored US consumers' preferences for freshness guarantees when buying ornamental plants and their respective satisfaction with the product. The study was framed in the context of satisfaction and regret, and showed that freshness guarantees reduced the risks of consumer dissatisfaction. Further products with freshness guarantees appeared of superior quality to consumers (Dennis *et al.*, 2005). Recently, Rihn *et al.* (2014) researched consumer preferences for freshness guarantees of cut flowers among US consumers. The authors considered different outlets, such as specialized flower shops, grocery stores, club stores, farmers' markets and nurseries. Results showed a high relevance of place of purchase for consumers' expectations of and preferences for freshness guarantees. Freshness guarantees were more important in grocery stores compared to specialized flower shops (Rihn *et al.*, 2014).

As for any kind economic transaction, price is an essential attribute when purchasing flowers (Behe *et al.*, 1999). Many studies have shown the importance of price, since this attribute strongly affects many consumer decisions. The perception of price can be affected by socio-demographic background and personal values of consumers (Rihn *et al.*, 2011; Palma *et al.*, 2011; Yue, Hurley and Anderson, 2011; Huang and Lin, 2015). Consequently, price is an essential part of any economic study (Yue, Hurley and Anderson, 2011; Michaud *et al.*, 2013).
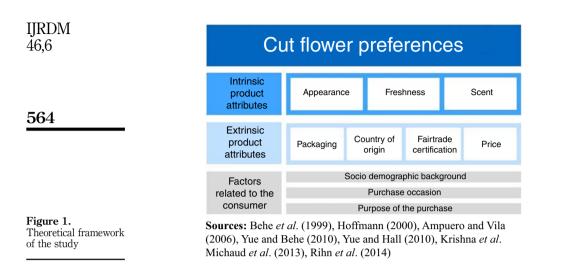
Prior research on consumer preferences for flowers has shown several intrinsic and extrinsic product attributes to be important to flower consumers (see Figure 1). Intrinsic attributes (appearance, scent and flower freshness) as well as extrinsic product attributes (price, packaging, information on country of origin, as well as flower certification indicating fair trade) provide signals to consumers which are used to evaluate flowers. Depending on the socio-demographic background of consumers, purpose of the purchase and purchase occasion preferences vary (Yue and Behe, 2008; Yue and Hall, 2010, Rihn *et al.*, 2011, 2014).

Material and methods
Survey instrument and data collection
The data were obtained from an online survey of a sample of residents of Germany targeted to be representative of the German population in terms of age, gender, monthly net-household income and federal state (see Table II). Respondents had to be German citizens and at least 18 years of age to participate. Online surveys serve as standard instruments for data collection, because the survey response is quick and costs are relatively low (Olynk *et al.*, 2010; Olynk and Ortega, 2013).

The survey was carried out in March 2016 and hosted via Qualtrics at Purdue University and distributed via e-mail by Lightspeed GMI through an opt-in panel. The survey was designed to collect information on buying behaviour of flower products, as well as cut flower attribute preferences and socio-demographic information. Attribute preferences were investigated using a maximum-difference scaling question, also known as best–worst

Figure 1.
Theoretical framework
of the study

Sources: Behe *et al*. (1999), Hoffmann (2000), Ampuero and Vila
(2006), Yue and Behe (2010), Yue and Hall (2010), Krishna *et al*.
Michaud *et al*. (2013), Rihn *et al*. (2014)

scaling (BWS). The best–worst questions were developed to provide insights into relative preferences for relevant cut flower attributes. The attributes investigated were appearance, scent, price, freshness guarantee, country of origin and certification indicating fair trade. These seven attributes were selected as a result of the literature review regarding attributes important to consumers when purchasing flowers. Overall, 1,505 respondents started completing the online survey and a total of 978 respondents completed the entire survey. Survey analysis was conducted using only completed responses.

Best–worst scaling
In 1992, Finn and Louviere introduced BWS (Finn and Louviere, 1992; Erdem *et al*., 2012). BWS builds on the method of paired comparison (MPC) (Thurstone, 1927), and is viewed as a multiple choice extension of the MPC. This approach has often been applied in sensory consumer studies (Jaeger *et al*., 2008). MPC explores trade-offs between paired items, while BWS allows the comparison of more than two product attributes letting the survey respondents choose the "best" and "worst" attributes (Erdem *et al*., 2012; de-Magistris *et al*., 2014). "Best–worst" can also be reworded as "most and least important", or to another expression that is relevant to describe the underlying dimension of interest. The pair of attributes selected as most or least important, results in the maximum difference in preference; therefore, the method is also called maximum difference scaling (Erdem *et al*., 2012).

BWS has been applied in different fields, including various applications in economics and marketing. Flynn *et al*. (2007) applied the technique to health care studies, while Goodman *et al*. (2005), Casini *et al*. (2009) and Mueller *et al*. (2009) analysed consumer preferences for wine attributes. Other studies in agricultural economics have investigated consumers' interest in and preferences for social responsibility, food values and food safety (Auger *et al*., 2007; Lusk and Briggeman, 2009; Erdem *et al*., 2012).

Flynn *et al*. (2007) emphasised that BWS has advantages over other methods measuring preferences, since it is a scale-free approach, and requires the survey respondents to discriminate among the product attributes (Auger *et al*., 2007). The scale-free approach became preferred in the past decade, because it overcomes the issue of scale subjectivity (Baumgartner and Steenkamp, 2001; Goodman *et al*., 2005; Auger *et al*., 2007; Lusk and Briggeman, 2009). Scale subjectivity can lead to biased conclusions, and is considered a problem when eliciting consumer preferences (Lusk and Briggeman, 2009).

Best–worst analysis
According to Finn and Louviere (1992), the probability that a survey respondent chooses a pair of attributes in a particular choice set is proportional to the difference between the "most important" and the "least important" attribute on the scale of interest. It is assumed that the respondent follows three steps. First, all possible pairs of attributes are evaluated. Then, the difference in the underlying dimension (in this case the importance given to attributes of cut flowers) for each pair is evaluated, and finally the pair of flower attributes that maximises this difference is chosen. In this study, survey respondents were shown seven choice sets with four attributes each (see Table I for an exemplary choice set).

In each of the choice sets the survey respondents were invited to choose one attribute which they considered as most important and one which they considered as least important. The latent unobservable distance between the flower attributes j (most important) and k (least important) chosen by respondent i is defined as:

$$I_{ij} = \lambda_j + \varepsilon_{ij}. \qquad (1)$$

In Equation (1), λ_j stands for the location of the attributes j on the scale of importance, and ε_{ij} for the random error term (Wolf and Tonsor, 2013). Accordingly, the probability that pair j, k is chosen by a respondent, where flower attribute j being the most important and flower attribute k being the least important from the choice set, is the probability that the difference between j and k is greater than all other possible differences in the choice set.

The distribution of error terms is set according to Lusk and Briggemann (2009). Assuming the error terms are independently and identically distributed type 1 extreme value, the probability takes the multinomial logit form:

$$\text{Probability} (j \text{ is chosen as best and } k \text{ is chosen as worst}) = \frac{e^{\lambda_j - \lambda_k}}{\sum_{l=1}^{J} \sum_{m=1}^{J} e^{\lambda_l - \lambda_m} - J}. \qquad (2)$$

As the probability calculation in Equation (2) shows, the parameter λ_j can be estimated with maximum likelihood estimation and represents the importance of attribute j relative to the attribute ranked least important (identified *ex post*), normalised to zero, to avoid the "dummy variable trap" (Lusk and Briggeman, 2009).

The multinomial logit model (MNL) assumes that respondents have homogeneous preferences for cut flower attributes. Since it is more likely that preferences vary across consumers, a random parameters logit (RPL) was implemented in order to explore preference heterogeneity among consumers. Since results should be consistent with standardized ratio scaling techniques, the share of importance (S) for each cut flower attribute, equal to the forecasted probability of being chosen as j (most important), can be calculated following Lusk and Briggeman (2009) as:

$$\text{Share of importance for cut flower attributes } S_j = \frac{e^{\lambda_j}}{\sum_{k=1}^{J} e^{\lambda_k}} \qquad (3)$$

Attribute	Most important	Least important
Scent		
Freshness guarantee		
Price		
Country of origin		

Table I.
An exemplary choice set shown to the survey participants

In addition to mean shares of preference for the entire sample, individual-specific preference shares were estimated for each respondent by utilising individual-specific coefficients from the RPL. The share of preferences for all seven cut flower attributes investigated must sum to 1.

One particularly useful way to represent consumer preferences for retail products is a latent class model (LCM) (Train, 2003). Respondents are sorted into a number of classes where preferences are homogenous within a given class and heterogeneous between classes (Boxall and Adamowicz, 2002). The LCM model is especially useful because consumers are grouped together into classes and can be studied as a segment of consumers rather than as individuals. Individual respondents are both (probabilistically) assigned to a latent class and simultaneously parameters for each class are estimated during the estimation process (Swait, 1994). Assuming a respondent belongs to a specific latent class, denoted as s, the conditional probability of that respondent's choices is:

$$\left(\text{Prob}\,(j = \text{best} \cap k = \text{worst})/s\right) = \frac{e^{\lambda_{js}-\lambda_{ks}}}{\sum_{l=1}^{J}\sum_{m=1}^{J}e^{\lambda_{js}-\lambda_{ks}}-J}, \tag{4}$$

where λ_{js} and λ_{ks} are class-specific parameters (Ouma $et\ al.$, 2007). Classes are unobservable and the probability of membership in a class takes the MNL form:

$$\text{Prob}(s) = \frac{e^{(\theta_s Zk)}}{\sum_{s=1}^{S}e^{\theta_s Zk}}, \tag{5}$$

where Zk is a set of factors hypothesised to drive class membership and θ_s is a parameter vector normalised to zero that characterises the impact the drivers have on class membership (Ouma $et\ al.$, 2007). Because parameter estimates are not intuitive to interpret, preference shares are calculated to facilitate the ease of interpretation. The shares of preferences are calculated as:

$$\text{Share}_j = \frac{e^{\lambda_j}}{\sum_{k=1}^{J}e^{\lambda_k}} \tag{6}$$

Preference shares provide a more intuitive means of analysing relationships between the attributes explored than coefficient estimates (Wolf and Tonsor, 2013). The shares must sum up to one across the six attributes. In the case of the LCM, the preference share for each attribute is the forecasted probability that an attribute is chosen as the most important (Wolf and Tonsor, 2013).

Results, discussion and implications
Demographics and flower purchasing habits
Consistent with the most recent German Census (2011), the sample of the respondents consisted of 48 per cent men and 52 per cent women. The largest share of survey respondents was between 30 and 49 years old and had a degree from vocational training. Low to medium range incomes (1,500 euro to below 2,000 euro; 2,000 euro to below 2,600 euro; 2,600 euro to below 3,600 euro) were prevailing in the sample. According to the German Census (2011), approximately 26 per cent of the population did not obtain a professional qualification, and around 17 per cent obtained at least a bachelor degree or higher (Table II). As is common in surveys conducted online (see Cummins $et\ al.$, 2016; Byrd $et\ al.$, 2017) education levels of the sample obtained differed slightly from the German Census (2011) target.

In the sample collected and analysed approximately 41 per cent of respondents belonged to the graduate population, whereas 4.5 per cent did not obtain any form of

Variable description	Survey (% of respondents)	Census (% of population)
Gender		
Male	48	49
Female	52	51
Age		
18–29 years	17.5	17.1
30–49 years	35.3	34.1
50–64 years	24.9	24.3
65 years and over	22.3	24.6
Net household income		
Less than €900	7.8	7.6
€900–below €1,300	9.7	9.5
€1,300–below €1,500	5.9	5.7
€1,500–below €2,000	15.4	15.6
€2,000–below €2,600	18.2	17.7
€2,600–below €3,600	19.4	21.2
€3,600–below €5,000	15.5	15.1
€5,000–€18,000	8.0	7.6
Education		
No professional qualification obtained	4.5	26.7
Apprenticeship	43.1	46.2
Degree from a technical college	9.9	10.6
Degree from a professional academy	6.4	1.5
Polytechnic degree (diploma, bachelor, master)	13.1	5.8
University degree (diploma, bachelor, master)	19.6	7.9
Doctoral degree	1.9	1.3
Other forms of qualification	1.5	Not applicable

Notes: $n = 978$. According to: Census Germany (2011) and German federal income and expenditure survey (2013)

Table II.
Sample Demographics

professional qualification. Thus, the sample obtained, like many other online samples, is slightly more educated than the population targeted.

In addition to the demographic characteristics, respondents provided information on their flower purchasing habits (Table III). In total, 79 per cent of respondents stated that they had purchased cut flowers in the past 12 months.

As the purpose for their purchase, 61 per cent emphasised gift giving, followed by 38 per cent who stated that the purchase was for themselves, and only 1 per cent used cut flowers for businesses purposes. The majority of the cut flower buyers reported expenditures in a range from €132 to €240 per year (€11–€20 per month). The reported flower expenditures are slightly lower than previous findings by Gabriel and Menrad (2013) showing annual expenditures for flowers and plants in a range from €234 to €304 for consumers from Southern Germany. However, these expenditures did not cover exclusively cut flowers, but included other types of ornamental plants. Further, Gabriel and Menrad's (2013) study focussed on the wealthier German states (Statista, 2016b).

Preferences for flower attributes

Results from the MNL and RPL analysis (see Table IV) show that respondents, at the mean, emphasised the attributes appearance and freshness guarantee, compared to scent, price packaging, country of origin and a certification indicating fair trade as factors they consider important when purchasing cut flowers. As the specific factor's utility parameters from the MNL and RPL models have no meaningful interpretation by

Variable description	Survey (% of respondents)
Cut flowers purchased in the past 12 month (n = 978)	
Yes	79
No	21
Purpose of the purchase (n = 733)	
For myself	38
As a gift	61
For business	1
Average monthly expenses for cut flowers (n = 733)	
Less than €5	17
€5–€10	27
€11–€20	28
€21–€30	16
€31–€40	6
€41–€50	3
More than €50	2

Table III.
Cut flower purchase behaviour of survey respondents

| Flower attributes | Econometric estimates | | | Share of preferences | |
	MNL	RPL Coefficient	SD	MNL (%)	RPL (%)
Appearance	2.480**	3.939**	1.354**	39.0	53.5
	0.041	0.073	0.072		
Scent	1.309**	2.094**	1.085**	12.1	8.5
	0.0365	0.058	0.057		
Price	1.128**	1.680**	1.981**	10.1	5.6
	0.036	0.067	0.068		
Country of origin	0.049	0.057	1.924**	3.4	1.1
	0.034	0.066	0.075		
Certification indicating fair trade	0.999**	1.604**	1.675**	8.9	5.2
	0.036	0.064	0.063		
Freshness guarantee	1.958**	3.184**	1.423**	23.2	25.1
	0.039	0.069	0.061		
Packaging	0	0.00		3.3	1.0

Notes: Individuals made 7 choices and there were 978 individuals, which results in 6,846 observations. **Significant at the 1 per cent level

Table IV.
Multinominal logit and random parameters logit results and derived preference shares

themselves, the corresponding derived preference shares for each cut flower attribute are analysed.

From the RPL model, the mean preference share devoted to appearance was 53.5 per cent and the mean preference share for freshness guarantee was 25.1 per cent. Given the relative size of the preference shares, it can be interpreted as appearance was a bit more than twice as important to respondents as freshness guarantee. Considering that the attribute appearance reflects the ultimate purpose of an ornamental flower, namely, beautification, it is noteworthy that the preference share for appearance is not expressed even more dominantly. In contrast, the preferences for the freshness guarantee are not surprising; consumers seem to have an interest in ornamental products with a longer vase life, as earlier studies have also shown (Rihn *et al.*, 2014). Studies on other agricultural products, such as meat or fresh produce, also show that a long shelf live is a desired product attribute for

consumers (Varela *et al.*, 2005). In the purchase situation, consumers cannot easily evaluate or predict vase life, because freshness of flowers is not readily—or accurately—observed by most shoppers. The inability to discern freshness, and thus predict vase life, by most consumers may explain the relatively high preference share for the guarantee of freshness.

Besides appearance and freshness guarantee, respondents reported scent as an attribute of importance with a mean preference share of 8.5 per cent from the RPL. As consumers use their senses to evaluate product quality, the scent of the product can provide them with an indication of product quality. Indeed, flower fragrance may provide an indication of flower freshness, since older flowers do not usually have a pleasant scent. In line with these results, Behe *et al.* (1992) stated that consumers have the desire to smell floral products before actually buying them. They found that consumers prefer floral products with flower scent to products without any scent. Overall, intrinsic attributes of flowers seemed to have more importance to German consumers than the extrinsic attributes.

From the individual-specific estimates of preference shares, correlations between the size of the preference shares for the seven flower attributes were estimated (Table V). All but three correlations among the individual-specific preference shares were either significant at the 1 per cent or at the 5 per cent level. The strongest correlation observed was the negative relationship between the size of the preference share (relative level of importance) devoted to appearance and the size of the preference share for freshness guarantee (-0.482). Given that these two factors were previously identified as those which consumers picked as the two most important attributes when buying cut flowers (see mean preference shares in Table IV), the trade-off in importance is understandable in this forced trade-off experimental setting.

Other relationships observed were between the size of preference share for scent and packaging (0.417). Both correlations emphasise the importance of intrinsic flower attributes, which involves consumers using their senses, for instance smelling and looking at flowers, when choosing flowers and appraising their quality. If a consumer cannot evaluate flowers by himself/herself, due to limited knowledge and skills (Behe and Wolnick, 1991), the freshness guarantee is a way to overcome this limitation. This holds particularly true, in settings, e.g., online shops, where consumers have no opportunity to inspect flowers before the purchase. The importance of packaging underlines that not only intrinsic attributes are important, but most likely extrinsic attributes, such as packaging, play a supportive role. Colours and material of the packaging should support the natural beauty of the flowers in order to increase the attractiveness of the product (Underwood *et al.*, 2001; Orth and Malkewitz, 2008). Furthermore, the size of the preference share for the attribute freshness guarantee had a negative correlation with the size of the preference shares for all other attributes.

Flower attribute	Appearance	Scent	Price	Country of origin	Certification indicating fair trade	Freshness guarantee	Packaging
Appearance	1						
Scent	−0.226**	1					
Price	−0.360**	−0.072*	1				
Country of origin	−0.213**	0.034	−0.068*	1			
Certification indicating fair trade	−0.342**	−0.035	−0.110**	0.087**	1		
Freshness guarantee	−0.482**	−0.135**	−0.268**	−0.085**	−0.181**	1	
Packaging	−0.244**	0.417**	0.036	0.202**	0.073*	−0.077*	1

Notes: $n = 978$. *,**Correlation is significant at 5 and 1 per cent levels, respectively

Table V.
Pearson correlations amongst preference shares for cut flower attributes

LCM of flower consumers

In addition to an RPL model of preference shares, a LCM was also specified to allow analysis of consumers in groups or segments (Table VI). A model with four classes of consumers was ultimately chosen. The Bayesian information criterion (BIC) has frequently been used to evaluate the fit of LCM models and determine the number of classes that are most appropriate (Boxall and Adamowicz, 2002; Wolf and Tonsor, 2013). Using a combination for the BIC and the size of class membership, a four-class model was chosen. While a model with five-classes was a better fit, it yielded a class with small membership and provided little improvement in the BIC over the four-class model. Likely candidate covariates (gender and high income) were analysed to determine whether or not they were helpful in characterizing class membership, however, none of those tested proved significant.

Class 1, labelled the "I prefer budget flowers" class, contained 26.0 per cent of the respondents with appearance being the most important attribute accounting for 42.5 per cent of the preference share. Appearance was followed by price with 26.5 per cent and scent with 16.7 per cent of the preference share, respectively. This class dedicated relatively less importance to country of origin, certification indicating fair trade, packaging and a freshness guarantee. As members of this class are dominantly focussed on the intrinsic attributes of the flower, which represent the basic product, and on price, they appear interested in budged flowers.

Class 2, labelled the "I prefer luxury flowers" class, contained 32.7 per cent of the respondents with appearance as the most important attribute accounting for 48.6 per cent of the preference share. Appearance was followed by freshness guarantee with 30.6 per cent and packaging with 14.6 per cent of the preference share, respectively. This class appears to be relatively less concerned with scent, price, country of origin and certification indicating fair trade, as these attribute account for less than 3 per cent of the preference shares each. One could argue that scent should have achieved a higher percentage, when considering

| Cut flower attributes | Coefficients | | | | Share of preference | | | |
	Class 1	Class 2	Class 3	Class 4	Class 1 "I prefer budget flowers" (%)	Class 2 "I prefer Luxury flowers" (%)	Class 3 "I prefer ethical flowers" (%)	Class 4 "I prefer more information" (%)
Appearance	3.299**	4.897**	3.693**	1.488**	42.5	48.6	40.9	22.2
	(0.135)	0.185	0.176	0.111				
Scent	2.364**	1.95**	2.356**	0.623**	16.7	2.5	10.7	9.3
	(0.122)	0.121	0.163	0.108				
Price	2.858**	1.796**	−0.584**	1.059**	27.4	2.2	0.6	14.5
	(0.143)	0.12	0.202	0.085				
Country of origin	−0.803**	−0.859**	1.32**	0.815**	0.7	0.2	3.8	11.3
	(0.107)	0.096	0.158	0.094				
Certification indicating fair trade	0.350**	1.255**	2.471**	1.354**	2.2	1.3	12.0	19.4
	(0.125)	0.121	0.189	0.117				
Freshness guarantee	1.731**	4.433**	3.418**	1.295**	8.9	30.6	31.0	18.3
	(0.128)	0.19	0.178	0.101				
Packaging	0	0	0	0	1.6	14.6	1.0	5.0
Class probability					26.0	32.7	16.6	24.7

Table VI.
Latent class results and derived preference shares

Notes: Individuals made seven choices and there were 978 individuals, which results in 6,846 observations. **Significant at 1 per cent level

flowers a luxury product, but in fact high priced cut flowers on the German market such as Strelitzia, Hydrangea or Orchids do not have strongly noticeable smells.

Class 3, labelled the "I prefer ethical flowers" class, contained 16.6 per cent of the respondents and is therefore the smallest class. This class appeared most concerned with the intrinsic attributes of the flowers, but also showed interest in one extrinsic attribute, as respondents devoted 40.9 per cent of the preference share to appearance, 31 per cent to freshness, 12 per cent to certification indicating fair trade and 10.7 per cent to scent. Price and packaging were less important to this class of consumers each accounting for 1 per cent or less of the preference share. Similar to classes 1 and 2, respondents in this class had a stronger interest in the attributes inherent in the product but are also worried about production practices and labour conditions as the underlying aspects of flowers with a certification indicating fair trade.

Class 4, labelled the "I prefer more information", contained 24.7 per cent of the respondents and more than any other class appeared interested in a mix of attributes. Consistent with the other three classes, appearance with 22.2 per cent of the preference share was considered the most important attribute. Appearance was followed by certification indicating fair trade with 19.4 per cent and freshness guarantee with 18.3 per cent of the preference share, respectively. Further, price received 14.5 per cent and country of origin received 11.3 per cent of the preference share, respectively. As the interest in all these attributes is relatively balanced, it appears that respondents have placed relatively equal weight on these factors, which could be reflective of a number of things. On the one hand, consumers in class 4 may not be familiar with cut flowers and may appreciate advice when choosing flowers. On the other hand, perhaps consumers in class 4 are experienced consumers but simply place value on relatively more flower attributes than the other classes, leading to smaller relative preference shares for more attributes in total. The analysis presented cannot accurately determine why respondents probabilistically assigned to a specific class have the preferences they have shared, however, understanding those preferences is valuable for the industry nonetheless.

The comparison of the four classes shows that in all classes, appearance is the attribute that respondents are highlighting. In three classes, namely, class 2, class 3 and class 4, the interest in freshness is also apparent. Appearance and freshness are closely linked by nature, due to physiological processes, e.g., withering, influencing both. Consequently, if the vase life of cut flowers is lessening (because the flowers are aging), the appearance deteriorates. It can be concluded that respondents in these classes would like to avoid dissatisfaction by diminishing flower quality and desire to sustain the beauty of their flowers. In all classes, the intrinsic attributes received the largest share of preferences, but the extrinsic attributes are of relevance to distinguish the classes among each other. The extrinsic attributes can serve as references for horticultural marketers, which allow them to adjust their range of products and to offer floral products with attributes that meet consumers' needs.

Managerial implications
This study presented German consumers' preferences for cut flower attributes, including appearance, scent, price, packaging, country of origin, certification indicating fair trade and freshness guarantee. Results show that the product attributes appearance, freshness guarantee, and scent are more appreciated by German consumers when purchasing flowers than the other attributes studied. However, the attributes price, packaging and certification indicating fair trade are relevant to provide insights into potential marketing strategies.

Marketing managers can use this information to improve flower advertisements in an effort to increase the demand for cut flowers. Marketing campaigns may wish to emphasise freshness guarantees as well as products to extend the flowers' vase life, and other measures

to extend the beauty of flowers for a longer period. Local flower retailers may be able to contribute to consumer education with respect to flower care and prolonging the flowers' vase life while growers and breeders may strive to improve the physical properties of flowers in order to improve freshness and vase life.

With the focus on "sustained beauty" indicating high flower quality, floral retailers may want to emphasise flowers with various attributes are available to contribute to meeting to diverse demands, such as for budget flowers or those grown under certain labour standards. Commercial and public holidays when flower demand increases, such as Valentine's Day, Mother's Day and Christmas, may be able serve as an opportunity for education and communication about flower attributes, as consumers may pay more attention to flowers than at other times. For everyday business, a "sensory corner" where attractive flower arrangements are available, or areas where consumers are invited to rest and read about flowers, as well as look at, smell, and touch flower may be a way to increase consumers' interest in cut flowers by appealing to the attributes, which were found to be relatively most important.

Suggestions for future research
In future research the BWS method could be applied to the samples from other countries to better understand cultural differences in purchasing behaviour related to flowers. Further, the approach could be applied to potted plants, as it is likely that consumers consider different attributes as more relevant due to the more lasting nature compared to cut flowers. The study of Yue, Dennis, Behe, Hall, Campbell and Lopez (2011) could serve as an orientation as it investigated consumer preferences for local and sustainable plants, which are starting to become a trend in Germany, reflected in the introduction of various flower labels.

In addition, exploring German consumers' willingness to pay (WTP) for cut flowers as a gift or for personal use might provide further pertinent information to horticultural practitioners and marketers. Building on the present study it would be interesting to explore individual consumer's WTP for freshness guarantees comparing two scenarios where flowers are bought for personal use or as gifts. Following Yue and Hall (2010), consumers are likely to show heterogeneous preferences, when comparing these two scenarios. Such research could add to prior studies (Yue and Hall, 2010; Rihn *et al.*, 2014) and deepen the knowledge on floral gift giving and demand for sustained beauty. Particular in the gift-giving context, online flower retailers should be included as an alternative outlet, since online retailers have not yet been explored in this context.

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