What Affects Consumption Patterns of Organic and Conventional Products?

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D12, Q13, M3

Summary

Consumers show an increased interest in organic food today and a willingness to pay premium for organic products. In addition to price, changing attitudes and beliefs about food quality affect food choice. This article analyses the impact of attitudes, quality characteristics and socio-demographics on consumption of organic and conventional pork, potatoes and milk. The concept of 'perceived quality' provides the theoretical background. The data come from a consumer survey conducted in Germany in 2004 (n=260). An ordered logit model was used for analysing the data. We observe clear differences in consumers' use of certain quality characteristics as they perceive and evaluate conventional and organic fresh foods.

Keywords: perceived quality, consumption patterns, fresh food, organic, ordered logit model

JEL classification: D12, Q13, M3

1. Introduction

The range and variety of food products in retail markets today present a challenge for understanding consumers' purchase decision-making and consumption patterns. In the selection and consumption of fresh foods consumers' evaluation of quality plays a major role. Because there are few reliable cues to quality (e.g., for "tastiness"), consumers find it difficult to evaluate the quality of fresh and unprocessed food such as vegetables or meat (Bredahl, 2003). For other products and foods, consumers may use brands to assess quality before purchase. In the case of unprocessed food, lacking brands, other factors influence the purchase decision. Consumers use various intrinsic and extrinsic cues to infer food quality (Alfnes, 2004). Beside intrinsic cues such

as fat content and appearance, extrinsic cues, such as price, labels or packaging are becoming increasingly important to consumers. Thus, in order to meet consumers' expectations and preferences, it becomes important for producers to know which quality cues and attributes are relevant and accessible to consumers. And, from a consumers' perspective, certain qualities have to be visible and understandable in order to reduce uncertainty about the product and consumer dissatisfaction (Glitsch, 2000; Grunert et al., 2004). Thus, any effort to differentiate products and promote food quality will only be successful if new or advanced attributes can be communicated to consumers (von Alvensleben and Scheper, 1997).

This article considers the impact of perceived food quality on consumption patterns of fresh foods. Because of the increasing importance of the organic food market, we are interested not only in the quality perception and evaluation of conventional but organic foods as well. Furthermore, we want to analyse how this affects consumption habits taking the approach of 'perceived quality' (Steenkamp, 1990) into account. Market data show that the European and American sales volume of organic products has increased considerably (Verhoef, 2005). For example, in 2000 the German sales of organic products had the value of € 2.05 billion while in 2004 the sales volume adds up to € 3.5 billion. The German market has grown by double digit growth rates since 2003 (ZMP, 2006: 2p.). Accordingly, our objective is to uncover the impact of quality attributes on the consumption of conventional and organic pork, potatoes and milk.

We use an ordered logit model as a framework for identifying the quality attributes that influence consumers' evaluation of food quality. An application to pork, potatoes and milk is made in relation to consumers' consumption frequency of these goods. Data from a household survey conducted in 2004 in Germany (with sample size of 260) allow us to relate consumer behaviour to selected demographic characteristics and to evaluate the role of consumer attitudes, measured through the use of factor analysis.

The paper is organised as follows. Section 2 presents some related literature; section 3 describes theoretical background; the fourth section presents the model, then the methodological background and results are discussed in the fifth section. The last section (6) presents some concluding remarks.

2. Previous Studies

Several recent studies show that consumers generally have a positive perception of organic products (e.g., Roddy et al., 1994; Scholderer et al., 2004). Roddy and colleagues show for Irish consumers that organic food products were perceived to be safer, healthier and more nutritious, considered to taste better than conventional food and to be more environmental friendly. Based on studies reviewed here, the quality cues consumers use include knowledge about production process (organic or not, or other methods), price, and appearance including colour, visible fat and cosmetic damage from insect damage or plant diseases.

Scholderer and colleagues (2004) find consumers expect substantially higher eating quality in pork that was produced in organic and free-range systems. In their study, the participants tasted pork chop samples. Samples labelled 'free-range' or 'organic' were consistently perceived to have higher eating quality than pork chops labelled 'conventional' or unlabelled ones, independent of the actual meat type consumers had tasted. The results suggest that the experience of quality of organic pork may depend on the consumers' expectations. Thus, the credence quality attributes free-range and organic have a positive impact on the quality perception as it influences consumers' experience of the taste of the meat.

Extrinsic quality cues such as place (availability), promotion and packaging as well as the intrinsic quality cue appearance also influence consumer attitudes toward organic products (Roddy et al., 1994; Thompson and Kidwell, 1998; Magnusson et al., 2001; Yue et al. 2006). Thompson and Kidwell (1998) measured consumers' actual choices of organic and conventional

products made in retail outlets, and accounted for effects of differences in cosmetic appearance. The products examined were fresh fruits and vegetables. Their results show a sensitivity of consumers at specialty groceries concerning differences between prices of organic products and conventional products. Households with children were more likely to purchase organic products while more highly educated (graduate or professional degrees) consumers were less likely to do so. Cosmetic damage had a small effect on the probability of purchasing organic products. Yue et al. (2006) find that although consumers are willing to pay more for organic fruit (apples), at increasing levels of cosmetic damage, consumers discount the added premium, even to the point of not being willing to buy fruit with relatively high, although benign, levels of cosmetic damage.

Magnusson et al. (2001) carried out a survey to analyse the attitudes of Swedish consumers concerning organic milk, meat, potatoes and bread. Their results show that university educated people and young respondents had more positive attitudes than their comparison groups toward the purchase of organic alternatives, although among survey participants, the experience quality attribute 'taste' ranked as the most important criterion and the credence quality attribute 'organically-produced' the least important criterion in the purchase decision. Long shelf-life and healthiness were also relatively important. The view that organic products were too expensive and not being widely available were the main reasons for not buying organic. *Roddy et al.* (1994) also found this result.

In a Danish study, Bredahl and Poulsen (2002) showed that consumers defined high quality pork in terms of the experience quality attributes taste, tenderness, juiciness, freshness, leanness and healthiness. A good taste was the most important attribute. The intrinsic quality cues colour and visible fat content were mentioned as important cues of perceived quality, too, and used as indicators of the meat's freshness. The participants preferred lean meat. Meat from

extensive outdoor production was generally perceived to have a higher quality than intensive indoor production.

Finally, Bruhn's (2002) analysis of the long-term development (1984-2001) of the organic food market in Germany shows that most consumers buy organic food occasionally. The most important motivations for buying organic food are health aspects. As health is a predominant value for older customers, the elderly, especially, buy organic food. However, health is a credence quality attribute and needs to be communicated through a source that consumers trust. At the same time, Bruhn argues that the demand of German consumers for organic foods is also influenced by market factors that increase the availability of products or reduce price, such as increasing distribution density, promotion and discounting of prices. As Roddy et al. (1994) and Magnusson et al., (2001) found, although consumers associate positive attributes to organic production, the higher price was a barrier to the actual purchase.

3. Theoretical Background

From a consumer's perspective, food quality is a perceptual and an evaluative construct which is relative to person, place of purchase and purchase situation (Cardello, 1995). To translate consumers' quality perception into physical product and process attributes we require knowledge and understanding of the overall quality evaluation. Furthermore, how this evaluation relates to intrinsic and extrinsic cues, and how these cues relate to physical product and process attributes (Henson, 2000). In this section we explain the meaning of perceived quality, quality attributes and cues and how consumers form quality perceptions and evaluations. Because we differentiate between quality cues and quality attributes in this article, we use the term quality characteristics when referring to both at a time.

3.1 Perception and Evaluation of Food Quality

Following Steenkamp (1990) we use the term 'perceived quality' to stress, that a consumer's quality evaluation is dependent on his or her own perceptions, needs, and motivations. The perceived quality is regarded as an overall one-dimensional evaluative judgement, which is based on the processing of quality cues in relation to relevant quality attributes. Thus, the quality cues become important signals evaluated by consumers.

The relevant quality attributes can be grouped into search, experience and credence quality attributes. Search quality attributes are those that can be evaluated by the customer before the purchase. Experience quality attributes are those that are evaluated after the purchase or after the consumption. And, credence quality attributes can never be evaluated by the average consumer himself; the consumer then has to trust the judgement of others (Nelson, 1970; 1974; Darby and Karni, 1973). In the case of many foods, it is almost impossible for consumers to identify quality of the products prior to purchase (Alfnes, 2004) because these goods are only to a limited degree characterized by search quality attributes. For example, colour is only an imperfect measure of "fresh taste" for fruit. Foods are mainly characterized by experience and to an increasing extent by credence quality attributes. Accordingly, consumers have to form quality expectations when making purchase decisions (Grunert, 2002; Brunso et al., 2004). In the case of experience and credence quality attributes, consumers will try to infer the quality from alternative indicators such as a reliable brand name or certificate (Grunert, 1997).

Quality cues are product characteristics that can be perceived and evaluated by a consumer without consumption (Oude Ophuis and van Trijp, 1995), and are used by consumers in the evaluation of "quality". It is common to differentiate between intrinsic and extrinsic quality cues (Northen, 2000). Intrinsic quality cues refer to physical characteristics of the product, such as colour and odour (Bech et al., 2001, 99). This type of cue is particularly relevant for fresh foods. For example, the appearance of fresh vegetables or meat is clearly an indicator of the

expected perceived quality (Oude Ophuis and van Trijp, 1995). Extrinsic cues are related to the product without being a part of it, e.g. specific labels or price (Verbeke et al., 2005). Extrinsic quality cues are especially useful for marketing activities, because they can be changed without the need to modify the physical product (Oude Ophuis and van Trijp, 1995). Extrinsic quality signals (e.g. a label) have important welfare implications to consumers since their use conveys values to consumers without change in inherent (intrinsic) product qualities (Bonnet and Simioni, 2001).

Steenkamp (1990) developed a model of the quality perception process, and this structure is used as the basis of our empirical work. See figure 1. The model of the quality perception process describes the way consumers form perceptions about the quality of a product in purchase decisions and offers a useful framework for uncovering the effects of quality cues and attributes on perceived quality and on each other. Quality characteristics are identified as intrinsic and extrinsic quality cues, and experience and credence quality attributes. The quality cues are used in the development of perceived quality by the individual. The quality perception process involves three processes: (i) cue acquisition and categorization, (ii) quality attribute belief formation, and (iii) integration of quality attribute beliefs. This process is influenced by personal and situational variables.

We use this structure in sorting the various types of quality cues, and to motivate the important role that various cues play in determining consumers' perceptions about product quality, and hence over product choice in the market.

Insert Figure 1

3.2 Framework for Categorization of Quality Characteristics

In order to identify the main drivers of consumer choice and consumption we make use of an approach used by Oude Ophuis and van Trijp (1995) to categorize the survey's quality

characteristics in a general way. Their approach follows Steenkamp's (1990) conceptual model described above. Intrinsic quality cues involve attributes such as appearance, colour, shape, size and structure; extrinsic quality cues involve attributes such as price, brand name, country of origin, source or nutritional information; experience quality attributes involve taste, freshness and convenience; and credence quality attributes involve attributes that involve support for health, or production that supports naturalness, animal friendliness, the environment or other desired production processes. These examples are by no means exhaustive.

In our application, we use specific food quality characteristics, as structured by Caswell et al. (1998), and expanded by Northen (2000). Based on their approach the quality characteristics are divided into product and process characteristics. Product characteristics are then separated into food safety, nutrition, sensory, functional and image. This category includes characteristics such as hormones, calories, taste or labels. The process characteristics include characteristics such as animal welfare or organic production. We extended the approach by adding a third category, termed "environmental characteristics", to describe the attributes found at the point of sale such as service, cleanliness, added information. These characteristics have a high impact on consumers' perception of food quality as shown by Bruhn and Grebitus (2005). Among product characteristics, we associate the extrinsic cues related to product function and image; intrinsic cues of sensory attributes (appearance and variety) and nutrition content; experience quality attributes/beliefs related to sensory attributes (freshness and taste); and credence quality attributes/beliefs related to food safety attributes. Among process characteristics, we associate the credence quality attributes/beliefs of method of production and product origin. And, among environmental characteristics, we associate extrinsic cues that relate to the point of sale and availability of product information and advice. In the survey, we took this approach to categorize

the characteristics used to explain the impact of certain quality cues and attributes on consumption frequency. (The detail of assignment is presented in Table 3.)

4. The Model

Consumers' willingness to buy (purchase intention) the three different milk products is expressed in frequency of consumption, such as daily, 5-6 times a week, 3-4 times a week, etc. to measure the corresponding latent utilities. Because the respondent variables are categorical instead of quantitative, we use an ordered logit model with robust standard errors to estimate the probability of consumers' frequency of consumption and accordingly making purchase.

Suppose U_i^m is the utility that consumer *i* derives from consuming the product *m* and U_{ij} can be expressed as follows:

$$U_i^m = X_i\beta^m + \varepsilon_i^m; \quad i = 1,\Lambda\ ,n\ ; m = 1,\mathrm{L}\ M \qquad (1)$$

where X_i is the design matrix which is a row vector of the *i*th consumer's characteristics. These characteristics include socio-demographics and quality attributes. β^m is the coefficient associated with X_i. And ε_i^m is the residual error term that is not captured by design matrix X_i. There are *n* consumers and *M* products.

In a survey that asks the respondents' opinion, the respondents' intensity of feelings is dependent on the measurable factors *X* and unobservables. In many situations, the respondents are not asked to respond to *U* directly. Instead, they are given only a set number of possible answers, say six, to the question of *y*. Consumers choose the cell that most closely represents the intensity of response to the question. For example, for product *m*, consumer *i* is asked to choose among the six choices: daily ($y_i^m = 6$), 5-6 times a week ($y_i^m = 5$), 3-4 times a week ($y_i^m = 4$), 1-2 times a week ($y_i^m = 3$), less than once a week ($y_i^m = 2$), and never ($y_i^m = 1$).

The ordered logit model depends upon the idea of the cumulative logit. This in turn relies on the idea of the cumulative probability. Let C_{ij}^{m} denote the probability that the *i*th individual is in the *j*th or higher category for product *m*:

$$C_{ij}^{m} = \Pr ob(y_i^m \le j) = \sum_{k=1}^{j} \Pr ob(y_i^m = k) \qquad (2)$$

Then we turn the cumulative probability into cumulative logit for product *m*:

$$\text{logit}(C_{ij}^{m}) = \log\left(\frac{C_{ij}^{m}}{1-C_{ij}^{m}}\right) = \alpha_j^m - \beta^m X_i \qquad (3)$$

m= conventional pork, organic pork, conventional potatoes, organic potatoes, conventional milk, organic milk.

5. Survey and Descriptive Results

A survey of private households conducted in 2004 provides data on the consumption (purchase and frequency of consumption) of conventional and organic pork, potatoes and milk, and other household characteristics and attitudes. The data were collected in Germany in the capital city of the federal state Schleswig-Holstein, Kiel. All respondents were older than 18 years and lived in private households. The survey was conducted using questionnaire-based face-to-face interviews. The interviews were collected in January and February. The sample consisted of 260 participants (response rate 36%). The sampling method applied was a purely random sample derived from the social address register of Kiel. Table 1 shows the structure of the sample and comparison to the demographic characteristics of residents of the city of Kiel. Based on the comparison, the sample is representative of the residents.

Insert Table 1

5.1 Consumption of Pork, Potatoes and Milk

Survey participants were asked questions concerning their consumption of conventional and organic products, as shown in Table 3. Organic products were consumed much less frequently than the conventional products, which is not surprising. Potatoes were consumed at least 1-2 times a week by nearly 80% of the interviewees. About 50% of interviewees consumed pork 1-2 times a week, and about 40% consumed milk at least 1-2 days a week. Asking for consumption patterns in a questionnaire is more precise than asking for purchase behaviour, because in the latter case you have to take quantities and storage patterns additionally into account. In interpreting the results, we derive purchase behaviour from consumption behaviour.

Insert Table 2

5.2 Consumer Attitudes Concerning Food Quality Attributes

To identify the consumers' attitudes that affect the role that food quality characteristics play in consumption decisions, survey participants received questions from a 27-question item-pool on specific and general food-related attitudes. Each item was evaluated individually. The items were stated in a matter which took those attitude-dimensions relevant for evaluating food quality into account. For the evaluation of the single items we used a 5-point Likert-Scale (5 = I strongly agree, 1 = I strongly disagree) as the measurement instrument to gather the relevant attitudes in a differentiated way.

The set of data on attitudes were analysed by means of exploratory factor analysis for reducing the attribute space from a larger number of more or less highly correlated variables (item pool) into a few unrelated, independent factors. Our criteria for determining the number of factors were principal component analysis (PCA), varimax as the rotational strategy and the

Kaiser criterion. We generated a six factor solution. The explained total variance was 55.02%; the Cronbach's alpha for all factors measured 0.8526.

Through the factor analysis, we found the following factors to measure consumer attitudes:

Factor 1 (F1): Care about production + Mistrust and Scared

Contains the items which express that they care about production methods (e.g. organic) and animal husbandry. Furthermore they are scared and don't trust meat from the supermarket. (Cronbach's alpha: 0.76)

Factor 2 (F2): High price does not mean better quality

Sums up the statements which express that a higher price doesn't mean a better quality in the meaning of food having a better taste or fewer pesticides. Those consumers disagree with the argument that a higher price means a higher quality. (Cronbach's alpha: 0.68)

Factor 3 (F3): Trust in food production

Includes those items regarding the trust in common, conventional food, food producers and production methods. (Cronbach's alpha: 0.44)

Factor 4 (F4): Functional and price orientation

Includes attitudes concerning packaging attributes, as well as the lack of influence of price on food quality and food control. (Cronbach's alpha: 0.72)

Factor 5 (F5): No interest in origin and production methods

Includes those statements which describe the attitudes towards local products, origin and production methods. Price is more important to those consumers than production methods. (Cronbach's alpha: 0.74)

Factor 6 (F6): No health and environmental awareness

Contains those items which show no interest in health or environmental-friendly aspects of food, such as importance of a healthy diet and environmentally friendly packaging. (Cronbach's alpha: 0.53)

5.3 Quality Characteristics for Purchasing Pork, Potatoes and Milk

Table 3 shows the quality attributes we used to identify the main drivers for pork, potatoes and milk purchase and the associated categories of the attributes, based on the extension of Caswell et al. (1998) and Oude Ophuis and van Trijp (1995). The table shows the percentage of participants who thought that the given attribute was important making their purchase decision. These attributes are included in the ordered logit model to evaluate their impact on consumers' consumption and actual purchase patterns.

Insert Table 3

5.4 Consumption Patterns Concerning Conventional vs. Organic Food

An ordered logit model that incorporates the computed factor scores, product attributes and other socio-demographic variable was used to evaluate the consumers' consumption choice. Therefore the six factors (attitude-dimensions F1 – F6) were included in the ordered logit as independent variables, in addition the attributes and socio-demographics are independent variables. The attributes are listed in Table 3. Table 4 shows the definition of the factor groups and socio-demographic variables. The estimation results are reported in Tables 5-7.

Insert Table 4

The table rows (Tables 5-7) are separated into three categories of variables: attitudes toward food quality according to the factor analysis; attributes concerning food quality; and socio-demographics. The columns report the estimated coefficients, standard errors and the respective z-values of the ordered logit model explaining consumption frequency of conventional and organic pork, potatoes and milk. In interpreting the coefficients, we discuss both

consumption and purchase behaviour based on an assumption that consumption and purchase are related. That is, we interpret the impact of the quality attributes and cues on the perceived food quality and consequently on consumption and purchase.

Insert Table 5

Insert Table 6

Insert Table 7

5.5 Discussion of Results

Analyses of the three product groups were statistically significant based on likelihood ratio tests. The Pseudo R^2 ranged from 0.10 to 0.27, with higher values reported for the three sets of estimates for organic products. The values are within a range often found in cross-section consumer studies.

5.5.1 Results for Pork

Conventional pork consumption shows the fewest number of statistically significant attributes of all analysed products. The significant positive attributes are the extrinsic cue of price and the experience quality attribute of freshness. As price is regarded as the most important cue for all products (Zeithaml, 1988), its significance may reduce the use of cues for other quality evaluation. The result on freshness indicates that freshness for (conventional) pork is likely used to cue on intrinsic quality attributes valued by consumers in cooked product. It may also be that the small number of relevant quality cues for conventional pork are due to frequent pork consumers being habitual in their purchase patterns and not requiring many other cues to evaluate the product quality. As freshness is an experience quality attribute it must be inferred by consumers using quality cues. Appearance was significant at 11% level. Hence, we assume consumers' use appearance to infer the pork's freshness. Consumers of conventional pork are those that have attitudes indicating they care less about production method and animal husbandry,

and are not concerned about meat from supermarkets (Factor 1 – F1). That is, those who are scared and show mistrust about the current food production situation consume less conventional pork.

In contrast, several statistically significant factors affect frequency of consumption of organic pork. Among extrinsic quality cues, an attribute that describes the environment of the purchase was statistically significant, the provision of service, advice to have a positive effect on consumption. The positive and significant effect for service and advice is consistent with the fact that most purchases of organic pork occur in specialty shops, where one can find salespersons who give advice compared with traditional food retailers. The credence quality attributes of food safety and organic process both had a positive effect on consumption frequency for organic pork. In contrast, for conventional pork, food safety has a negative effect although it is not significant. Food safety is positively related to the quality evaluation of organic pork. The significance of 'organic' is important as the study uses self-reported recall of consumption behaviour, which might be positively biased as a result of social desirable responses (Verhoef, 2005).

Regarding the socio-demographic effects, although we found no significant results for conventional pork, for organic pork household size, presence of children and education affected consumption frequency. Household size has a significant negative effect and the presence of children in the household has a significant positive effect. These results suggest that parents would like to buy organic pork for their children, however as household size increases they can not afford to buy organic pork as it is reportedly more expensive than conventional pork (ZMP, 2006). Roddy et al. (1994) also suggest larger households chose conventional over organic products because of the higher price of organic foods. Those consumers with a very high education consume organic pork more frequently than those with a lower education. In contrast to

this result, Thompson and Kidwell (1998) found that higher educated (graduate or professional degrees) consumers were less likely to buy organic fresh fruits and vegetables than others.

Again, consumer attitudes have some effect on consumption. The factor representing the consumer attitude that a high price yields no better quality (F2) led to less frequent consumption of organic pork.

5.5.2 Results for Potatoes Consumption

The results for potatoes show that only one environmental quality factor was associated with conventional potato consumption, related to the availability of information in the store. The nutrition characteristics of calories decreased consumption. The significant and positive effect for the 'organic' attribute for organic potato consumption suggests that consumers perceive 'organic' to be a desirable type of product lacking undesirable ingredients such as pesticides or fungicides. The kind of potatoes or variety was associated with reduced consumption frequency of conventional potatoes. This result may be due in part to the relatively small assortment of different potato kinds. Consumers seeking for variety would tend to buy other foods.

Credence quality attributes were relatively important in the choice and frequency of consumption for both conventional and organic potatoes. The subgroup food safety has a relatively large effect. The attribute food safety has a negative significant effect for conventional potatoes consumption. That suggests that consumers concerned about food safety would consume less conventional potatoes. For conventional potatoes the health attribute has a significant positive effect, which could be because potatoes as an unprocessed natural product, is believed to be healthy. Hygiene in the shop / at the counter also plays an important role as a measure of a credence quality attribute. For both conventional and organic potatoes this attribute has a significant negative effect on consumption. The reason could be that potatoes are most often

presented as unprocessed foods in the shop and usually without packaging. Consumers who are more hygiene conscious choose potatoes less frequently.

Other credence quality attributes include attributes related to the process used and location of growing and marketing the potatoes. Organic production methods lead to a significant and positive effect on the consumption frequency for organic potatoes. The origin of potatoes (which may be associated with local origin or not) had a statistically significant effect on the conventional and organic potato consumption. If the consumer was sensitive toward origin, consumption frequency of organic potatoes increased; origin had the opposite effect on conventional potatoes. Potatoes are often local products, which could explain why local will have no additional impact if the consumer assumes the origin to be local in this case (local and origin were correlated with $\rho = 0.45$).

Some socio-demographic variables affect consumption frequency as expected. Older consumers and consumers in larger households consume more conventional potatoes; Education has a positive effect on consumption of organic potatoes. Modest level of education is statistically significant, but all coefficients are positive for the organic potatoes. These results suggest that the higher the education the more organic potatoes will be consumed. Although Thompson and Kidwell (1998) found that higher educated (graduate or professional degrees) consumers were less likely to buy organic fruits and vegetables, we would expect a positive effect, and results may differ by time period and sample (including national differences).

Underlying consumers' attitudes are relatively important in describing consumption of potatoes. Those consumers who care about production and are scared by food scandals (F1) consume less conventional and more organic potatoes. Shoppers who think that expensive food is no better quality (F2) and have a more functional and price orientation (F4) consume more

conventional potatoes. Overall, unconcerned consumers would consume more conventional potatoes and less organic potatoes.

5.5.3 Results for Milk Consumption

Both extrinsic and intrinsic quality cues are significant predictors of milk consumption and consumption frequency. The extrinsic cues related to the functional product characteristic of package size, and image related to brand both increase the frequency of consumption of conventional milk. We note that there is a lot more packaging variety for conventional milk than for organic milk. Consumers who require special sizes such as smaller packs for single households or bigger packs for families may choose conventional milk because they have no similar alternative for organic milk. Milk is the only product with a significant positive effect of brand.

Among intrinsic quality cues, the nutrition information on fat content has a significant negative effect for conventional as well as for organic milk. Concerns about fat intake may lead consumers to choose other beverages than the dairy.

The experience quality attribute related to sensory aspects of freshness has a significant positive effect on conventional milk consumption. Given the perishable nature of milk, freshness would likely be an important quality attribute. Those that put high value on this attribute are more frequent consumers of conventional milk. The related quality attribute shelf life has a significant positive effect on organic milk consumption. Those that are more frequent consumers of organic milk are influenced by the credence quality associated with organic production process and the origin of the organic milk.

Among significant socio-demographics, women seem to buy more organic milk than men. Older consumers buy less organic milk than others. Because organic products in Germany are often sold in specialty shops, it may be that older, less mobile consumers are less likely to

purchase the organic product (Roddy et al., 1994; Magnusson et al., 2001). However, organic milk has the widest product distribution among organic products, so there might be other reasons for not buying organic such as habitual purchase of conventional milk, packaging or freshness.

With respect to consumers' attitudes that underlie consumption decisions for milk, we see that consumers who care more about production methods and hold mistrust on the production system (F1) would buy organic milk more frequently. Those who hold positive attitudes towards functional properties and are oriented to price (F4), those with no interest in production methods and product origin (F5), and those who do not care about health and environmental aspects (F6) are less frequent consumers of organic milk. However, we should note that consumers that consider health and environmental aspects not to be important would consume less conventional milk.

6 Discussion

This research investigated the impact of consumers' attitudes and socio-demographics and certain quality characteristics on consumption patterns of conventional and organic fresh food.

The results confirm among others for conventional **pork** that the extrinsic quality cue 'price' has a significant positive effect. Thus, we can use this for marketing activities (Oude Ophuis and van Trijp, 1995). Promotions that provide special prices work very well if the consumer is price sensitive. Furthermore, the experience quality attribute freshness is used by consumers. This cue is strongly related with appearance which in turn is related to fat content; several studies (e.g. Glitsch, 2000) show that consumers prefer lean meat over marbled meat. Thus, offered meat should rather be lean probably with a higher share of intra-muscular fat to keep the taste. Regarding quality characteristics of organic pork, food safety has a significant and positive effect. However, because this is a credence quality attribute, labels or brand name are required to communicate this.

Regarding the quality characteristics of **potatoes,** food safety and health have significant influence on the quality perception. They are both credence quality attributes and difficult to communicate to consumers. As they seem to be a benefit for customers, it may be possible to communicate this fact by labels such as 'pesticide free'. Hygiene at the counter is a search quality attribute and an extrinsic quality cue. Negative effects exist for both conventional as well as organic potatoes. Therefore, food retailers should think about other ways to sell potatoes. At least the counter should be clean. Another possibility could be to remove dirt or mud from the potatoes before selling them. Calories are intrinsic cues for consumers. Because potatoes do not have nutrition labels printed on their nets or bags (if they are packaged), it is difficult for the consumer cannot access this type of information. Consumers may like to have additional and specific nutrition information. Without correct (updated) information, consumers may make incorrect assumptions about the contribution of potatoes to weight gain. Printing at least basic nutrition information on the label could be a first step to cope with this problem. Kind or variety is an intrinsic quality cue. As there are not that many kinds of potatoes, expanding options or varieties offered could be a solution to increasing consumption.

For conventional potatoes we find that consumers seem to search for information such as recipes or nutritional information. Thus, consumers would eventually consume more potatoes if they had better skills. This is underlined by the fact that the age has a highly significant positive effect on the consumption frequency. Older generations are more used to prepare and consumer potatoes than younger generations.

For **milk,** we found a significant positive effect of the quality cue 'brand'. Certainly, one reason is that potatoes and pork are unprocessed and mostly sold without brands or even packaging. For milk we can count several brands, retailer as well as manufacturer brands. The significance for brand is even higher for organic milk than for conventional milk. This leads us to

conclude that the brand is the cue used by consumers for recognizing the organically produced milk. This shows furthermore that a strong brand could be one possibility to influence consumers purchase decision even for fresh almost unprocessed food.

The intrinsic quality cue fat content has a negative influence on shopping behaviour for milk. We assume this is due to the fact that the tested milks are whole fat milks and health conscious consumers chose to buy skim milk. There are different types of fresh milk, such as skim milk, non fat milk available or UHT milk. However, there are fewer varieties for organic milk. Thus, there may be opportunities for product line extension.

Finally, we find that the credence quality attribute ‘organic’ has a significant and positive effect on consumption of organic pork, potatoes and milk. Organic production communicated through a label works as an extrinsic quality cue and can be used for marketing activities.

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Table 1: Structure of the sample (in %)

Percentage	Total Sample	City of Kiel, Germany
Gender		
Female	56	52
Male	44	48
Age		
18 – 34	40	42 (≤ 34)
35 – 49	23	22
50 – 64	18	18
> 64	19	17
Household		
One Person	29	-
Two Persons	46	-
Three Persons	12	-
Four Persons	10	-
Five Persons	2	-
Children in Household		
With Children	20	-
Without Children	80	-
Age of Children		
0-2	17	9
2-6	22	22
6-12	28	35
12-18	33	34 (older 12)
Concerned with daily shopping		
Yes	70	-
Sometimes	26	-
No	4	-
Education		
Low Education	18	-
Modest Education	27	-
High Education	35	-
Very High Education (University Degree)	19	-
Others	1	-
Household Net Income €		
< 400	7	-
400 – 800	15	-
800 – 1300	13	-
1300 – 1800	19	-
1800 – 2300	11	-
> 2300	18	-
No answer	17	-
N total	260	229,598*
%	100	100

*Source: Buergeramt der Landeshauptstadt Kiel (2002)

Table 2: Frequency of Consumption concerning Pork, Potatoes and Milk

% (n=260)	Conventional Pork	Organic Pork	Conventional Potatoes	Organic Potatoes	Conventional Milk	Organic Milk
Daily	1.2	0.8	6.5	1.9	28.1	3.1
5-6 times a week	2.3	0	12.3	2.7	1.9	0
3-4 times a week	8.8	0.4	31.9	7.7	6.9	1.5
1-2 times a week	40.4	3.5	27.7	18.1	10.4	2.3
Less than once a week	31.9	20.8	15.4	20	17.3	15
Never	15.4	74.6	6.2	49.6	35.4	78.1

Table 3: Quality Characteristics Related to the Purchase of Pork, Potatoes and Milk

Categories	**Attributes**	**Pork**	**Potatoes**	**Milk**	**Further Categorisation**
		Ranked as 'Important' (%)			
Product	Food safety	39.2	20.8	27.3	Credence Quality Attributes
Food Safety	Health	45.4	49.6	48.8	Credence Quality Attributes
	Hygiene at the counter	83.8	31.9	31.2	Credence Quality Attributes
Functional	Packaging design	5.4	13.1	18.5	Extrinsic Quality Cues
	Packaging material	18.8	37.7	46.2	Extrinsic Quality Cues
	Packaging size	24.2	46.2	36.5	Extrinsic Quality Cues
	Shelf life	46.2	30.8	86.2	Extrinsic Quality Cues
Image	Brand	6.2	25.4	20.8	Extrinsic Quality Cues
	Price	61.2	64.2	62.7	Extrinsic Quality Cues
	Labels	43.8	28.8	21.2	Extrinsic Quality Cues
Nutrition	Calories	13.1	8.1	18.1	Intrinsic Quality Cues
	Fat content	36.9	5.0	56.9	Intrinsic Quality Cues
	Fibre content	4.2	14.6	3.5	Intrinsic Quality Cues
	Ingredients	26.5	19.2	27.3	Intrinsic Quality Cues
Sensory	Appearance	72.7	76.9	20.8	Intrinsic Quality Cues
	Freshness	81.5	77.7	78.1	Experience Quality Attributes
	Kind variety	12.7	29.6	10.4	Intrinsic Quality Cues
	Taste	70.0	82.3	58.5	Experience Quality Attributes
Process	Animal husbandry	44.2	–	26.2	Credence Quality Attributes
	Local	52.3	56.9	41.5	Credence Quality Attributes
	Organic	27.7	32.7	19.2	Credence Quality Attributes
	Origin	65.4	60.0	36.5	Credence Quality Attributes
Environment	Clean point of sale	79.6	78.1	73.5	Extrinsic Quality Cues
	Additional information	15.8	11.9	8.1	Extrinsic Quality Cues
	Point of sale	46.5	38.5	38.5	Extrinsic Quality Cues
	Nutrition information	24.2	26.9	10.4	Extrinsic Quality Cues
	Service and advice	44.6	16.9	1.9	Extrinsic Quality Cues

Table 4: Definition of Independent Variables

Variable	Definition
Factor 1 (F1)	Care about production, Mistrust and Scared
Factor 2 (F2)	High price does not mean better quality
Factor 3 (F3)	Trust in food production
Factor 4 (F4)	Functional and price orientation
Factor 5 (F5)	No interest in origin and production methods
Factor 6 (F6)	No health and environmental awareness
Age	Age of the consumer (integer years). (Age squared and log age did not show significant results).
Education	Dummy variables for every category (see table 2). Low education dropped due to multicollinearity.
Income	Monthly household net income. Dummy variables for every category (see table 2). 800-1300 EUR dropped due to multicollinearity.
Household Size	The number of persons in the household.
Children	Dummy variable equal to one if children in the household.
Attributes from table 4	Dummy variables equal to one if the consumer marks it as important/used for purchase of pork, potatoes, milk.

Table 5: Estimation results for ordered logit models for Pork Consumption

		Conventional Pork [b]				Organic Pork[c]			
		Coef.	Std. Err.	z-value[a]		Coef.	Std. Err.	z-value[a]	
Attitudes	F1	-0.88	0.16	-5.60	***	0.29	0.27	1.08	
	F2	-0.13	0.15	-0.86		-0.60	0.23	-2.53	***
	F3	0.22	0.14	1.63		-0.25	0.22	-1.12	
	F4	-0.04	0.17	-0.25		-0.23	0.22	-1.04	
	F5	0.19	0.16	1.22		0.10	0.25	0.40	
	F6	0.15	0.12	1.21		0.08	0.21	0.39	
Categories	Food Safety	-0.15	0.34	-0.43		1.12	0.44	2.54	***
Product	Health	-0.06	0.36	-0.18		0.15	0.55	0.27	
Food safety	Hygiene at the counter	-0.32	0.49	-0.65		1.01	0.81	1.24	
Functional	Packaging design	-0.03	0.85	-0.04		-1.17	1.44	-0.81	
	Packaging material	-0.03	0.51	-0.06		-0.42	0.71	-0.58	
	Packaging size	0.20	0.30	0.68		-0.59	0.53	-1.12	
	Shelf life	0.24	0.29	0.82		0.72	0.48	1.51	
Image	Brand	-0.12	0.67	-0.19		-0.09	0.78	-0.11	
	Price	0.65	0.34	1.93	**	-0.16	0.45	-0.36	
	Labels	0.14	0.36	0.41		-0.41	0.58	-0.70	
Nutrition	Calories	-0.41	0.38	-1.08		-1.31	0.92	-1.44	
	Fat content	0.43	0.34	1.26		0.66	0.54	1.21	
Sensory	Appearance	0.61	0.42	1.44		-0.92	0.62	-1.49	
	Freshness	1.06	0.47	2.24	**	-0.95	0.85	-1.11	
	Kind variety	0.46	0.48	0.96		0.33	0.65	0.50	
	Taste	0.05	0.31	0.16		-0.08	0.54	-0.15	
Process	Local	0.04	0.38	0.11		0.53	0.58	0.92	
	Origin	0.29	0.41	0.69		0.49	0.73	0.67	
	Organic	-0.52	0.39	-1.34		1.49	0.42	3.59	***
Environment	Clean point of sale	-0.20	0.38	-0.54		0.07	0.56	0.12	
	Additional information	0.50	0.44	1.14		-1.02	0.63	-1.62	
	Nutrition information	-0.21	0.37	-0.58		-0.32	0.51	-0.62	
	Service + Advice	-0.02	0.31	-0.07		0.82	0.39	2.09	**
	Point of sale	-0.02	0.31	-0.06		-0.16	0.44	-0.35	
Socio-	Gender	-0.35	0.29	-1.19		-0.21	0.51	-0.42	
demographics	Age	0.01	0.01	1.26		-0.01	0.02	-0.41	
	Household size	0.25	0.18	1.35		-0.61	0.29	-2.09	**
	Child (yes)	0.43	0.51	0.85		1.41	0.71	1.99	**
	Modest education	-0.21	0.42	-0.50		-0.11	0.65	-0.18	
	High education	-0.24	0.52	-0.47		0.48	0.62	0.77	
	Very high education	-0.40	0.55	-0.73		1.24	0.74	1.68	*
	<400 EUR	-0.75	0.88	-0.86		-0.81	0.88	-0.93	
	400-800 EUR	0.05	0.47	0.10		0.11	0.73	0.15	
	1300-1800 EUR	-0.18	0.46	-0.39		0.05	0.77	0.07	
	1800-2300 EUR	-0.70	0.48	-1.46		0.27	0.67	0.41	
	>2300EUR	0.21	0.38	0.55		0.76	0.54	1.41	

[a] Level of significance: ***p<0.01; **p<0.05; *p<0.10.
[b] Wald χ^2 (42) = 112.4 (p = 0.000), Log pseudo-likelihood = -293.44, Pseudo R^2 = 0.177.
[c] Wald χ^2 (42) = 105.94 (p = 0.000), Log pseudo-likelihood = -140.64, Pseudo R^2 = 0.244.

Table 6: Estimation results for ordered logit models for Potato Consumption

		Conventional Potatoes[d]				Organic Potatoes[e]			
		Coef.	Std. Err.	z-value[a]		Coef.	Std. Err.	z-value[a]	
Attitudes	F1	-0.28	0.15	-1.86	*	0.35	0.18	1.94	**
	F2	0.46	0.14	3.25	***	-0.01	0.14	-0.07	
	F3	-0.09	0.16	-0.54		-0.27	0.20	-1.38	
	F4	0.42	0.16	2.53	**	-0.04	0.15	-0.27	
	F5	-0.18	0.16	-1.08		-0.22	0.19	-1.18	
	F6	-0.02	0.15	-0.15		0.06	0.17	0.33	
Categories	Food Safety	-1.18	0.45	-2.61	***	0.65	0.41	1.59	
Product	Health	0.61	0.31	1.96	**	-0.30	0.36	-0.82	
Food safety	Hygiene at the counter	-0.53	0.35	-1.49		-0.82	0.36	-2.26	**
Functional	Packaging design	0.36	0.47	0.77		-0.50	0.47	-1.07	
	Packaging material	0.18	0.30	0.61		0.39	0.33	1.21	
	Packaging size	0.26	0.26	0.98		0.31	0.30	1.03	
	Shelf life	0.39	0.31	1.27		-0.10	0.35	-0.27	
Image	Brand	-0.07	0.35	-0.19		0.11	0.35	0.30	
	Price	0.05	0.30	0.16		0.10	0.31	0.31	
	Labels	-0.37	0.37	-0.99		-0.32	0.36	-0.88	
Nutrition	Calories	-1.29	0.72	-1.78	*	0.32	0.98	0.32	
	Fat content	0.99	0.71	1.40		0.00	1.25	0.00	
	Appearance	0.27	0.36	0.75		0.21	0.35	0.59	
Sensory	Freshness	-0.03	0.34	-0.08		-0.11	0.42	-0.27	
	Kind variety	-0.60	0.33	-1.81	*	0.20	0.34	0.58	
	Taste	0.50	0.46	1.09		-0.09	0.40	-0.22	
Process	Local	0.37	0.37	1.00		-0.38	0.42	-0.91	
	Origin	-0.64	0.31	-2.08	**	0.74	0.37	2.01	**
	Organic	-0.20	0.35	-0.55		1.27	0.39	3.26	***
Environment	Clean point of sale	-0.25	0.35	-0.70		0.19	0.38	0.48	
	Additional information	0.56	0.47	1.20		-0.15	0.50	-0.29	
	Nutrition information	0.70	0.34	2.05	**	-0.11	0.33	-0.33	
	Service + Advice	0.15	0.38	0.40		-0.33	0.40	-0.82	
	Point of sale	-0.11	0.27	-0.42		-0.34	0.31	-1.09	
Socio-	Gender	-0.46	0.31	-1.50		0.39	0.31	1.23	
demographics	Age	0.05	0.01	4.88	***	0.00	0.01	-0.11	
	Household size	0.39	0.18	2.14	**	-0.12	0.22	-0.55	
	Child (yes)	0.64	0.52	1.22		0.46	0.56	0.82	
	Modest education	-0.53	0.44	-1.21		0.80	0.47	1.70	*
	High education	-0.01	0.46	-0.03		0.28	0.50	0.55	
	Very high education	0.22	0.55	0.40		0.90	0.59	1.52	
	<400 EUR	0.59	0.67	0.88		0.29	0.58	0.50	
	400-800 EUR	0.49	0.44	1.10		0.52	0.50	1.05	
	1300-1800 EUR	0.47	0.43	1.08		0.26	0.50	0.51	
	1800-2300 EUR	-0.40	0.47	-0.86		0.74	0.46	1.61	
	>2300EUR	-0.38	0.39	-1.00		0.61	0.50	1.24	

[a] Level of significance: ***p<0.01; **p<0.05; *p<0.10.
[d] Wald χ^2 (42) = 96.88 (p = 0.000), Log pseudo-likelihood = -365.38, Pseudo R^2 = 0.124.
[e] Wald χ^2 (42) = 98.14 (p = 0.000), Log pseudo-likelihood = -304.71, Pseudo R^2 = 0.123.

Table 7: Estimation results for ordered logit models for Milk Consumption

		Conventional Milk[f]				Organic Milk[g]			
		Coef.	Std. Err.	z-value[a]		Coef.	Std. Err.	z-value[a]	
Attitudes	F1	-0.21	0.15	-1.44		0.48	0.26	1.82	*
	F2	0.01	0.16	0.08		-0.14	0.23	-0.59	
	F3	0.07	0.16	0.42		-0.24	0.25	-0.96	
	F4	0.03	0.16	0.21		-0.70	0.25	-2.77	***
	F5	-0.25	0.19	-1.36		-0.50	0.30	-1.65	*
	F6	-0.26	0.15	-1.69	*	-0.59	0.33	-1.79	*
Categories	Food Safety	0.27	0.42	0.64		0.35	0.59	0.58	
Product	Health	-0.34	0.32	-1.06		-0.36	0.58	-0.62	
Food safety	Hygiene at the counter	-0.07	0.33	-0.22		-0.21	0.50	-0.41	
Functional	Packaging design	0.32	0.42	0.77		-0.20	0.54	-0.38	
	Packaging material	-0.22	0.31	-0.72		-0.24	0.46	-0.53	
	Packaging size	0.63	0.31	2.02	**	-0.65	0.49	-1.32	
	Shelf life	-0.15	0.43	-0.35		1.21	0.71	1.69	*
Image	Brand	0.64	0.36	1.79	*	0.87	0.56	1.55	
	Price	-0.05	0.30	-0.16		0.29	0.57	0.51	
	Labels	-0.32	0.40	-0.80		-0.29	0.61	-0.47	
Nutrition	Calories	-0.04	0.44	-0.09		-0.11	0.66	-0.17	
	Fat content	-0.55	0.31	-1.78	*	-1.04	0.48	-2.15	**
Sensory	Appearance	0.56	0.39	1.44		0.13	0.14	0.93	
	Freshness	0.69	0.34	2.02	**	0.48	0.56	0.85	
	Kind variety	0.09	0.56	0.17		0.51	0.67	0.76	
	Taste	0.28	0.29	0.96		-0.47	0.58	-0.81	
Process	Local	0.45	0.33	1.37		0.11	0.53	0.20	
	Origin	0.01	0.10	0.12		0.30	0.16	1.89	*
	Organic	-0.20	0.40	-0.50		1.77	0.48	3.68	***
Environment	Clean point of sale	0.35	0.36	0.98		-0.74	0.62	-1.20	
	Additional information	0.42	0.48	0.87		0.34	0.60	0.57	
	Nutrition information	-0.39	0.45	-0.86		-0.01	0.73	-0.02	
	Service + Advice	-1.29	1.03	-1.26		1.01	1.10	0.92	
	Point of sale	-0.46	0.35	-1.29		0.16	0.49	0.33	
Socio-	Gender	-0.31	0.29	-1.07		0.94	0.53	1.75	*
demographics	Age	-0.01	0.01	-0.96		-0.03	0.02	-1.68	*
	Household size	0.25	0.24	1.01		-0.13	0.26	-0.49	
	Child (yes)	0.70	0.59	1.19		-0.50	0.76	-0.65	
	Modest education	0.05	0.40	0.13		-0.75	0.57	-1.32	
	High education	0.71	0.45	1.57		-0.66	0.68	-0.98	
	Very high education	0.41	0.51	0.81		0.25	0.87	0.29	
	<400 EUR	-0.96	0.66	-1.46		-0.66	1.01	-0.66	
	400-800 EUR	-0.07	0.42	-0.17		-0.38	0.58	-0.66	
	1300-1800 EUR	-0.45	0.46	-0.98		-1.05	0.69	-1.53	
	1800-2300 EUR	-0.58	0.46	-1.26		0.43	0.93	0.46	
	>2300EUR	0.17	0.43	0.40		0.14	0.85	0.17	

[a] Level of significance: ***p<0.01; **p<0.05; *p<0.10.

[e] Wald χ^2 (42) = 74.19 (p = 0.002), Log pseudo-likelihood = -353.07, Pseudo R^2 = 0.099.

[f] Wald χ^2 (42) = 102.24 (p = 0.000), Log pseudo-likelihood = -142.66, Pseudo R^2 = 0. 254.

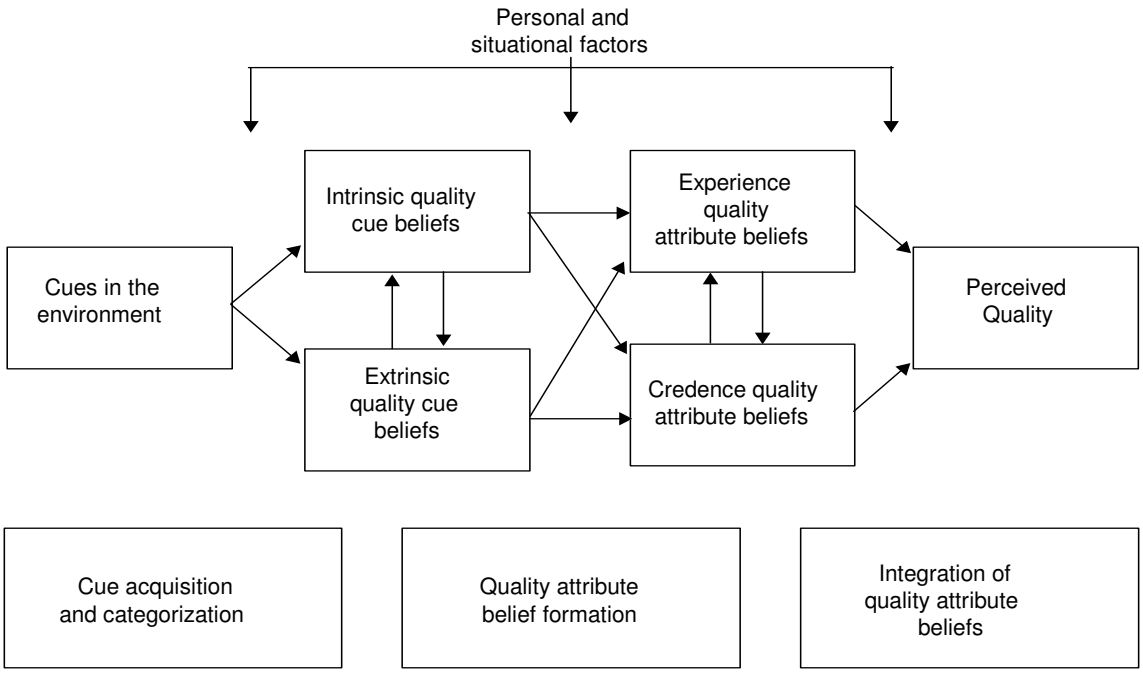

Figure 1: A conceptual model of the quality perception process
Source: Steenkamp, 1990

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