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INTERNATIONAL
JOURNAL ON
FOOD SYSTEM
DYNAMICS

Int. J. Food System Dynamics 4 (2010) 295-304

Risk, Information, and Trust in the Food Chain: Factors Explaining Consumer Willingness to Pay

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Received March 2010, accepted September 2010, available online February 2011

ABSTRACT

This paper analysed factors contributing to consumers' willingness to pay (WTP) for increased quality information. The empirical scope of the study was restricted to beef, because the beef labelling system enables reliable tracing of quality attributes. The results showed that consumer perceptions of specific risks in food partly explain their WTP. Also negative experiences heard from other people increased the probability of WTP. Trust seems to be extremely significant factor in WTP models. This study implies that the majority of the respondents trust the food safety authorities and the co-operation of all stakeholders in the food chain.

Keywords: risk, trust, information, beef, willingness to pay.

1 Introduction

The safety of food in the food chain has become an increasingly interesting issue to consumers and the media. It has also become a source of concern, as the amount of information on the risks related to food safety continues to expand. In this paper the factors contributing to consumers' willingness to pay for increased quality information were identified. Studying the willingness to pay of consumers makes it possible to determine whether the consumers consider the quantity of information available on the safety and quality of beef sufficient. The empirical scope of the study was restricted to beef, because the beef labelling system enables reliable tracing of the origin of beef, as well as attributes related to safety, environmental friendliness and animal welfare.

The paper is organised as follows: in section 2 an overview of relevant literature of formation of consumer perception of quality cues, risks and trust is provided. In section 3 the research hypotheses for consumers WTP is suggested. In section 4 the modelling of WTP is presented and finally summary and conclusion are presented in section 5.

2 Formation of consumer perceptions of quality and risks

2.1 Quality cues as basis for consumer quality evaluation

In the food chain buyers cannot evaluate all quality and safety characteristics merely on the basis of search attributes. Nor does experience necessarily indicate food safety and quality characteristics with a sufficient degree of certainty. Under conditions of imperfect quality information, how then do consumers form their quality perceptions?

When evaluating the quality of food products, consumers must contend with various quality cues. Earlier studies have showed that consumers utilise quality cues such as the colour, fat content, place of purchase,

appearance, absence of packaging and marination, and origin and brand (Bredahl, 2003; Glitsch, 2000; Grunert, 1997; Järvelä, 1998).

Consumer quality perception and decision-making processes have been studied in many ways, the most extensive of which has been the Total Food Quality Model (Grunert, 1997; Grunert et al., 2004). This model combines several previous approaches to food quality, such as the means-end chain (Gutman, 1982), the Fishbein-Ajzen attitude theory (1975), information economics (Nelson, 1974; Darby and Karni, 1973), theories of reasoned action and planned behaviour, and expected and perceived quality (Oliver, 1980, 1993).

Consumer perceptions of quality are an outcome of a process that involves many different phases. In literature, manifold models of food quality exist. Grebitus (2008) gives a profound review of different models of quality perception. Bernués et al. (2003), for example, built a conceptual model that describes the formation of consumer quality perception as a synthesis of quality supply, consumer perception of and demand for quality. The model reproduces the above-mentioned quality formation process based on actual and perceived quality cues and the integration of these beliefs in the evaluation of total quality (Figure 1). Similarly to Grunert's (1997) model, buying and experience processes are divided, and the expected quality is thereby differentiated from the experienced quality and credence quality. In this model, the importance of information flow in consumer quality perception process is showed.

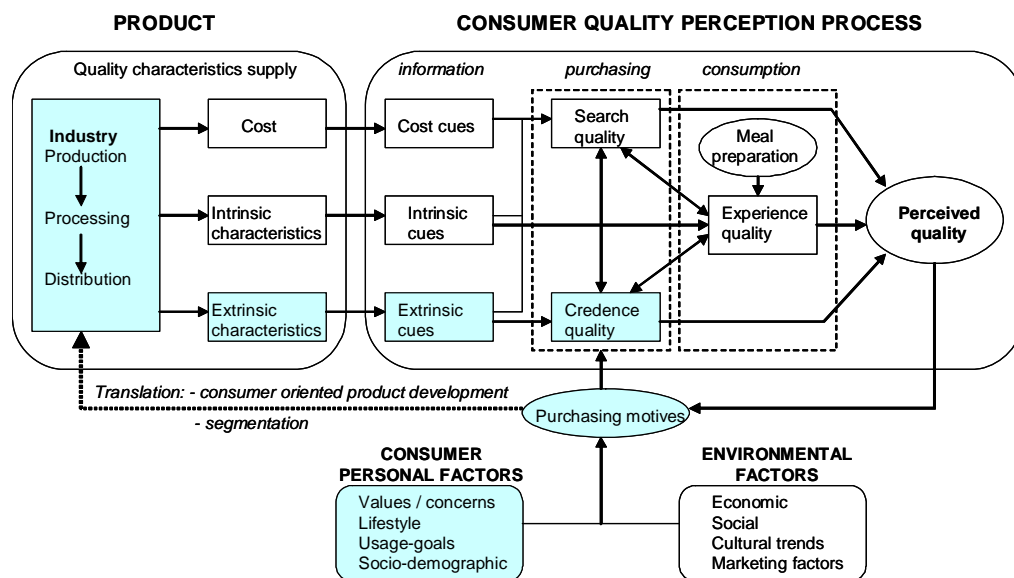


Figure 1. The supply, perception of and demand for food quality (Bernués et al., 2003).

The classification of information cues was derived from economics of information approach, where the consumer is able to detect some quality characteristics before buying. However, most quality characteristics can only be detected after buying.

According to Steenkamp (1989), quality cues are information that the consumer can receive and ascertain before making buying decisions. Intrinsic quality cues are related to physical product characteristics such as the colour and fat content. Extrinsic quality cues are associated with the product, but they are not an integral part of the physical product itself, and they can be modified without altering the actual product. Extrinsic cues include information on properties such as the origin, production processes and pricing.

Becker (2000) highlighted the supply of quality cues of the food industry. This brought into focus the fact that it is possible for the operators in the food chain to influence the supply of quality cues provided to consumers. In the consumer choice process, expectations of quality are thus based on imperfect quality information, and the term 'expected quality' is therefore used. Expected quality consists of perceived quality cues. Consumers mainly base their perceptions of product quality on a limited number of quality cues, due to time constraints and individual quality information processing capabilities. Clearly, it is important to focus in the food chain to the provision of information on the most significant indicators for consumers of experience and credence quality cues. Consumer-oriented food chains should strive to

convert the most important indicators into extrinsic cues.

In this article the consumers' need for increased quality information in the food chain is tested by using WPT method. The results will also reflect the tendency of increasing the consumer-orientation in the operation of the food chain.

2.2 Quality and safety –related cues in meat products

This chapter clarifies the formation of the consumer quality perception of meat products and the use of quality cues related to beef products in particular. Grunert (1997) found that consumers generally observe the quality of meat through various quality cues, such as the colour, aroma, “use by” date, cut of meat, display hygiene, packaging, price, weight, conspicuous bones/veins, deep-frozen or fresh, marbling, visible fat, fat content, and the colour and consistency of fat. Since a time limit is present in the buying process, two factors appeared to dominate the formation of expected quality: perceived fat and the place of purchase. In other words, by choosing a given place of purchase, the consumers show trust in a specific meat seller or food store that is believed to recognise high quality meat.

If there are no distinct recognisable quality labels on the market, the price of the product can be regarded as a quality cue according to Monroe and Krishnan (1985). However, as a consequence, manufacturers may have no intentions and financial incentives to increase quality information on the market, if the product price loses its meaning as a quality cue. This may be a further reason for the failure of the markets to produce enough quality information.

Another paradox may occur if quality is too difficult for the consumers to observe. When the quality and safety differences between products are highlighted too strongly, consumers may question the quality of meat and, in extreme cases, completely reject meat products (Kola et al., 2003). Among quality cues, safety is clearly a credence characteristic, which makes it especially difficult for consumers to estimate. Henson and Northern (2000) studied the process by which consumers assessed the safety of beef at the point of purchase in six EU countries. They found that at the point of purchase, information on animal feed, the country of origin and freshness were regarded as the most useful indicators of the safety of beef. In the UK and Sweden, a brand/quality assurance label was ranked higher than in the other countries involved in the study. In general, the price of the product and the name of the producer were not considered as good indicators of the safety of beef. Many studies indicate that the origin of beef is an important indicator of product safety for consumers (Bernués et al., 2003; Henson and Northern, 2000; Glitsch, 2000).

According to Becker (2000), credence quality characteristics in food products can be crystallised as the following list of attributes: hormones, antibiotics, fat/cholesterol, *Salmonella*, and, in beef, BSE. If information on these attributes is not available to the consumers at the point of purchase, they must rely on information from other communication channels, such as other people and the media.

Järvelä (1998) stated that food safety is valuable in itself or as an intrinsic value, and consumers mainly perceive it through the purity and freshness of meat. In the consumers' minds, freshness is linked with the slaughter of animals, the storage times of meat, and whether or not the meat is packaged. With unpacked meat, consumers assess the origin and texture of the meat, and their trust in the seller of the meat in the store. With packaged meat, consumers can easily deduce its freshness from the packaging and “use by” dates. When prioritising safety aspects, consumers base their selection on criteria such as the domestic origin as well as the unpackaged and unmarinated state of the meat. Visual appearance and labels also help consumers to choose safe meat.

2.3 Perception of risk and information on beef products

The consumer decision process involves risk when the consumer cannot anticipate consequences with certainty, and some of the consequences are likely to be unpleasant (Bauer, 1960). From the viewpoint of an individual, it is a question of perceived risk. Perceived risk can be divided into two concepts: uncertainty about the true probabilities and harmful consequences (Cunningham, 1967). Consumer risk can also vary depending on whether it is related to a specific product category or a specific product (Bettman, 1973; Dowling and Staelin, 1994). The third essential definition of risk is that of acceptable risk for a given product (Kahnemann et al., 1982; Dowling and Staelin, 1994).

Consumer risk perception is affected by many factors that vary from one situation to another. Often, these factors are related to the purchase situation and are also product specific. As an example, Dowling and Staelin (1994) mentioned the following:

- (I) Product specific attributes such as quality and price;
- (II) The likelihood of harmful consequences of purchase;
- (III) Buying motives; and
- (IV) Situational factors such as the place of purchase.

Studies have shown that in addition to package labelling, consumers use various information sources such as internal and external memory (Bettman, 1979). Internal memory mainly arises from the consumer's own experience. External memory refers to the information obtained by listening to other people's experiences, or through the media. Becker (2000) stated that if not enough information is available on credence characteristics; consumers must use other information channels, such as acquaintances and the media.

Järvelä (1998) found that, personal negative experiences distinctly impact future purchases. In addition, such experiences are very easily shared with other consumers. This means that reports of negative experiences spread out and affect the buying behaviour of other consumers as well. The role of the media is more likely to cause fear than to satisfy the consumers' informational needs.

In Europe, a constantly growing number of studies have investigated the use of quality cues and consumer risk perception in beef products. Henson and Northern (2000) stated that the consumers' perceived ability to assess risks associated with beef will affect their risk perception; the more influential is the perceived ability to evaluate quality in the purchase situation, the smaller is the risk perceived by the consumers in that situation. Another finding was that the more experienced the consumer was, the smaller was the perceived risk. Based on earlier literature, McCarthy and Henson (2005) summarised the most important determinants for perceived risk as follows:

- the consumer's perceived ability to assess the risks of beef products;
- interest in food preparation and beef;
- perceived product consistency;
- perceived confidence in the purchase location; and
- experience.

Consumers use various ways to reduce the risks involved in food purchase situations. McCarthy and Henson (2005) listed various risk reduction strategies in beef products. In order of importance, they are: purchase location, colour of the meat, country of origin, quality labels, fat content, label information, price, smell, texture and information on the butcher. According to McCarthy and Henson (2005), the use of a single source of information such as a quality label may not be sufficient. Instead, multiple risk relievers are required.

2.4 Trust in the suppliers of information

Traditionally, public authorities and institutions responsible for the control of food safety have enjoyed consumer trust. The study of Piironen et al. (2004) is introduced as a context for the discussion of consumer trust in the providers of information. The study focuses on the consumer opinions on food safety and trust in the stakeholders of the food chain.

The results showed that foundations of consumer trust are societal and cultural in nature. In addition to various actors, institutions, production, distribution and consumption, they are also affected by the prevailing beliefs and perceptions. For the consumers, it is crucial to have confidence in the actors tasked with risk assessment and risk handling activities. It is important to note that consumer trust is grounded in trust in people, i.e. human actors, instead of concepts, such as food safety.

Among other things, Piironen et al. (2004) investigated whether consumers trust in the safety of the food they buy and consume. With this question, they wanted to clarify consumer perceptions about the functioning of the markets. According to their results, consumers seemed rather confident, as 59% of the consumers indicated a high degree of trust in the safety of food. However, 40% of consumers indicated uncertainty about food safety. Only 1% of the respondents stated that they had very little trust in the safety of food.

In the study, some socio-demographic differences could be found. For example, women were more sceptical than men, and the more educated the respondents were, the more they trusted in the safety of food. However, the size of the family or the number of children did not affect consumer trust. Older

people seem to value personal trust in shopkeepers more than younger people.

Trust in food varies across different types of food. Regarding the safety of beef, the two most important factors for the respondents were strict meat safety requirements together with monitoring and control actions carried out by the municipal food control authorities. In third place, the consumers ranked good product information on beef products. It seems that consumers regard trust in different systems and regulations as a crucial element in building trust in the safety of food, while personal trust in the suppliers of meat has a minor role. This confidence in the safety of food seems to depend on a more general sense of personal security and confidence (Piiroinen et al., 2004).

3 Research hypotheses for consumer willingness to pay

Based on the theoretical frameworks described above, we may deduce that perfect information on the quality and safety of food products is not available on the food market, and therefore consumer choice is based on quality cues. Information on the quality of food is thus imperfect and may be divided asymmetrically between the various actors in the food chain. It may be imperfect because contamination related to some risk factors may occur along the whole food chain. From these theoretical frameworks, the following hypotheses can be deduced:

Hypothesis I

If there is not enough quality information on the food market, consumers are willing to pay for it and thus indicate gaining utility from increased quality information.

Hypothesis II

The higher the risk a consumer associates with food products, the greater is the value increase and willingness to pay for quality information.

Hypothesis III

Personal and other people's negative experiences concerning food quality affect willingness to pay for quality information.

Hypothesis IV

Trust in the providers of food quality information affects consumer willingness to pay for quality information.

4 Results

4.1 Binomial logit model and factors explaining willingness to pay

Willingness to pay can be analysed in several ways. Here we discuss the motives and factors affecting consumer willingness to pay by using a binary logistic model. The dependent variable of the model divided the respondents into two categories: those willing to pay and those unwilling to pay. The purpose of the model was to identify the most important explanatory factors for willingness to pay. In the analysis, willingness to pay acted as a dichotomic dependent variable that received the value 1 for respondents indicating willingness to pay > 0, and, respectively, the value 0 for respondents indicating no willingness to pay.

The method calculates the probability ($y = 1$) of an outcome, as derived from the following formula:

$$P(y = 1) = \frac{e^z}{1 + e^z} = \frac{1}{1 + e^{-z}} \quad (1)$$

where z is a linear function of the explanatory parameters.

The purpose of a logit analysis is to explain willingness to pay on the basis of a theoretical framework.

Motives explaining willingness to pay can be defined as follows, on the basis of the theoretical framework underlying this and earlier studies:

- awareness of risks (Latouche et al., 1998);
- personal negative experience of illness caused by inferior food (Bettman, 1979; Järvelä, 1998);
- other people's negative experiences of illness caused by inferior food (Bettman, 1979; Järvelä, 1998);
- food-related risk factors and their harmfulness (risks specific to given product categories; Dowling and Staelin, 1994);
- knowledge of the product (McCarthy and Henson, 2005);
- trust in the providers of information (McCarthy and Henson, 2005; Piironen et al., 2004)
- trust in storekeepers (McCarthy and Henson, 2005; Piironen, 2004);
- sociodemographic characteristics (sex, age, gross and net income of the household, region of residence, political party, number of children, special diet, vocational training, basic education, type of residential area);
- usage of current package labelling (only beef-buying respondents queried, n = 1036);
- knowledge of primary production in general.

4.2 Results of binomial logit model

In the survey, a total of 1,290 respondents (protest answers excluded) answered the first dichotomic willingness to pay question. Of this total, 944 respondents (73%) indicated willingness to pay, while 346 (nearly 27% of all respondents) gave a negative response.

The purpose of the model was to identify factors distinguishing the two categories of consumers. In the analysis, willingness to pay acted as a dichotomic dependent variable that received a value 1 for respondents indicating willingness to pay > 0, and, respectively, a value of 0 for respondents indicating no willingness to pay.

The goodness of fit of the model to the research data was evaluated using the -2 Log Likelihood (1,328) and its explanatory power using the Cox-Snell R-square (0.126) and the Nagelkerke R-square (0.183). However, the interpretation of the Cox-Snell R-square value is not the same as in an ordinary linear regression analysis, because it cannot receive the value 1. However, the latter or Nagelkerke R-square value can be interpreted similarly to that of linear regression analysis. In this case, the variables of the model only explained some 18.3% of the variance of the dependent variable.

Although the model did not appear particularly well-fitting when evaluated using the $-2LL$ and R-square values, it nevertheless succeeded in predicting nearly 80% of the observations into the correct category (Table 1). At the estimation stage, the model performed quite robustly, i.e. during the statistical analysis of the explanatory variables, the removal or insertion of variables kept the R-square values, preceding signs and mean errors of the model quite stable.

Only the statistically most significant coefficients were selected for inclusion in the model, as presented in Table 2 below. The results of the model showed that the factors with a positive effect on willingness to pay included several trust-related variables: for example, consumer trust in a particular provider of information increased positive willingness to pay. Factors decreasing willingness to pay, or coefficients with negative preceding signs, were observed in the cases where the respondents rarely ate beef.

Based on the theoretical framework of this study, one might have assumed that negative personal experiences would emerge as a significant explanatory factor for willingness to pay, but in the research data this was not the case. Instead, it was the variable representing other people's negative experiences of food that was found significant in the model. This is a rather interesting result, because some 17% of the respondents reported personal experience of illness caused by inferior food, while 50% knew or had heard of other people with similar negative experiences.

Table 1
Observed and predicted values produced by the binomial logit model.

Observed values	Predicted values		
	No willingness to pay	Positive willingness to pay	Correctly predicted (%)
No willingness to pay	83	263	24.1
Positive willingness to pay	42	902	95.5
Total percentage			76.4

Of the variables describing the categorical risks of food, two were selected for inclusion in the model: genetic modification of food and foodborne zoonotic diseases, where they were considered as harmful risks. Quite distinctly, the most significant variables affecting consumer willingness to pay were trust in the providers of information, as well as trust in the capability of storekeepers to ensure that the beef sold in stores is safe. Trust in the operators of the food chain was also significant for willingness to pay.

Of the factors describing consumer buying behaviour, two were selected for inclusion in the model: the respondents who do buy beef in the first place and the respondents with grocery shopping responsibility in the family.

Table 2. Binomial logit model (n = 1,290).

Variable	β	S.E	Sig.	Odds ratio
Buys beef (β_1)	0.533	0.184	0.004	1.704
Knows or has heard of people who have fallen sick from inferior food (β_2)	0.317	0.139	0.022	1.373
Considers genetic modification of food harmful (β_3)	0.520	0.143	0.000	1.682
Rarely eats beef (β_4)	-0.490	0.171	0,004	0.613
Has trust in storekeepers (β_5)	0.303	0.139	0.029	1.354
Has trust in the information provided by the Finnish authorities (β_6)	1.643	0.261	0.000	5.171
Has trust in the information provided by the whole food chain together (β_7)	1.554	0.236	0.000	4.728
Has trust in the information provided by private research laboratories (β_8)	1.635	0.381	0.000	5.131
Has trust in the information provided by consumer organisations (β_9)	0.895	0.333	0.007	2.447
Has trust in the information provided by the food industry (β_{10})	1.451	0.645	0.025	4.266
Has trust in the information provided by the European Union authorities (β_{11})	1.283	0.415	0.002	3.609
Has responsibility for grocery shopping, alone or together with someone else (β_{12})	0.485	0.161	0.003	1.624
Considers foodborne zoonotic diseases harmful (β_{13})	0.383	0.183	0.036	1.467
Constant (α)	-1.912	0.317	0.000	0.148

Numerous other variables were also tested for inclusion in the model, but they did not prove significant. For example, several typical sociodemographic factors describing the respondents, such as age, sex,

occupation, gross income and net income, were not significant for willingness to pay in this model. This is a typical phenomenon in studies focused on consumer choice (Enneking 2004).

The predicted probability for willingness to pay can be calculated as follows:

$$P(y = 1) = \frac{e^z}{1 + e^z} = \frac{1}{1 + e^{-z}} \quad (2)$$

where

$$z = -1.912 + 0.533 * \beta_1 + 0.317 * \beta_2 + 0.520 * \beta_3 - 0.490 * \beta_4 + 0.303 * \beta_5 + 1.643 * \beta_6 + 1.554 * \beta_7 + 1.635 * \beta_8 + 0.895 * \beta_9 + 1.451 * \beta_{10} + 1.283 * \beta_{11} + 0.485 * \beta_{12} + 0.383 * \beta_{13}$$

In Table 2 above, the odds ratio calculated for each variable describes the degree to which the variables affect the probability. Below, two sample respondent profiles demonstrate the effect of the coefficients on the probability of the willingness to pay or unwillingness to pay. If the predicted probability receives a value < 0.5, the respondent is not willing to pay. If the probability value is greater than or equal to 0.5, the respondent belongs in the category of those willing to pay.

Sample profile, Respondent 1:

Respondent 1 does not buy beef ($\beta_1 = 0$, $\beta_{12} = 0$) and rarely eats beef ($\beta_4 = 1$). In addition, Respondent 1 considers neither genetic modification of food nor foodborne zoonotic diseases as harmful food-related risks ($\beta_3 = 0$ and $\beta_{13} = 0$), and all trust-related variables ($\beta_5 - \beta_{11}$) receive the value 0 (no trust in storekeepers or quality information from any source). This probability receives the value 0.083. A probability value of 0.083 indicates that the respondent is not willing to pay for increased beef quality information.

Sample profile, Respondent 2:

Respondent 2 buys beef ($\beta_1 = 1$) and considers genetic modification of food and foodborne zoonotic diseases as harmful food-related risks (β_3 and $\beta_{13} = 1$). Respondent 2 also trusts in the information provided by the Finnish authorities ($\beta_6 = 1$). This probability receives the value 0.810. A probability value greater than or equal to 0.5 indicates that the respondent is willing to pay for increased beef quality information.

4.3 Summary of the willingness to pay estimation results: factors explaining willingness to pay

In this study four hypotheses were introduced:

- (I) If there is not enough quality information on the food market, consumers are willing to pay for it and then indicate gaining utility from increased quality information.
- (II) The higher the risk a consumer associates with food products, the greater is the value increase and willingness to pay for quality information.
- (III) Personal and other people's negative experiences concerning food quality affect willingness to pay for quality information.
- (IV) Trust in the providers of food quality information affects consumer willingness to pay for quality information.

The first binary model confirmed the premise that certain food-related risk factors and trust in the operators of the food chain do affect consumer willingness to pay. A fairly large proportion of the respondents, nearly 73% (protest responses were excluded from this study), were willing to pay for increased information related to the safety, origin and other quality attributes of beef. Based on the results, it can be stated that not enough quality information is available on the markets, and that the majority of consumers are willing to pay for quality information (Hypothesis I).

The results also showed that certain risk factors impact consumer willingness to pay. If the respondents considered genetic modification of food or foodborne zoonotic diseases as harmful or extremely harmful risk factors in food, they were more likely to be willing to pay for quality information. The results produced by the models thus confirmed the premise that certain food-related risks affect willingness to pay for beef quality information (Hypothesis II).

Based on the theoretical framework of this study, one might have assumed that personal and other

people's negative experiences of illnesses caused by inferior food would increase willingness to pay and the need for quality information. However, the results of the binary logit model showed that only other people's negative experiences affected willingness to pay, while personal negative experiences of inferior food did not have a similar effect (Hypothesis III).

The fourth hypothesis based on the theoretical framework of this study anticipated that trust in the providers of information does affect willingness to pay, although the actual direction could not be predicted in the light of earlier studies. This study demonstrated that willingness to pay is highly dependent on the respondents' trust in the providers of information, and that trust does increase consumer willingness to pay for beef quality information (Hypothesis IV).

5 Conclusions

When a consumer is choosing food and estimating its safety in a store, information on its risks and their precise statistical probabilities is rarely, if ever, available. Therefore, consumer information on the risks is mainly based on hearsay and personal experiences. The purpose of the empirical part of the study was to identify factors that explain consumer willingness to pay for increased quality information. According to the findings, consumer perceptions of specific risks in food partly explain their WTP. This confirms the results of the Cicia and Colantuoni (2010) that consumers are placing increasing importance on meat attributes such as food safety. Other explanatory factors that increased willingness to pay were negative experiences heard from other people. This is clear indication that consumers fail to notice quality information, or that the information available on quality properties is not adequate in the market. Therefore they trust in quality signals that are inappropriate in their nature.

According to the results, it can be concluded that the majority of the respondents trust in the food safety authorities and the co-operation of all stakeholders in the food chain. Trust is a very important factor explaining willingness to pay. For some consumers, trust is linked with personal contact with storekeepers. For others, trust is linked with confidence in public authorities. These empirical findings form the most prominent scientific contribution of this study.

This study examined what kind of information consumers require to ensure quality and safety in the food chain. This study verified that consumers need more information on the quality of the food on the market. Consumers require more information on the control of foodborne diseases on farms, the genetic modification of production animals and animal feed, and on the control of medical treatment of production animals. After the survey for this study was conducted, animal welfare became headline news at the turn of the years 2007 and 2008. This public discussion may heighten the need for information on the control of animal welfare.

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