Analysis of food quality perception processes

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Abstract. A model of the quality perception process of the consumer with respect to food products has been developed. The model integrates a number of quality-related concepts. An empirical study was carried out to examine the relationships between the concepts. It appears that the various concepts can be meaningfully related to the quality perception of different food products.
Key words: quality perception, consumer behaviour, food products, agricultural products, quality indicators, quality attributes, quality risk.

Introduction. Quality of food products has generated much interest in the Netherlands. It is a concern of agribusiness and government to improve further the quality of food products in order to meet the needs of the consumer and to strengthen the economic position of the food industry. However it has been difficult to translate the attention for the quality of food products into policy guidelines and recommendations for the agribusiness. This is caused to a large extent by the scarce knowledge about the way consumers perceive the quality of food products and how these perceptions are formed. This is an important topic because the perceived quality and not the 'objective' (technical) quality is a decisive factor in consumers' decisions concerning the purchase of food products.

Model and data collection. A study was carried out to investigate the way consumers perceive the quality of food products. The research was based on a comprehensive model for the formation of consumer quality perceptions (Fig. 1). The model integrates information about products, the importance of quality indicators, ratings of products on quality attributes and the importances of the quality attributes, with the perceived quality of the food product. A distinction can be made between intrinsic and extrinsic quality indicators (Olson & Jacoby, 1972). Intrinsic quality indicators are derived from the actual physical product in the sense that they cannot be changed or experimentally manipulated without also changing the physical characteristics of the product itself, e.g. colour and appearance of the product. Extrinsic quality indicators are product-related but are not actually a part of the physical product (e.g. price, brand name and image of the store where the product is sold). Intrinsic quality indicators are mostly determined by the production process whereas extrinsic quality indicators are predominantly determined by marketing policy. The consumer uses intrinsic and extrinsic quality indicators to determine the ratings

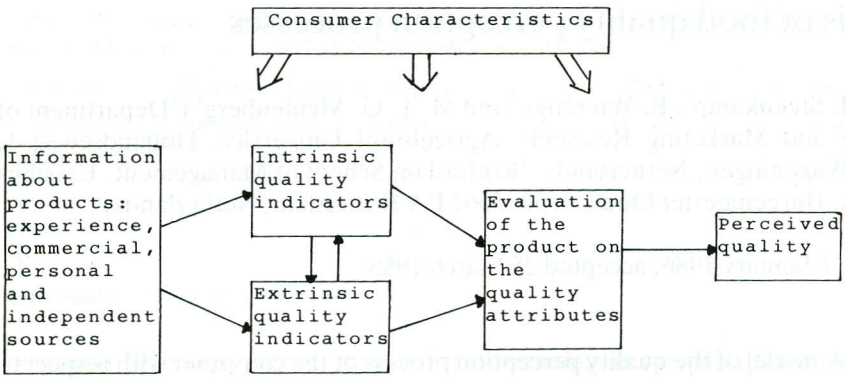

Fig. 1. A model for the formation of consumer quality perceptions with respect to food products.

of a product on quality aspects that cannot be sensorically evaluated at the point of purchase (taste, vitamin content, etc.; Cox, 1967, Jun & Jolibert, 1983). These aspects are called quality attributes. For example, colour (intrinsic quality indicator) and price (extrinsic quality indicator) can be used to evaluate the taste (quality attribute) of a specific meat cut.

Data with respect to the various phases of the model for the quality perception of food products were obtained in a nation-wide random sample of 1074 individuals. The respondents were personally interviewed. The individual to be interviewed was the main purchaser of food products in the household. Comparison of socio-economic and demographic characteristics of the sample with other data indicated that the sample was representative of the Dutch population.

Results. Apart from their own experiences, consumers prefer to obtain information about the quality of food products from independent sources such as informative labelling and the 'Consumentengids' (the magazine of the Dutch Consumer Union). The preference for independent sources is strongest among higher educated consumers (χ^2 test, $P < 0.01$).

The intrinsic quality indicator 'appearance of the product' and the extrinsic quality indicator 'image of the store where the product is sold' are the most important indicators for the quality perception of perishable food products. The extrinsic indicator brand name is the most important indicator for the quality perception of non-perishable food products. The importance attached to quality indicators was consumer-specific. In order to explore this issue further, analysis of variance was applied to the data. It can be concluded that consumers with lower incomes attach more importance to the price as an indicator of the quality of a food product (i.e. the higher the price, the better its perceived quality) than consumers with higher incomes ($P < 0.01$).

The respondents were asked to rate the importance of thirteen quality attributes of thirteen food products. Factor analysis was applied to these data to discover the basic underlying quality dimensions. Four dimensions were found which could be

Table 1. Scores representing the importance of a quality dimension for the perceived quality of thirteen food products obtained by factor analysis of individual attribute scores (rescaled average factor scores).

	Nutritional value	Additives	Energy	Sensory
Meat	0.323	0.487	0.866	0.640
Fresh vegetables	0.892	0.059	0.014	0.548
Milk	0.406	0.046	1.149	0.051
Bread	0.487	0.041	0.526	0.277
Apples	0.443	0.000	0.000	0.659
Cheese	0.255	0.053	0.999	0.349
Canned vegetables	0.353	0.707	0.141	0.000
Minced meat	0.000	0.541	0.916	0.616
Frozen vegetables	0.551	0.411	0.145	0.107
Jam	0.127	0.789	0.188	0.205
Meat products	0.133	0.347	0.837	0.688
Margarine	0.178	0.364	0.886	0.086
Jarred vegetables	0.416	0.653	0.106	0.297

labelled as: nutritional value (correlations with attributes like protein content, vitamin content and nutritional value), additives (correlations with preservatives, artificial flavour and colour additives), energy (correlation with attributes like fat, protein and caloric content) and sensory (correlating with smell, appearance and taste). The food products differ considerably with respect to the importance attached to the four dimensions. For example, the additives dimension (to be regarded as a negative quality dimension) is especially important for the perceived quality to jam, canned vegetables and jarred vegetables. The complete results (i.e. the factor scores averaged over the respondents) are reported in Table 1. The scores are scaled so that per dimension the lowest value is zero. The higher the score, the more important is that dimension for the perceived quality of the food product in question.

A concept of quality risk was developed by combining perceived variation in quality (Bettman, 1973) and perceived competence in judging this quality variation (Lambert et al., 1980). For a number of food products the quality risk was investigated. Products with a relatively high quality risk are canned vegetables, frozen vegetables, eggs, minced meat and chicken.

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Transversal dispersion associated with convective flow parallel to an interface separating two layers with different properties

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Abstract. The transport of solute is studied for a flow domain consisting of two regions which are separated by a sharp interface. Hydraulic and chemical properties of the two regions are different. The longitudinal dispersion coefficient is assumed to be zero and the transversal dispersion coefficient is finite. The transport equations are solved taking the correct boundary conditions at the interface into account. The validity of the assumption of an infinite transversal dispersion coefficient (D_T) often encountered in the literature is shown to be questionable for the system considered.

Key words: heterogeneity, interface, solute transport, aquifer, transverse dispersion.

Introduction. The transport of solute through porous media is generally described mathematically by solving the convection dispersion equation as given by Bear (1972). In heterogeneous flow domains this equation is solved for more than one sub-domain with appropriate conditions linking the sub-domains. For solute transport in fractured media, Tang et al. (1981) couple the transport in the fracture with a diffusion process perpendicular to the fracture surface. In a cross section of the