

## Consumer Perception of Bread Quality

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**Abstract— Bread contains a wide range of important nutritional components which provide a positive effect on human health. However, the consumption of bread in Belgium is declining during the last decades. This is due to factors such as changing eating patterns and a increasing choice of substitutes like breakfast cereals and fast foods. The aim of this study is to investigate consumer's quality perception of bread towards sensory, health and nutrition attributes. Consumer's quality perception of bread seems to be determined by sensory and health attributes. Three clusters of consumers are identified based on these attributes. In the first cluster, consumers' quality perception of bread is not dependent on the health attributes it embraces, but to some extent on sensory attributes. For the second cluster, both health and sensory attributes appear to influence quality perception. In the third cluster only sensory attributes appear to be important in determining quality perception, though in a negative direction. The results of this study will possibly help health professionals and policy makers to systematically inform the consumers about the positive effects of bread and its components. Furthermore, firms can use the result to build up a tailor-made marketing strategy.**

**Keywords— Consumer, Quality perception, Bread**

### I. INTRODUCTION

Bread offers a positive effect on the human health due to the presence of many important nutritional components, such as dietary fibres, minerals and vitamins. However, the consumption of bread in Belgium has declined by 13.8% during the period 1999 – 2003 [1], due to factors such as changing eating patterns and an increasing choice of substitutes such as breakfast cereals and fast foods [2, 3].

The choice of food depends on consumer's beliefs and attitudes [4, 5]. Beliefs are the cognitive knowledge of consumers, linking attributes, benefits and object. Attitudes are the feelings or an affective response to product attributes [6]. Consumers use numerous product criteria to evaluate whether a food product satisfies their expectations and requirements.

Based on the multiple characteristics perceived in a product, consumers adopt an attitude towards the food product [7]. Perception filters between external (objective) and internal (subjective) stimuli of the consumer. The human subjectivity or perception is determining consumers' preference, choice and attitudes [8]. Determinants of perception are the consumer's goals and motives for consumption.

In this paper the focus is on the quality perception of bread in Belgium. The consumer's quality perception process is described by Issanchou [9].

The process starts with the collection and categorization of intrinsic and extrinsic product features. Intrinsic product features belong to the product itself, such as appearance, colour, shape, and presentation of the product. In contrast, extrinsic product features are related to price, brand name, stamp of quality, etc. Based on these perceived quality cues beliefs are formed about the quality attributes of the product. Hereby, a distinction is made between experience and credence quality attributes. The first can be experienced directly at the time of consumption and include attributes such as convenience, freshness and sensory characteristics. On the opposite, credence quality attributes, such as healthiness and naturalness, are not directly perceivable for the consumer and require a high level of abstraction. The perception of both kind of quality attributes leads in a final step to an overall quality evaluation of the product.

Determinants of the perceived quality relate to food properties, socio-demographic factors, as well as marketing factors. Food properties include sensory properties, health attributes, and safety attributes [4, 5, 9]. Socio-demographic variables comprehend age, gender, family status (children), and family size [2-6, 10, 11]. Environmental factors include economic variables (price) and marketing stimuli (traceability, quality, and nutrition labelling). In this paper the perceived quality of bread properties is used to group consumers according their quality perception. Subsequent, socio-demographic aspects are used to characterize the achieved groups of consumers.

The paper first gives an overview of some nutritional, health and sensory aspects of bread in section two. Subsequently, the methodology and results of a Belgian consumer study are presented in sections three and four. Conclusions are drawn in section five.

## II. ASPECTS OF BREAD QUALITY

Man learned the art of bread making more than 4000 years ago. Though not always in the same form or as we know it today, bread has been a popular staple food for ages. The nearly ubiquitous consumption of bread places it in a position of global importance in international nutrition [12]. Bread products vary widely around the world, as do their production techniques. Basic ingredients are cereal flour, water, yeast or another leavening agent, and salt [13].

Cereals provide important amounts of most nutrients [14] and form an important part of a balanced diet (i.e. one that provides all the food groups in the nutrition education pyramid or plate and all recommended dietary intakes). In addition to their high starch content as energy source, cereals also provide dietary fibre, protein (high in proline and glutamine, but low in lysine) and functional lipids rich in essential fatty acids [15]. Important micro-nutrients present in cereals include vitamins, especially many B vitamins, minerals, antioxidants and phytochemicals [16]. The nutritional importance of dietary fibre has been demonstrated in many studies. A typical Western diet contains less than 20 g/day, whereas the recommended daily intake is 25-30 g of dietary fibre [17]. Regular consumption of whole grain foods and dietary fibre has been associated with a reduction of bowel transit time [18], a reduction in the incidence of cardiovascular disease [19], diabetes [20], reductions in colorectal cancer [21] and hypertension [22]. Cereals can have a protective effect as a source of antioxidants and phytochemicals [23].

For the consumer, the key attributes of bread are flavour and texture [24]. The most important flavour compounds are formed during baking, when heat reactions, such as the Maillard reaction and caramelisation, take place. Enzymatic and possible fermentation reactions influence the flavour of bread crumb, whereas heat reactions affect the flavour of bread crust. Besides the flavour attributes, the freshness, colour, texture and biting properties dramatically influence the overall perception of bread. When a loaf of bread is removed from the oven, a series of changes starts that eventually leads to deterioration of the quality [25]. These

changes are collectively termed ‘staling’ and include all the processes that occur during storage except microbial spoilage. The consumer detects staling by changes in taste as well as in texture. The typical aroma of fresh bread is lost and a ‘stale’ flavour develops with time. Concerning the textural changes of bread, it is observed that the crumb becomes dry and hard, whereas the crust becomes soft and leathery.

In this paper, it will be shown that health and sensory aspects of bread largely determine the consumer perception of bread quality.

## III. METHODOLOGY

Consumers’ perception of bread is investigated in a Belgian consumer study, using both qualitative and quantitative research techniques. Based on literature review and focus group results a questionnaire was developed. The sample characteristics of the survey are described in Table 1.

Table 1 Sample characteristics of the Belgian survey, in number and %

Characteristics	N	%
Size of the sample	251	100
Gender		
Female	156	62,2
Male	92	36,7
Age		
$\bar{x}$	38	
20-30 years	100	39,8
31-45 years	76	30,3
> 46 years	71	28,3
Children		
No	122	49,6
Yes	124	50,4
Family size		
$\bar{x}$	3,0	
1 person	34	13,9
2 persons	82	33,5
3 persons	34	13,9
4 persons	52	21,2
$\geq 5$ persons	43	17,5

The self-administered questionnaire is divided into two parts testing the behaviour and the perception of bread consumers. The data achieved from the survey are analyzed by factor- and cluster analysis, leading to a segmentation of bread consumers. The description of the achieved clusters is carried out by means of ANOVA.

## IV. RESULTS

In this chapter first consumers’ perception and attitudes towards bread are presented, followed by a segmentation of these consumers into three groups. Fi-

nally, the three groups are described by several socio-economic variables and in relation to their bread consumption.

#### A. Consumer perception and attitude towards bread

Consumers perceive bread as a basic and traditional food product. Furthermore bread is perceived as being important in a balanced diet, because of the nutritional quality of its fibres, minerals and vitamins content. In addition, bread is considered as a suitable energy source, contributing to a higher saturation grade.

However, also negative attributes are associated with bread consumption related to price, monotony, unattractiveness, short shelf-life, and decreased perceived experience and credence quality, in particular in connection with an increased industrial production of bread. Besides, due to the many contrary statements of the different stakeholders, the consumers are insecure about the bread's nutritional value, such as related to Omega-3 bread.

#### B. Segmentation of bread consumers

The factor analysis revealed three factors related to health, nutrition, and sensory attributes. In Table 2 only the variables with high factor loadings on a factor are included.

Tab. 2: Main factors indicating consumers' quality perception of bread (n = 242)

Quality perception	Factor loading
Factor 1: Health	
"Multigrain bread is healthier."	0.830
"Brown bread is healthier than white bread."	0.749
"A description such as 'multigrain' or 'sunflower seed' bread is more important than a label or brand."	0.600
Factor 2: Nutrition	
"Bread is a source of energy."	0.824
"Bread is a staple food."	0.741
"Bread is good for the digestion."	0.523
Factor 3: Sensory	
"Bread loses its crispiness during storage."	0.796
"Bread becomes tastier with spread and filling."	0.784

Source: Own data

The cluster analysis on the three factors results in a three cluster solution. The group means of the obtained clusters for Health and Sensory differ significantly (Post Hoc Duncan test:  $p < 0.05$ ) from each other. The Health factor is loading the highest on the first cluster, whereas the Sensory factor is most con-

tributing to the third cluster. The Nutrition factor is not significantly differing between the achieved clusters ( $p = 0.482$ ). Figure 1 is providing a clear overview of the positioning of the clusters and the segmentation of Belgian bread consumers.

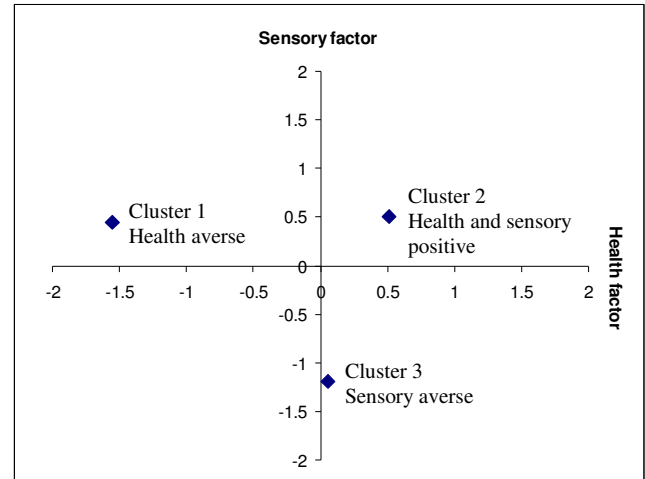


Fig. 1: Segmentation of Belgian bread consumers based on the quality perception related to health and sensory attributes (Source: own data)

#### C. Description of the consumer segments

The achieved clusters are described by the means of ANOVA using the variables age, children, gender, and family size. Only the age and children are significant differentiating between the three clusters ( $p < 0.05$ ). This means, mainly younger people (between 20 and 35 years) are positive towards the health and sensory attributes of bread. Older people are rather health or sensory averse. Furthermore, families with children tend to be rather averse in relation to the health attributes of bread. In contrast, being health/sensory averse or positive is not dependent on gender or family size.

In a second ANOVA the relation between bread consumption and cluster membership is explored. The bread consumption is measured on a 4-item interval-scale. The respondents had to indicate whether they eat bread never (1), seldom (2), sometimes (3), or always (4) during breakfast, lunch, afternoon tea, and dinner. For the quality perception of bread only bread consumption for dinner is significantly different between the three clusters ( $p < 0.005$ ). Those who consume more regularly bread for dinner are more likely sensory averse towards it. Those who eat least bread for dinner are rather positive towards health and sensory attributes of bread. The bread consumption at lunch time is significant to a 90% confident interval

( $p < 0.1$ ). In contrast to the bread consumption at dinner time, the results show that respondents who consume more regularly bread for lunch are rather health and sensory positive.

Although the results for the other meal times are not significant, an interesting consumption pattern can be deduced. The main meal for bread consumption is the breakfast, whereas the afternoon tea is the meal with the least consumption of bread. Furthermore, the bread consumption at lunch and dinner is about similar.

## V. CONCLUSION

It can be concluded that related to the quality perception of bread, three groups of consumers can be differentiated based on health and sensory attributes. The first group (cluster 1), assembled of consumers in their thirties/forties with children, is very negative towards health attributes, but positive towards sensory attributes. This group perceives bread tastier when it is still crispy and with spread and filling. Concerning the health attributes, brown and multigrain bread not perceived as healthier than other bread types. In addition, the bread's label or brand is more important as quality indicators than a description expressed in the bread's name, such as "sunflower-seed bread". One assumption for the health averseness of this group could be that the perception of this group is influenced by the preferences of their children, which like rather white than multigrain bread as shown in other studies [e.g. 26].

In contrast, the majority of the respondents of the second group (cluster 2) are positive towards both, health and sensory attributes. Similar to the first group, the bread is more liked when it is still crispy and becomes tastier with spread and filling. Contrary to the first group, brown and multigrain bread is perceived as healthier than white bread. Furthermore, a clear description of the bread is more important than a brand or a label for this group. These respondents are mainly younger people (in their twenties) which have rather no children.

The third group (cluster 3) is very averse towards the sensory factor and includes respondents in their thirties with rather no children. Bread is not becoming tastier with filling and spread and it doesn't matter if the bread loses its crispiness. Furthermore, this group has no clear preference for or against health attributes. Hence, this group is indifferent towards the health attributes of brown/multigrain bread. However, it is worth to mention that the bread consumption of this

group is highest for breakfast and dinner. It can be assumed that these consumers haven't found an attractive alternative for bread.

Based on this segmentation two kinds of organisations with different intentions can be addressed i.e. public authorities and food producers. First, it is public authorities' responsibility to monitor public health, and to provide adequate and easy understandable information about a well balanced food diet to consumers. Hence, the current research results provide interesting information which could be integrated in future communication and information campaigns about a healthy and well balanced food diet. Hereby, the focus should be on the first two groups.

Second, private company's communication is rather emotional loaded and aiming to increase the publicity of their brands. Consequently, private companies could differentiate their activities from competitors by developing strong bread brands, and highlighting a positive and highly appreciated image. Thus, private companies should tailor-made their marketing strategy by recommending tasty and best fitting spreads and fillings according to the type of bread and to encourage the sensory averse consumer to toast the bread, in order to reverse the staling process to some extend. Furthermore sensory averse consumers could be reached with innovations in the bread sector. This could be new types of bread or new forms of usages to increase the credence and experience attributes for this group.

Future research should also focus on other determinants of the quality perception of bread, such as safety aspects and environmental factors in the frame of globalisation.

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