

Food Quality: A Primer

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Abstract Quality is often regarded as attribute performance of product or service. For example, food quality is generally accepted as a basic element of the overall restaurant experience.

Quality food plays a crucial role in shaping the interactions between people and food. It has a significant impact on food company profitability. It has become a key element of success in the international food markets. This paper provides a primer on food quality.

Keywords Food quality, Food safety

Introduction

Food is a basic human necessity. It is an important medium through which national identity is experienced in every day consumption. Our health and well-being directly depend on the safety and quality of the food we eat and drink. Everyday humans consume food of varying quality. Food quality is of paramount importance to governments, food industry, and consumers. It is of high importance in terms of consumer interest, and determining market acceptance. It often has profound effects on individual life and fitness.

A number of food scandals have caused consumers to question the quality of food products and decreased the level of consumer trust toward the food chain, and, at the same time, increased the demand for food quality and safety [1]. Consumers in developed countries have become more demanding, taking unprecedented interest in the way food is produced, processed, and marketed. This creates situations where quality differentiation of food products has become necessary.

The quality of a product is the distinctive characteristic of the product that sets it apart from all others. Quality includes all other attributes that influence a product's value to the consumer. Product quality is often assessed by the consumer in relation to the cost of the product. High-quality, good-value products will create satisfied customers who, in turn, will be loyal and make repeat purchases [2]. Quality has a significant impact on company profitability.

Food quality is very important in food manufacturing because food consumers are susceptible to any form of contamination that may occur during the manufacturing process. It is also important in food processing because it is required that the environment is as clean as possible in order to produce the safest possible food. For food quality the judgements are often based on taste, health, convenience, labelling, packaging, environmental friendliness, and innovation [3]. Quality experience delivered by a food should match quality expectations of a consumer. Consumers often prefer high quality products to low quality ones, but may accept trading off higher quality for lower prices.



Food Quality Concept

The quality of food going to the consumer must always be assured. Food quality is a multifaceted issue that involves nutritional value, adulteration, safety of use, and traceability. Food quality is a crucial factor in order to maintain high standard food products. It is a key factor for consumers in their buying decisions. It is accepted as a fundamental component to satisfy restaurant customers.

It is widely accepted that quality has an objective and a subjective dimension. Objective quality refers to the physical characteristics built into the product and is typically dealt with by engineers and food technologists. Subjective quality is the quality as perceived by consumers [4]. It is based on personal criteria such as taste or convenience. Consumer perception of food quality is essentially an individual phenomenon, which may be affected by personal and situational characteristics.

Food quality in the United States is enforced by the Food Safety Act 1990. Quality monitoring takes place at various stages of the food chain including production, processing, storage, and transportation of food products. Food quality standards have become a fixture in the international trade system. They put enormous strain on producers from developing nations and tend to exclude them from participating in global supply chains [5]. Quality labels can be provided by manufacturers, retailers, government agencies, and consumer associations.

Food Quality Attributes

Food quality refers to the features and characteristics of a food product that is [6]: (1) Acceptable to consumers and meet their expectations, (2) Value for money, (3) Conforms to the required specifications, and (4) Profitable to the company.

The quality of a food can also be viewed from two perspectives: scientific status and consumer preferences. Scientific factors affecting the quality of a food include composition, spoilage, colorants, additives, nutrients, flavorants, functional ingredients, etc. Consumer preferences are linked directly to the human senses such as sight, touch, smell, taste, and mouthfeel [7]. The various factors affecting quality in food chains are illustrated in Figure 1 [8]. These include external factors such as appearance (size, colour, shape and consistency), texture, flavour (odour and taste), correct labelling (with the ingredients, nutritional information and manufacturer details), properly packaged products. Food quality also deals with product traceability, should a recall of the food product be required [6].

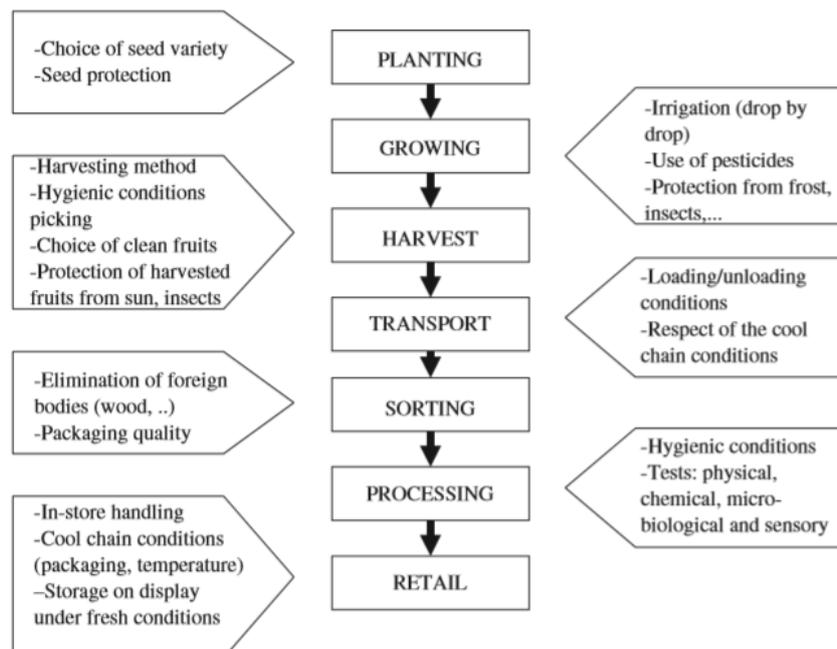


Figure 1: Factors affecting quality in food chains [8]



Quality is perceived in relation to satisfaction and behavioural intentions. Quality is usually regarded as attribute performance of product or service. Customer satisfaction/loyalty should be the critical objective of any business that intends to build repeat purchase. Behavioral intention refers to a person belief about what he intends to do in a certain situation. The three are related as shown in Figure 2 [9].

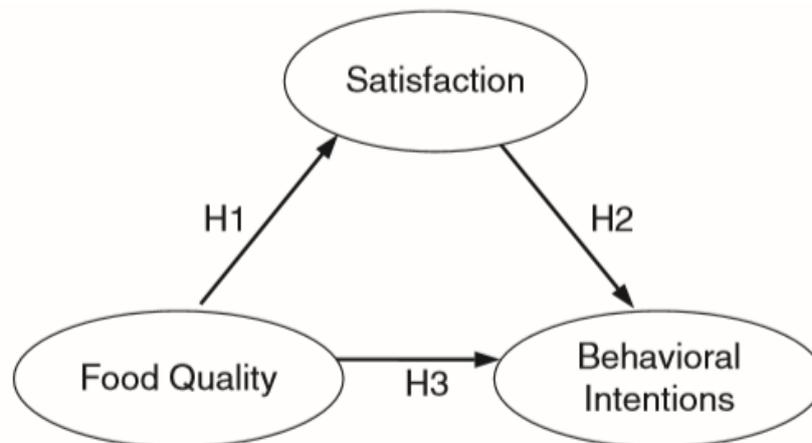


Figure 2: Relationship between food quality, satisfaction, and behavioral Intentions [9]

Food Quality Assessment

Quality measurement of fruits, vegetables, and food products is crucial to the food industry. Several measurement techniques for food quality assessment can be used in the laboratory e.g., chemical analysis, mechanical methods, optical methods, x-ray measurements, and nuclear magnetic resonance.

- *Data Analysis:* Multivariate data analysis comprises a large number of methods, which can cope with different aspects related to food quality. The wavelet transform is widely used in data analysis. This can be used toward getting more reliable measurement data for quality monitoring [10].
- *Spectroscopy:* Near-infrared spectroscopy has been widely applied for fast detection of food compositions and quality evaluation in food products to guarantee food safety and to provide technical support in food development [11]. Raman spectroscopy is a powerful analytical tool for evaluating food quality due to its attractive features (e.g., fingerprint identification, nondestructive data acquisition, fast manipulation, and on-site detection). Impedance spectroscopy provides interesting possibilities for food quality assessment.
- *Emerging Techniques:* The intensive use of emerging techniques to develop food quality evaluation systems will enhance the automation in the food industry. The rapid development of Internet of things has provided comprehensive applications in food quality and safety monitoring [12]. Cloud computing technology can also provide food safety monitoring service. A typical real-time food quality monitoring system is shown in Figure 3 [13]. The use of fuzzy logic for food quality has successfully proved its worth and establishes itself as a good alternative for automation.

Challenges

Although a variety of tools are available for measuring quality attributes, their correlation to consumer perception remains a challenging task. Food quality problems have attracted more attention by public, government, and food industry in past 10 years. The increasingly complex food supply chain increases the risk of food quality [14]. While a particular diet may result in weight loss for someone, it may not be effective for another person due to individual differences in genes and lifestyle. The food sector has become globalized and there is a proliferation of food quality standards worldwide.



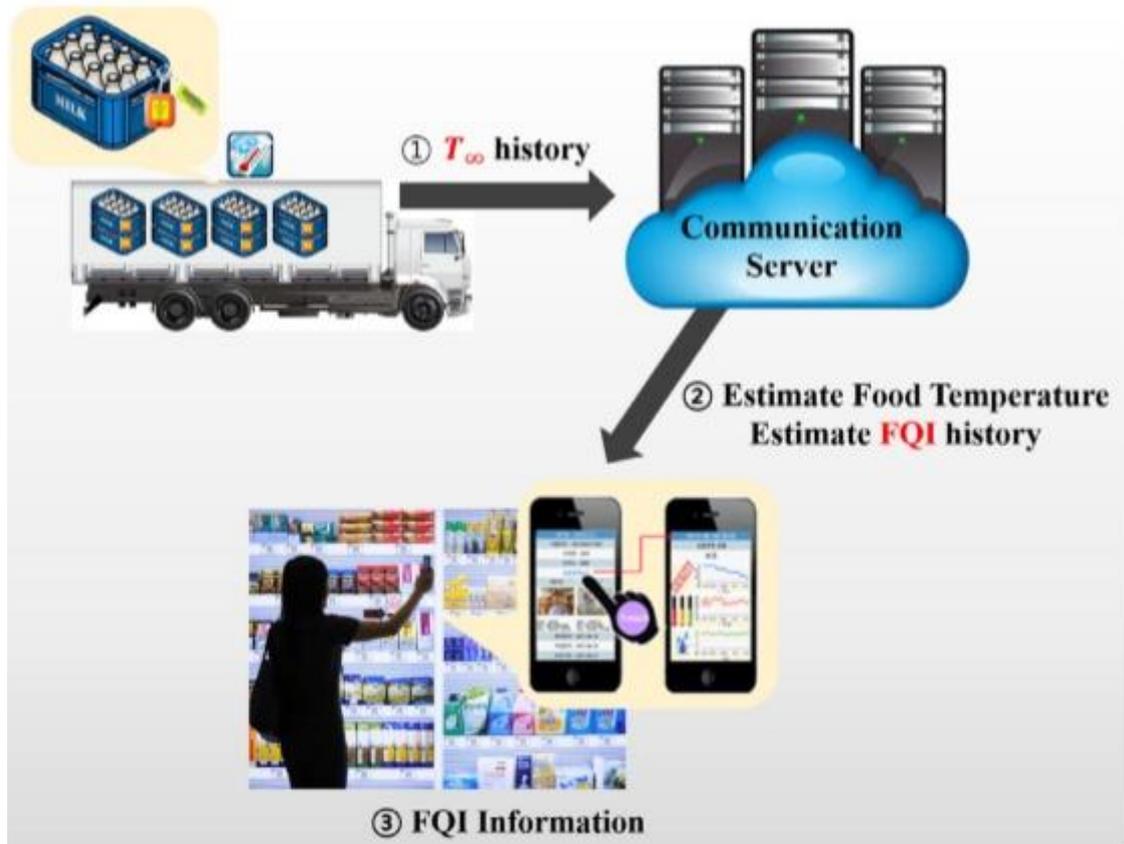


Figure 3: A typical real-time food quality monitoring system [13]

Conclusion

Food quality is a multidimensional concept and is considered as a critical factor in transporting, storing, and food industries making successful competition. It has become an important determinant of success in global food market and an area of ongoing concern for consumers.

More information on food science can be found in numerous books in [15-19] and the following journals exclusively devoted to it:

- *Journal of Food Quality*
- *Food Quality and Safety*
- *Food Quality and Preference*

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