

9 Summary and future prospects

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The many changes in the market for new food products call for a repositioning of existing food production systems and raise the question whether the concepts currently used can survive the challenges of the future. What we see is that apart from market saturation, a number of other developments have a large influence on market conditions. Generally consumers are becoming better educated and more demanding. They are also becoming less predictable in their purchase behaviour, eat more outside the home and are more conscious about health-related aspects. As a result there is a continuous need for new products and a more differentiated food product assortment. Related to this development product life cycles become shorter, and efficiency and flexibility of food production systems become even more important.

In this book many aspects relevant to innovation in food production systems are addressed. Each contribution to the book draws a clear picture of the current situation and future developments in its own domain. However, for successful planning and implementation of product and process innovation it is no longer sufficient to base this on a collection of individual elements. The complexity of the issue of product innovation and product acceptance requires an integrated approach. In fact, as may have become obvious from the previous chapters, there is a need for new concepts in which the various disciplinary approaches are combined into one integrated, techno-managerial approach. Technological inventions, such as those in the field of biotechnology, have to be translated into products which are attractive to consumers. Conversely, changing consumer values and habits will stimulate innovation in food production technologies which will in turn lead to the production of new products. This interdependency between consumers' wants and needs on the one hand and technologies and research on the other has been recognised by many food companies, but is not yet systematically implemented. The interrelationship between technology and consumer behaviour should receive more attention in the modelling of food product innovation.

An additional point which we stress in this book is that there is a need for a chain-oriented approach to product innovation which considers the whole food supply chain from breeders, through processing up to the consumer in one integrating concept. Traditionally, food supply chains have been characterised by two distinct features: 1. the one-way communication along the chain from producers of raw materials to the users of end products (the consumers) and 2. the poor understanding of the concept of product quality. Quality was and in a number of cases still is, predominantly based on technical criteria and producers have tended to focus in particular on costs and productivity. Actors in the food supply chain have this approach to quality in

common. In addition, each actor in a food supply chain will use specific quality criteria such as homogeneity and storability of raw materials at industrial level and ease of handling at the retail level. Sometimes these specific criteria can conflict with end product quality. As a result there is a need for a unified concept of product quality and acceptance throughout the production chain. It requires a chain reversal in which the consumer has become the focal point. Food production systems of the future can no longer be solely production driven but should be characterised as primarily consumer driven.

The contributions to the book also underline the importance of the relationship between the food production system and its environment. This is not only the case with respect to the food consumer, the focal point of the environment of every food production system, but also to the political and legal environment, the facilitating services and new technologies becoming available to a food production system. This environment deserves continuous monitoring by food production systems, if they are to play a leading role in product innovation.

The content of the book suggests that progress in the research of food product innovation should be made not only by further elaborating the topics covered in the various chapters but also by modelling the interdependency between technology and managerial (including marketing) elements of food product innovation. Consumer perception and preferences are the starting point for such a model of food product innovation. How are changes in consumer preferences and market economics translated into the necessary technological developments? A series of studies on future consumer issues has recently been carried out for the Dutch National Agricultural Research Council (NRLO). Meulenberg (1996) has analysed the socio-economic developments in the food market and translated them into consumer categories. Jongen et al. (1997) have used these categories and developed a model for translation of consumer preferences and perceptions into desired technological developments. The model is based on a systems analysis which uses the consumer as the focal point. A stepwise approach is followed in which seven successive steps are distinguished. These steps seem to form a useful framework for an integral model of product innovation in food production systems, and can be summarized as follows:

- I. *Thorough analysis of the socio-economic developments in specified markets*
- II. *Translation of consumer preferences and perceptions into consumer categories*
- III. *Translation of consumer categories into product assortments*
- IV. *Grouping of product assortments in product groups at different stages of the food supply chain*

V. Identification of processing technologies relevant for specified product groups

VI. Analysis of state of the art in relevant processing technologies

VII. Matching specified state-of-the-art processing technologies with future needs

Following this model the study showed that successful linking of Research & Development programmes within companies to market dynamics requires a number of new technological developments to be implemented. In connection with this model we also offer some conclusions and suggestions:

1. The increased competitiveness in the market and the observed changes in purchase behaviour of the consumer require 'dedicated' production systems which follow market dynamics more closely.

There must be a breakthrough in thinking from craft to 'design for manufacture', making use of information technology and computer management systems.

Biotechnology must be developed further, to modify and/or add desired properties to raw materials and ingredients.

More fundamental research must be done on structure-function relations with respect to product design technology and fabricated foods.

2. The increased complexity of the issue of product quality and acceptance, and the costs associated with product innovation necessitate structured approaches and integration of marketing and R&D for efficient use of knowledge and labour.

Systems such as Quality Function Deployment (QFD) and Effective Consumer Response (ECR) will be of great importance and should be developed and evaluated so that they are more suitable for use in food product innovation

The relation between Food and Health with a focus on the so-called non-nutritive components must require further research.

3. Integration of knowledge from different research areas such as sensor technology and materials technology will be necessary in order to be able to meet future consumer demands for product quality.

Developments in material sciences and in the field of (bio)sensors should be explored for application in food production systems, e.g. in new packaging concepts.

It is obvious that our knowledge about the relationships between market changes, consumer behaviour, food products and processing technologies is still by and large insufficient. Nevertheless the proposed stepwise approach seems promising and deserves further attention in order to transform it into a useful approach to strategic investment in product innovation, in particular in future technologies and R&D programmes.

References:

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