Multidisciplinary Food Innovation – consumers, product and communication

WURKS Project Siet Sijtsema, Dora Lakner, Harriëtte Snoek - 2018

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Content

- Introduction
- Background
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Purpose and content of this document

In order to promote multidisciplinary collaboration for food innovation, an overview and explanation will be provided about:

1. Consumers
2. Product development models
3. Communication

This overview is partially based on the work performed for the Connect4Action project of the European Union (EU): www.connect4action.eu.

The consumer at the heart of food innovations

- Insight into consumer perception and behaviour is the first requirement.
- Different disciplines involved from production to consumption.

The consumer at the heart of food innovations

To achieve a more sustainable food system and a healthier and more sustainable diet, it is essential to place the consumer at the heart of food innovation. The failure to meet the nutritional recommendations, the protein transition and more efficient food production systems need to be addressed.

This document presents a number of topics which will help to place the consumer in a key position when it comes to food innovations. Understanding the consumer and their behaviour is a prerequisite, as is the way in which a product can be characterised. It is also important to provide guidance on how these insights can help with various innovations from different disciplines and positions within the food system. This includes the chain from production to consumption as well as the various disciplines required for this, such as cultivation and production techniques, food technology, marketing, quality expertise, microbiology, logistics and retail.

Scope

- Points of reference for students
- Tools for innovations
- Theories, models and relevant insights

This document provides points of reference for students to contribute to innovations of large and medium-sized companies using developed models and theories. The various models and theories are explained with interesting findings, references and, if possible, an assignment so that students can practice with the material.

- Please refer to original sources when making use of this material.

Guidance

- Topics that are addressed:
    - Background of food innovations and a multidisciplinary approach
    - The consumer
    - Products and product development
    - Internal and external communication
- For each subject, the theory is described, examples are given and these examples are elaborated into possible points of reference.
- An assignment is included at the end of the document.

General background

- Changes in society
  - the diet should be more sustainable in order to reach climate goals
  - a more healthy food consumption is needed to achieve a population who's diet follows the recommendations
  - to make healthy diets available and accessible for all citizens, barriers need to be addressed
- It is therefore necessary to better understand consumers and innovations.

Examples of innovations in food

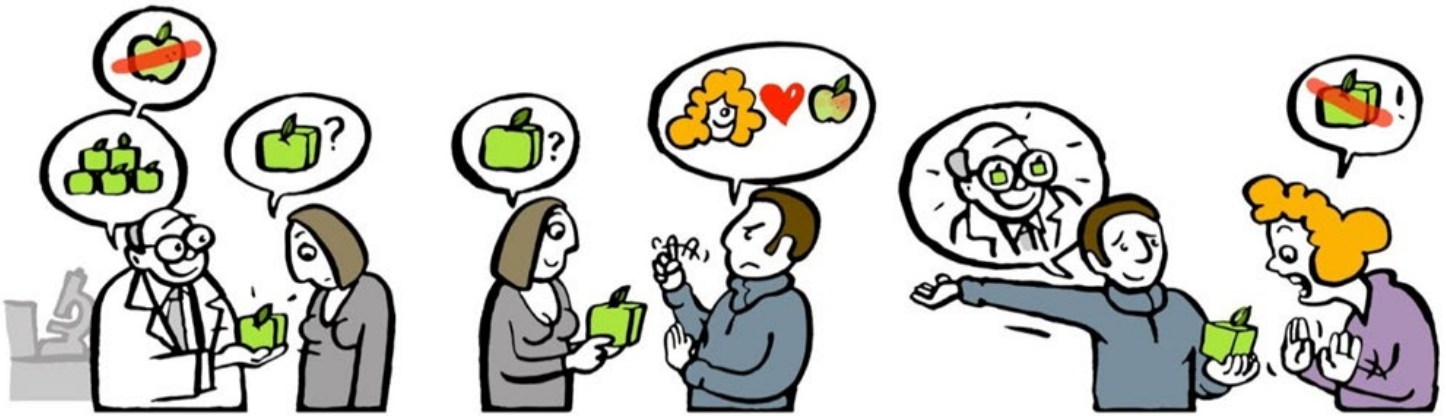
- Product and packaging
- Production process
- Position: marketing to new customer segments, improving marketing and communication activities (e.g. online initiatives).
- Approach: making strategic decisions and building relationships with external partners.

Anahita Baregheh, Jennifer Rowley, Sally Sambrook, Dafydd Davies, (2012), 'Food sector SMEs and innovation types', British Food Journal, Vol. 114 Iss: 11 pp. 1640 – 1653)

Failures of innovations

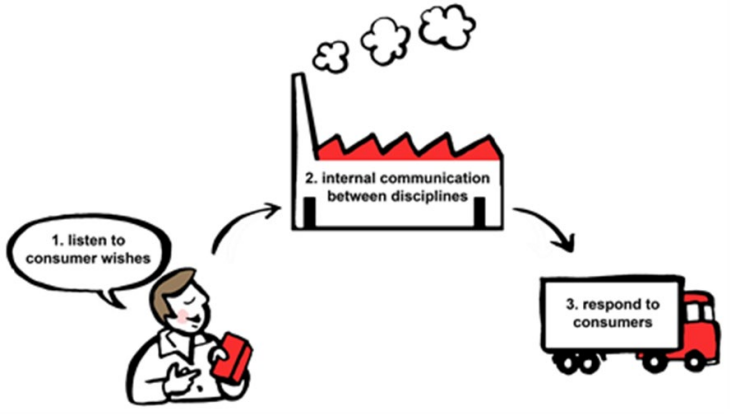
The percentage of innovation projects and business initiatives that failed either completely or partly is remarkably high and could exceed, in some cases, 70% of the initiated innovation projects.

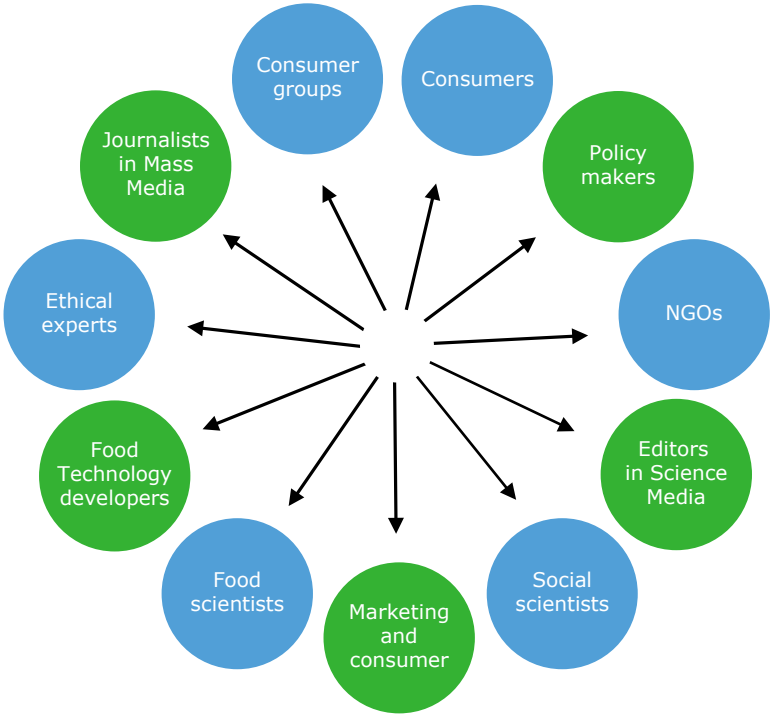
(Rizova, 2006; Balachandra & Friar, 1997; Carr, 1996; Cozijnsen et al.,2000; Wycoff, 2003)



DIALOGUE Between different experts

Engaging and connecting key players in a dialogue will help to respond better to consumer wishes and reduce innovation failures.





Which disciplines/positions participate in new product developments for food?

- Chain actors: breeders, growers, producers, processors, distributors, retailers
- Disciplines:
    - Technology, microbiology, processing, nutrition, sensory
    - Social sciences, marketing, economy, consumer research, communication, management
- Theoretical (scientific), practical (applied research), entrepreneurial
- Participation: chain actors, researchers, consumers (organisations), designers

Background: include the consumer in food innovation

- In order to be more successful, it is essential to include consumers in product development (Van Kleef et al 2005 and Grunert and van Trijp 2014).
- Consider consumer acceptance and risk perceptions of the innovated product (Fischer and Reinders, 2016).
- Stakeholders involved in product development express that a multidisciplinary approach is needed (Raley et al 2016).

Consumers

Understanding the consumer

Influencing the consumer

Product development – Food Perception model (Sijtsema, 2003)

Explanation

This model shows four interrelated determinants of food perception in daily life.

- First is the **individual** with her or his own characteristics related to demographics (e.g. age, gender, education level, income) biological (e.g. need for specific nutrients) and psychological (e.g. intentions and attitudes).
- Second is the individual as they operate in a social **environment** by being part of a household or a family in a specific society with its own culture and traditions.
- Third is the food **product** with its own characteristics.
- Fourth is the product as it is consumed in a specific **context** dependent on time and place.

Food perception is always a combination of a person perceiving a specific food product or dish, the food itself with its characteristics, as well as the production system applied.

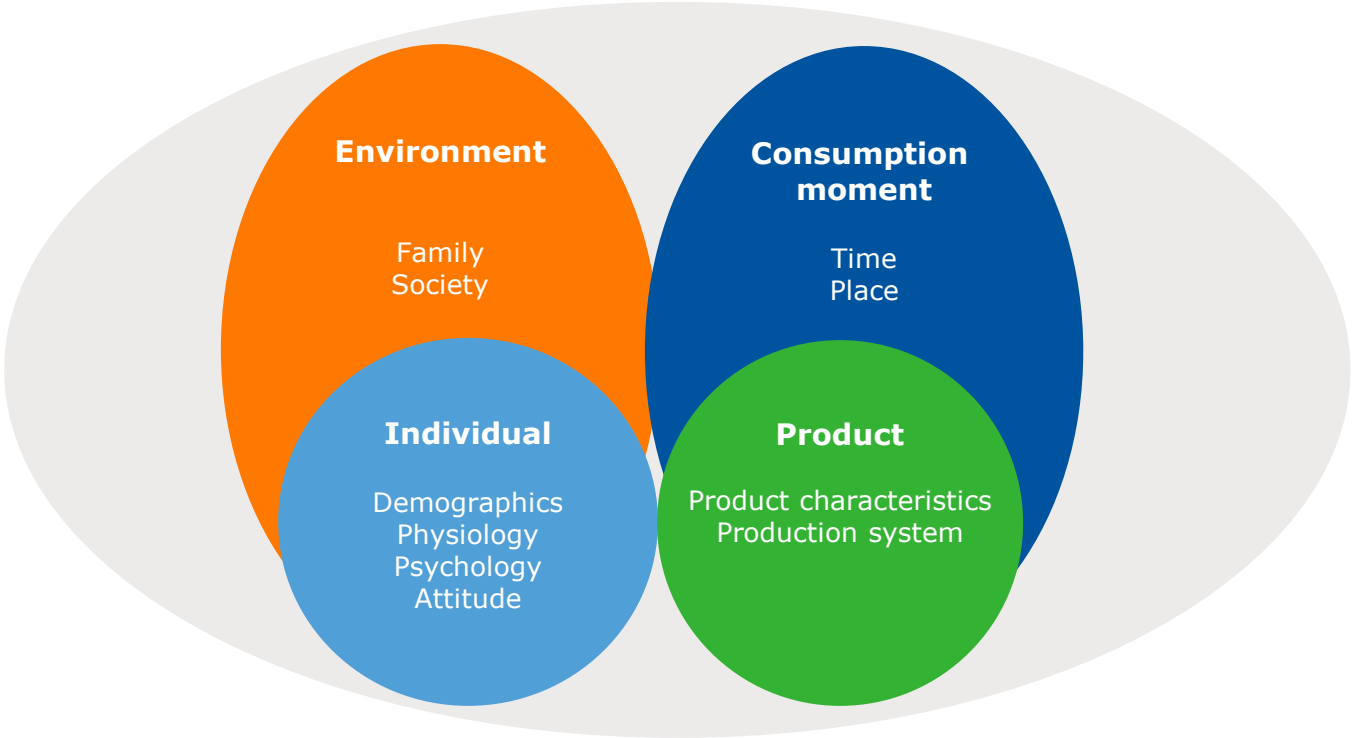
Sources

- Sijtsema 2003 thesis (see next page)

Examples and/or assignment

- Think about your breakfast this morning, a snack you had between meals yesterday and your warm meal last Monday.
- Additional questions to be answered about these different moments: Why did you eat that? Did you choose yourself or did someone else choose for you? Do you eat this more often or not and why? Where do your answers fit in the model?

Product development – Food Perception model (Sijtsema, 2003)



Perception
Sijtsema *et al.*, 2003

Products and product development

Product development & Consumers' food perceptions - Total Food Quality model (Grunert, 2005)

- A framework for understanding how consumers perceive and make decisions to buy or not buy and eat or not eat food products and how they perceive the quality of food products.
- Quality – defined from a subjective sense, which includes all aspects that make a product attractive to the consumer.
- This model shows the complexity of all kinds of variables which influence consumer food choices and acceptance at different moments in time and on different levels of abstraction.

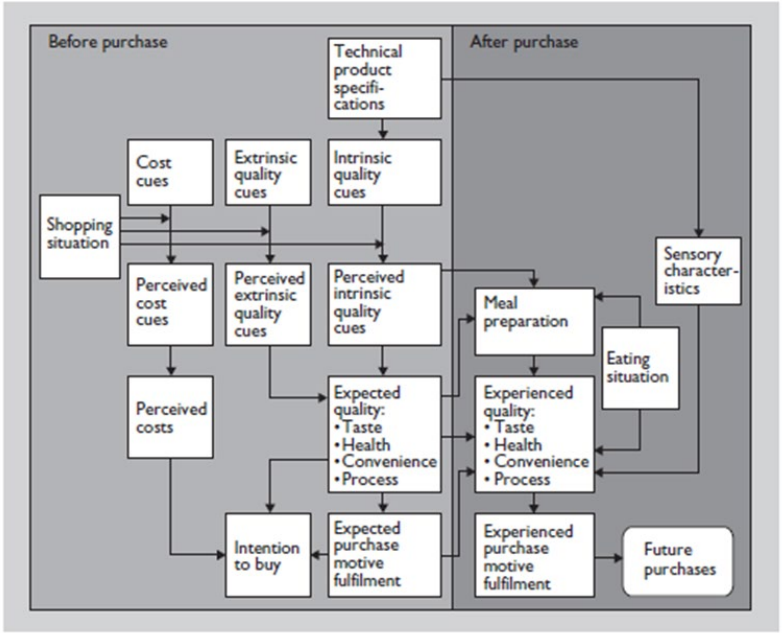
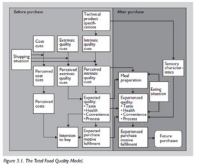


Figure 3.1. The Total Food Quality Model.

Product development & Consumers' food perceptions - Total Food Quality model (Grunert, 2005)



Explanation

How to understand the total food quality model:

- How consumers judge a food product is influenced by time, for example before and after purchase but also before and after eating. This is represented by the horizontal dimension of the model.
  - Expected quality (before purchase) and experienced quality (after consumption).
- Cues – pieces of information used to form expectations about quality.
  - Quality cues are both intrinsic (physical characteristics and objectively measurable such as colour, taste and texture) and extrinsic (all other characteristics which are added to a product such as brand, price, distribution, outlet, packaging).
  - Consumers talk about food and its characteristics on different levels (hierarchy of terms). Examples of general cues are 'healthy' and 'quality', whereas more concrete cues would be words like 'nutritious' and 'vitamin C' which relate to more specific characteristics. These more abstract values towards more concrete product cues is represented by the vertical dimension of the model

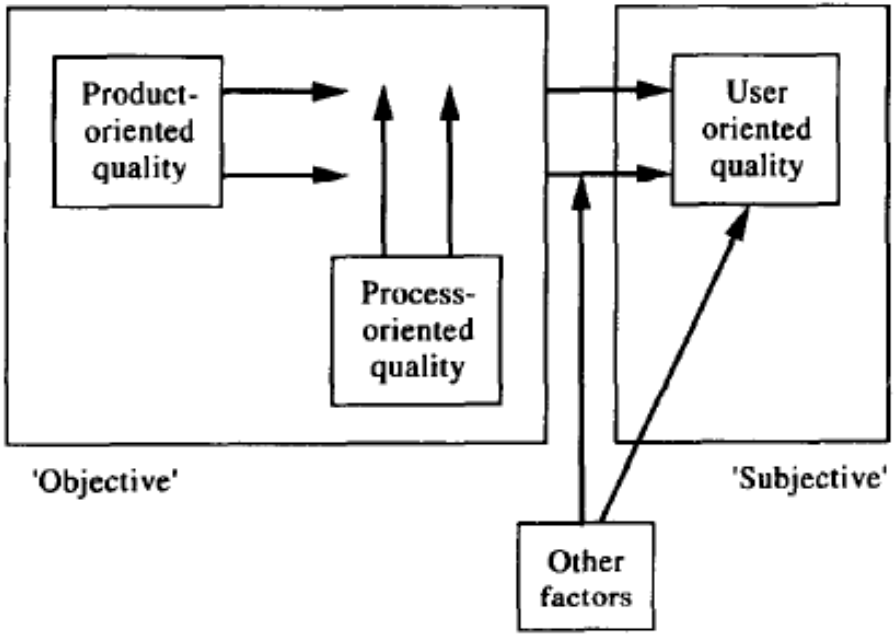
Sources

- Grunert 2005 https://pure.au.dk/ws/files/32302886/wp77.pdf
- Bronso et al 2002
- Grunert, K. G., & van Trijp, H. C. M. (2014). Consumer-Oriented New Product Development. in: Encyclopaedia of Agriculture and Food Systems (pp. 375-386).

Examples and/or assignment

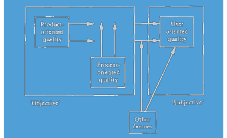
Assignment: Think about your weekly groceries or about what you eat every week. What do you consider to be important? What do you pay special attention to when you do your grocery shopping? What do you pay special attention to when you cook or eat at home? Did you consider the same product qualities to be important?

Product development – Food Quality Perception (Grunert, 1995)



Product development – Food Quality Perception (Grunert, 1995)

Explanation



Overview of different types of quality - This model shows the different types of perceptions which describe food quality.

- The objective quality consists of the product-oriented quality and process-oriented quality, both of which can be measured with instruments.
- Product-oriented quality is measured by means of a food product's physical properties, like the fat percentage of milk, sugar content in tomatoes, etc.
- Process-oriented quality is the extent to which the product-oriented quality remains stable at pre-specified levels (i.e. certain levels of fat percentage, sugar in tomatoes, etc.).
- The subjective quality is the user-oriented quality. This is the quality perception of the user who can be the retailer or the consumer. This type of quality might differ between consumers and other subjects such as retailers. This user-oriented quality can be influenced by factors in addition to the product itself, like the purchase situation, the price or with whom the product is eaten.

Sources

- Grunert , K. G. (1995) Food Quality: a means-end perspective. Food quality and preference 6 171-176
- Grunert 2005 https://pure.au.dk/ws/files/32302886/wp77.pdf
- Bronso et al 2002
- Grunert, K. G., & van Trijp, H. C. M. (2014). Consumer-Oriented New Product Development. in: Encyclopaedia of Agriculture and Food Systems (pp. 375-386).

Examples and/or assignment

- How does a company determine the quality of the ingredients, of the production process and of the end product? How are these measured?
- What do you, as the consumer, pay attention to when assessing food products? How do you assess this?

Product development – Means-end chain (Grunert, 1995)

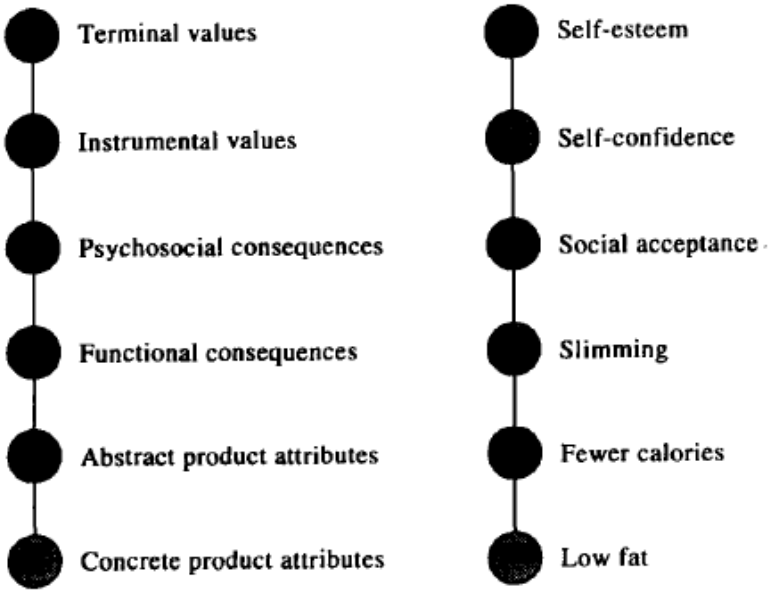


FIG. 2.

Product development – Means-end chain (Grunert, 1995)

Explanation

- The means-end chain is a model for consumers' cognitive structures depicting how concrete product characteristics are linked to personal consequences.
- More specifically, it demonstrates how concrete or abstract product characteristics are linked to the functional or psychosocial consequences of consumption, which in turn may be linked to the attainment of instrumental or terminal life values. Figure 2 provides two examples of the different levels of abstractness from consumer values to consequences and product attributes

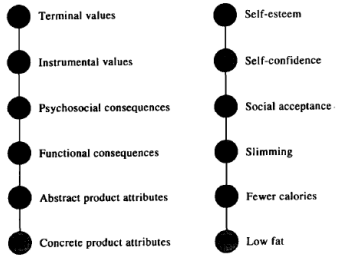


FIG. 2.

Sources

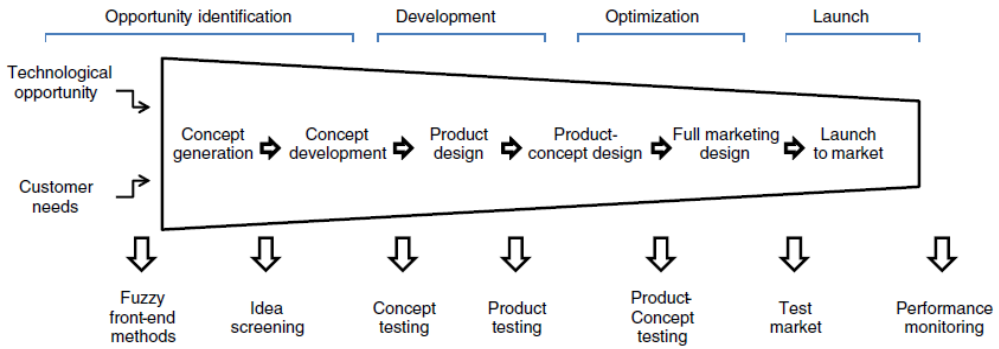
- Grunert, K.G. (1995) Food Quality: a means-end perspective. Food Quality and preference 6 171-176
- Grunert, K.G. (2005) Consumer behaviour with regard to food innovations: quality perception and decision-making In: Jongen, W.M.F and Meulenberg M.T.G Innovation in Agrifood systems Product quality and consumer acceptance.
- Grunert 2005 Author, year, title, etc. https://pure.au.dk/ws/files/32302886/wp77.pdf
- Other relevant sources: means-end chain

Examples and/or assignment

- Here are a few values, consequences and attributes:
- Happiness, quality of life, safety, honesty, confidence, long and healthy life, looking good, enjoyment, guilt, health, more energy, natural products, environmentally friendly product, good taste, price, sweet, delicious, crispy.
- Divide these into values, consequences and attributes.

Product development model – Formal gateway process (Grunert and Van Trijp, 2014)

- This model presents the different phases of consumer-oriented new product development. In this model technological and customer needs are combined.
- Different methods are presented below the funnel to explore and test consumer needs and wishes related to ideas, concepts and test products.
- This model shows the need for a multidisciplinary approach in which insights about consumer and customer needs are combined with insights about technological opportunities.



Product development model – Formal gateway model (Grunert and Van Trijp, 2015)

Explanation

How to understand the formal gateway model:

- The model divides new product development into four phases starting with opportunity identification, development, optimisation and launch.
- There are six phases in which technological insights and consumer and customer needs should be combined in order to generate ideas and concepts and to develop these into successful new products.
- Research methods to explore consumer and customer needs are given for each phase.

Sources

- Grunert, K. G., & van Trijp, H. C. M. (2014). Consumer-Oriented New Product Development. In Encyclopaedia of Agriculture and Food Systems (pp. 375-386).
- Grunert 2005 Author, year, title, etc. https://pure.au.dk/ws/files/32302886/wp77.pdf
- Bronso et al 2002
- ....

Examples and/or assignment

Assignment: Think about a new product. Which questions does the product give rise to and to which phase of the development process do they belong?

Consumer-oriented new product development model (Grunert, 2005)

- Consumer-oriented product development: the starting point of new product development should be a positioning of the product in terms of the qualities which are desired by consumers, because they tap into the consumer's life values thus creating motives for purchasing.
- This positioning of the product in terms of values has to be translated into a physical product in the product development process. The physical product will result in consumer exposure to certain intrinsic cues which result in the perception of quality both before and during the purchase and during preparation and consumption. These have to be complemented by the right set of extrinsic cues, so that the overall quality perception corresponds to the positioning. The set of desired extrinsic cues has to be implemented by packaging, advertising or other communicative means. The communication and the physical product should link the product to the same set of consumer life values, thus supporting each other in triggering the same purchase motives

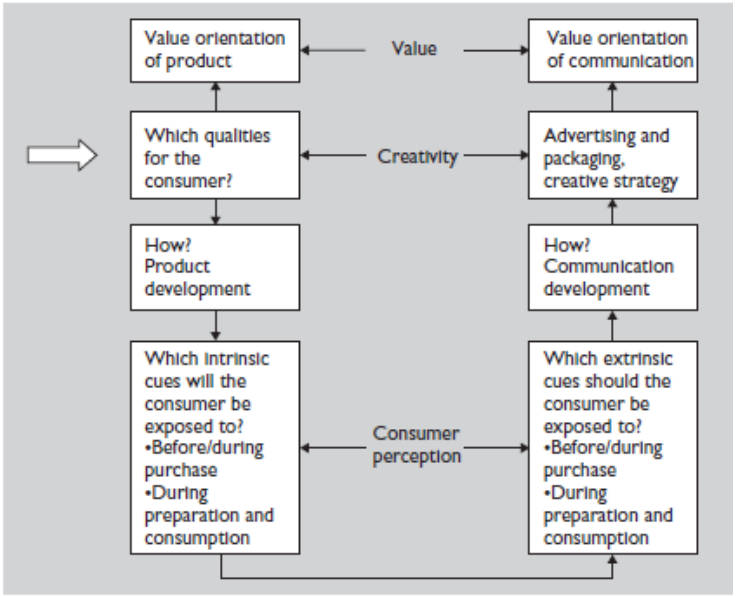


Figure 3.11. A model of consumer-oriented new product development.

Overview of methods to be applied when gathering consumer insights for product development (Van Kleef et al., 2005)

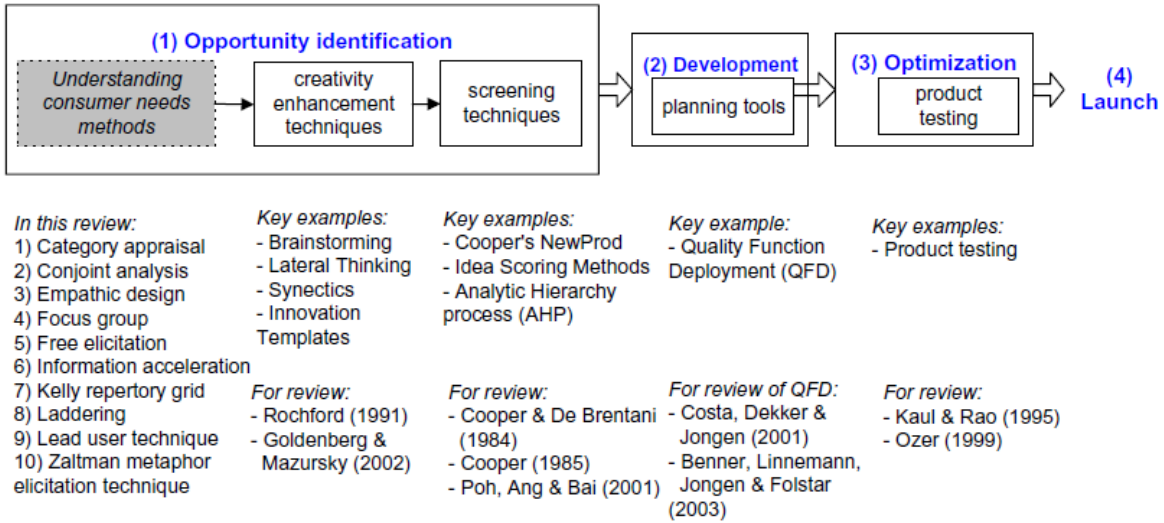


Fig. 1. Overview of stages of new product development process along with representative consumer research methods and key references for reviews.

Overview methods (Van Kleef et al., 2005)

Explanation

- The publication by van Kleef describes the methods that can be used in the various phases of product development to gain consumer insights.
- Incorporating the 'voice of the consumer' in the early stages of the new product development process has been identified as a critical success factor for new product development. Yet, this step is often ignored or poorly executed. This may be due to lack of awareness about which methods are available, the use of discipline-related terminology and the difficulty of accessing papers on this subject. This paper reviews and categorises ten of the most common methods in this area in terms of what their key features are and what their strengths, weaknesses and suitability are. We develop a classification scheme based on three performance dimensions with specific criteria: (1) stimuli used as a cue for need elicitation, (2) task format and (3) need actionability. We provide guidelines for the suitability of these methods in the new product development process based on the newness strategy of the development process (radical versus incremental innovation) and identify which functional department (marketing versus R&D) the method should primarily support

Sources

- Van Kleef et al (2005) Consumer research in the early stages of new product development: A critical review of methods and techniques. Food Quality and Preference 16 (2005)3. - ISSN 0950-3293 - p. 181 - 201.

Examples and/or assignment

- Link to the wiki?
- Which questions do I want to have answered and in which phase of the development am I currently? Do I want exploratory qualitative research? Do I want to know how large certain groups are (quantitative research)?

New product development – Quality Function Deployment

Further reading application of QFD on fruit:

Special issue Scripta Horticulturae (2012): The interdisciplinary ISAFRUIT- Vasco da Gama process and its resulting House of Quality method: The next step towards sustainable fruit production while addressing consumer demands with critical problem-oriented research Edited by: Luca Corelli Grappadelli, Pasquale Losciale & Lukas Bertschinger

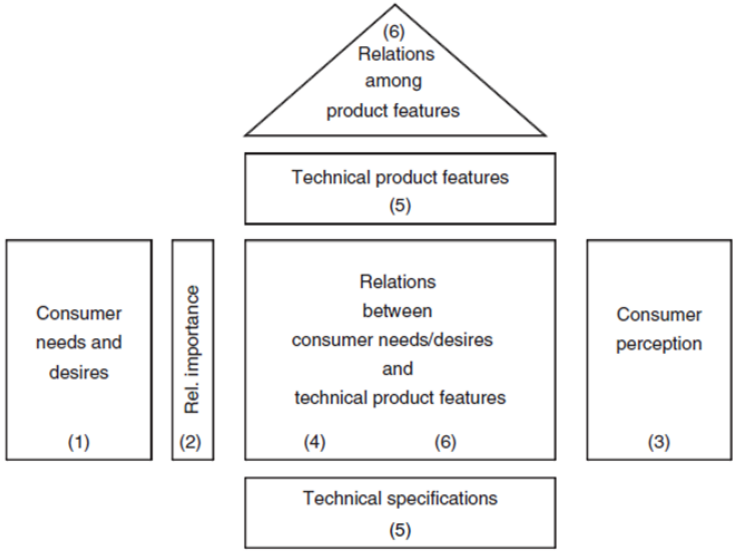


Figure 4 The House of Quality within Quality Function Deployment. Adapted from Van Trijp, J.C.M., Steenkamp, J.E.B.M., 2005. Consumer-oriented new product development: Principles and practice. In: Jongen, W.M.F., Meulenberg, M.T.G. (Eds.), Innovation in Agri-Food Systems: Product Quality and Consumer Acceptance. Wageningen: Wageningen Academic Press, pp. 87–124.

Quality Function Deployment - Example

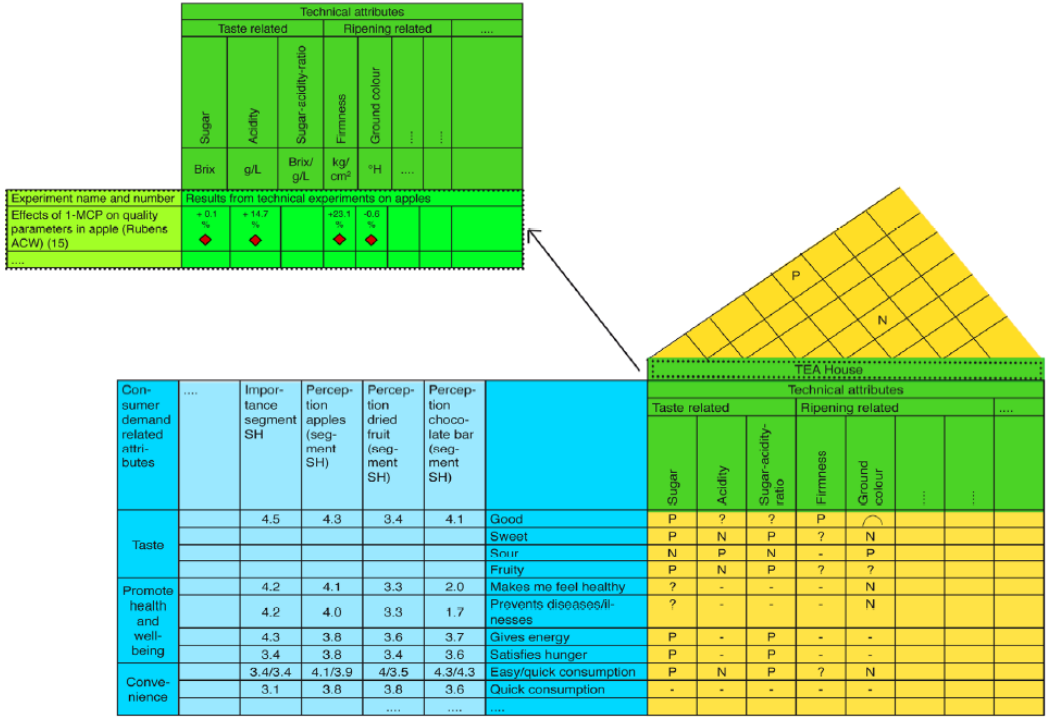


Fig. 2. Excerpt from the ISAFRUIT House of Quality, including an excerpt of the TEA house on the upper left. Note: all parts displayed are for explanatory purposes. Specific linkages and results are not suitable for referencing. For the most actual version of the House of Quality with the linkages established so far, see www.isafruit-vdg.ch.

Links

Link to wiki technology and consumer science:

- https://www.youtube.com/watch?v=a27AtHMtmkY
- https://www.youtube.com/watch?v=0bUlhZv-wCc

Link to glossary key terms:

- http://www.connect4action.eu/toolbox/glossary-of-key-terms/Glossary-1/

Link to further reading about consumer understanding:

- WURKS Consumer connections short food chains

Product development model Example

Explanation of the different stages:

- Opportunity identification
- Development
- Optimisation
- Launch

Example

Explanation by means of questions to be answered in the different stages of product development.

Based on work of EU ISAFRUIT

Jesionkowska, K., S.J. Sijtsema, D. Konopacka and R. Symoneaux (2009) Dried fruit and its functional properties from a consumer's point of view. *Journal of Horticultural Science & Biotechnology* (2009) ISAFRUIT Special Issue 85–88

Example dried fruit

opportunity identification → development → optimization → launch

During the harvest season, many berries are available.

- How can you best capitalise on this?
- Is dried fruit an option?
- If yes, how?

Dried fruit is interesting because:

- It contributes to increased fruit consumption
- It is easier and more user-friendly than fresh fruit as it keeps longer and is easy to take with you

Opportunity identification

Questions?

- How do people think about fruit and dried fruit in general?
- Which barriers do they experience when eating fruit?
- How do they eat dried fruit? Just like that or processed into other products?
- Which technologies are available to dry fruit? Conventional and freeze-drying and what are the characteristics of these products?
- Literature, equipment, testing

How do you get answers?

- Literature
- Consumer research: focus groups or interviews to measure perceptions about dried fruit.

Examples of results:

- Dried fruit is seen as unconventional in The Netherlands and more traditional in Poland

What do you do with answers?

- Meet with the product development team and take decisions together.
- What are the opportunities?
- Which technology is even better suited?
- Which products are most suitable for us?
- Drying different berries
- Trying out various drying technologies
- Develop a dried fruit product

Development

Questions?

- What is the consumption of dried fruit like?
- In combination with which other products is it consumed?
- When are dried fruits eaten?
- What could be another suitable moment for eating dried fruit?
- Which fruit is better or less suited for drying in terms of flavour?
- Which fruit is better or less suited in terms of healthiness?

How do you get the answers?

- Research by questionnaire
- Sensory tests
- Research the nutritional value

What do you do with the answers?

- Make a choice about which fruit you are going to use.
- Make decisions regarding which combinations with other products are possible (e.g. biscuits or cruesli with dried fruit).
- Make a choice to optimise technology?
- Make decisions regarding the sugar solutions for the drying process.

Optimization

Questions?

- On which consumer target group are you going to focus?
- Which preferences do people have?
- Which process technological characteristics deliver better quality products?
- And which ingredients?

How do you get the answers?

- Consumer evaluation of the product whether or not including health claims.
- Consumer preferences
- Quality tests
- Taste tests

What to do with answers?

- Which health aspects are you going to continue with?
- Which flavours are you going to continue with?
- Which fruit types are you going to continue with?
- Optimising the process
- Optimising the ingredients
- Optimising the quality

Launch

Questions?

- Which packaging?
- Where do you sell it?
- Which place is it given on the shelves?

How do you get the answers?

Research into:

- Consumer preferences for products and packaging.
- Which packaging is preferred?
- Which packaging do you use for which sales channel?

- Quality check
- Sensory research

What to do with answers?

- Formulate claims taking into account laws and regulations.
- Adjust packaging.
- Decide where to place the product on the shelves.

Communication

Barriers

Communication framework

Internal communication

External communication

Examples / cases

Based on EU Connect4Action -
http://www.connect4action.eu/

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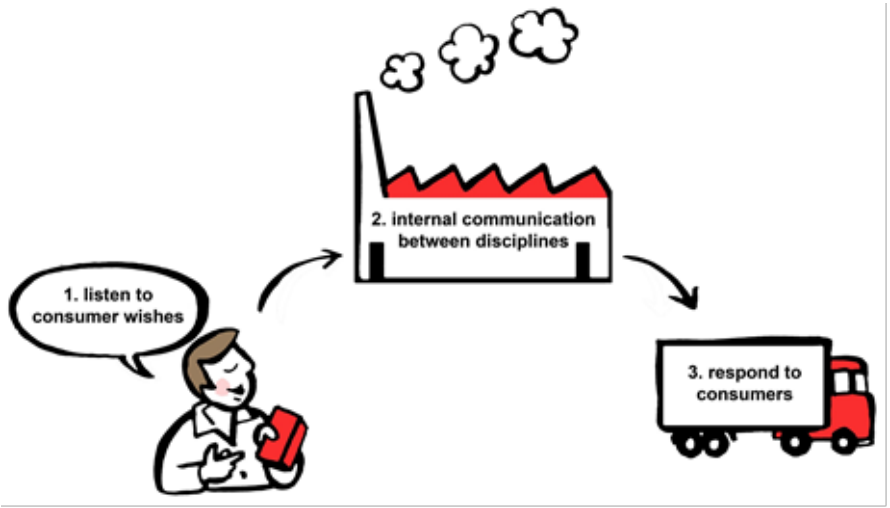
Innovation and communication

- In order to develop the dialogue at the various stages in the food technology development and commercialisation process, specific types of communication are necessary.

We focus on two types of communication:

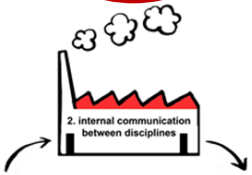
- **Internal communication:** between the different disciplines involved in food technology development and commercialisation within an organisation.
- **External communication:** between food technology development and the final consumer.



Internal- external communication

Internal communication

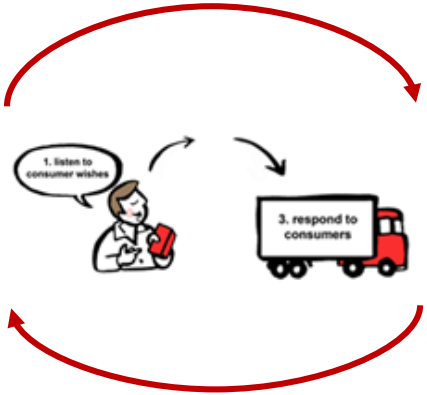
Business
Food
technology



External communication

Identify consumer wishes

Business:
Consumer
science



Consumers

Respond to consumer wishes

Multidisciplinary working (Jacobsen et al., 2014, Raley et al 2016 and deliverable 4.3)

Barriers

- The consumer scientist and food scientist do not use the same language: information from consumer scientists cannot be used by technologists and vice versa.
- The mindsets and goals of professionals from different disciplines differ: there is a low awareness of the objectives of other activities in the research and development processes.
- There is no opportunity in terms of time and organisational structure to develop a dialogue between consumer scientists and food technologists.

Opportunities/challenges

- Establishing an interdisciplinary team consisting of individuals possessing understanding of more than one discipline.
- Training multidisciplinary individuals.
- Direct communication between individuals through meetings and shared work.
- Formal management interventions.
- Allocating budgetary resources.

Considering consumer research (Jacobsen et al., 2014, Raley et al., 2016 and deliverable 4.3)

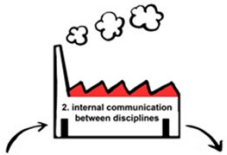
Barriers

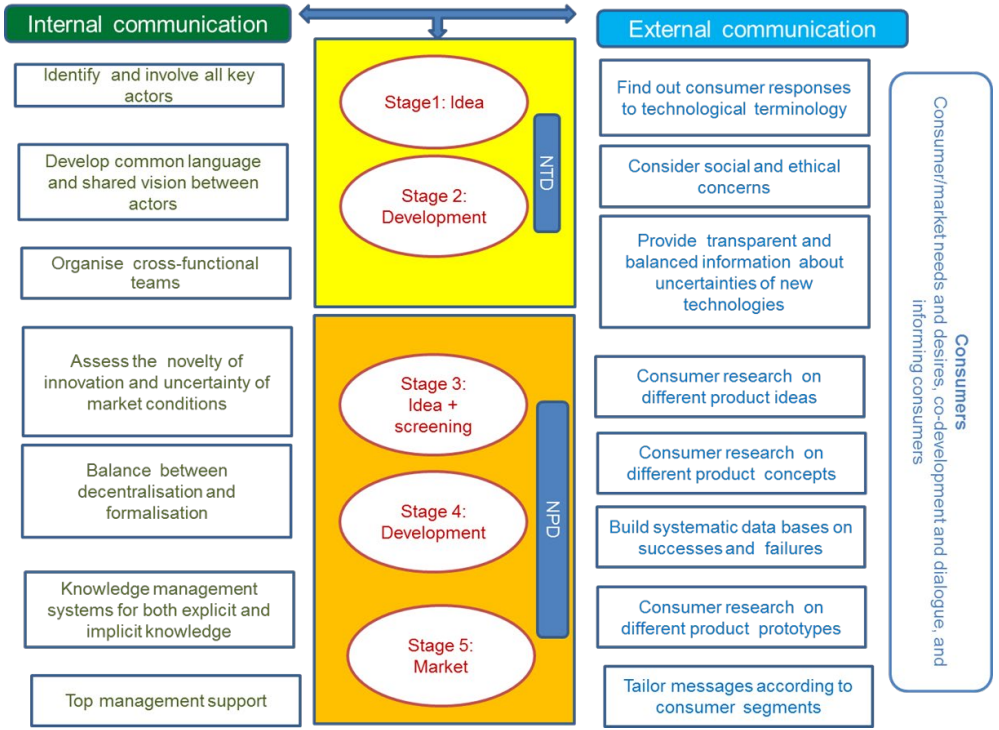
- The development of new technologies is driven by advancements in technology → consumer priorities are not taken into consideration before the product stage.
- The public may have difficulties in understanding and/or appreciating the benefits of new technologies unless they are presented as concrete product-related benefits.
- Information produced by consumer scientists may not be usable for food scientists or current consumer research methods are not able to assess the market potential of new technologies.
- Consumer research methods are not able to measure the market potential of new technologies.

Opportunities/challenges

- Robust/more effective consumer research methods are needed.
- Consumer research results need to be translated into concrete and actionable outcomes.
- Consumer scientists need knowledge and understanding of the technology being developed. They need the specifications of the technology and access to the available information about risks and uncertainties.
- Improved communication is needed between consumer scientists and food technologists in the design and interpretation of consumer research.

Communication Framework (www.connect4action.eu)





NTD:
New technology development

NPD:
New product development

Internal Communication

Why internal communication is important

Market-oriented New Technology Development (NTD) and New Product Development (NPD): identifying the consumer/market needs and desires and making them actionable in the innovation processes.

Making NTD/NPD more cost-efficient by:

- Reducing the number of failures
- Enabling rejections early in the process at the idea and screening stages
- Increasing the success of developed products

Why internal communication is important

- In the food industry, poor communication can lead to costly mistakes and waste of time and it is a major problem that only a very limited amount of market knowledge is actually integrated in the NPD process (Suwannaporn and Speece, 2003, Suwannaporn and Speece, 2000).
- For example marketing may give the product specification to R&D, but R&D then develops the product with no further communication to marketing. This lack of communication will most likely lead to failure of the food product, as market research is not included continuously in the NPD process.

Internal communication enablers (1)

Aim

The aim of the enablers presented in these slides is to create an effective and efficient communication process within the company. 'joint behaviour toward some common goal of interest'

Organisational structure

1. Formalisation

- Formalisation of activities will improve communication between marketing and R&D because the team members are forced to share information at fixed time intervals by for example having scheduled face-to-face meetings. Without these formal procedures, information sharing will only happen rarely and on the specific initiative of the team members (Moenaert et al., 2000).
- One of the formalisation procedures is the setting of clear goals, highlighting an important aspect of formalisation
- By having common goals and clarifying the individual person's role in the NPD process, people from different functions are more likely to share information and sort out conflicts.

2. Centralisation

- The overall view is that formalisation and decentralisation will facilitate internal communication between functions and thereby influence NPD success.

Internal communication enablers (2)

Team composition: how teams are optimally structured

1. Cross-functionality

- Crossfunctional teams where teams are consisting of experts from different functions – especially marketing, R&D, and manufacturing.
- In order to obtain better internal communication flow, internal linkages need to be stronger. Technical experts need to educate marketing experts about recent developments in technology, and marketing experts need to educate technology experts about aspects of consumer behaviour. Information must flow in both directions in order to increase the likelihood for NPD success

2. Role flexibility

- meaning that marketing experts and R&D experts are able to carry out some of each other's tasks.

Management mechanism

Management support is important to facilitate internal communication between functions by proactively supporting the interacting culture in the organisation

HOW:

- They can do this by frequently emphasising the importance of knowledge sharing for their employees and by establishing the right organizational context to facilitate the knowledge sharing
- Team to overcome difficulties, providing encouragement, keeping open communication channels with people involved in the NPD, and providing the resources facilitating a successful NPD process

Internal communication enablers (3)

Knowledge management

- A system that promotes collaborative environment for capturing and sharing existing knowledge, creates opportunities to generate new knowledge, and provides the tools and approaches needed to apply what the organization knows in its effort to meet its strategic goals'
- With the personalisation strategy, knowledge is connected to the individual person (tacit knowledge) and will often be shared by human-to-human interaction
- With the codification strategy knowledge is codified and stored in documents or databases where everyone within the company can make use of it.

Communication process

Transparency	**'The degree to which the communication network is sufficiently clear and accessible, in order to let everyone understand the inputs and progress made Moenaert et al.' (2000)** By making the responsibilities and expertise of each member in the NPD process explicit to other members, transparency will facilitate quick access to deep knowledge leading to more relevant knowledge being used
Knowledge usability	**'The extent to which the knowledge which is shared, is perceived as meaningful, relevant, action-oriented, and innovative'** ▪ One of the main barriers to integration of the two functions is that R&D is more technically oriented whereas marketing is more market oriented and the two functions will therefore find different kinds of information relevant. ▪ These different perceptions of relevance can be a problem, since relevance has a very strong effect on information usability (Moenaert and Souder, 1996). The difference in perception of knowledge usability appears from the different thought-worlds resulting from the different backgrounds of marketing experts and R&D experts. Whereas R&D experts are often graduated from engineering and science schools, marketing experts are often graduated from business schools (Griffin and Hauser, 1996). This difference typically results in different languages. ▪ Marketing experts may speak in terms of product benefits and perceptual positions, and R&D experts in quantitative terms of specifications and performance. This will limit the ability to communicate as information is not interpreted in the same way by the different functions. ▪ Making information useful for everyone is a big challenge for companies.
Knowledge credibility	Knowledge credibility relates to the climate in the company and the level of trust between functions
Communication cost	One of the arguments for engaging in crossfunctional communication is that the costs and delays related to continuous recycles can be avoided (Becker and Lillemark, 2006)

Examples of dos and don'ts in internal communication

Identify and involve all key actors

Identify and involve all key actors

In addition to research and product experts working with technology and production issues, NTD and NPD processes need input from different actors in the food domain. Consumers, regulators and different interest groups should be considered as possible stakeholders affecting the final acceptance of new technologies and products. These possible interest groups have to be identified case-by-case and assessed whether (and how) it would be beneficial to involve them in the NTD and NPD processes, e.g. by having an open dialogue with different interest groups. This approach will enable early detection of possible barrier and facilitators for the acceptance of new products and technologies.

Identify and involve all key actors

Technology and product development projects are often including various actors, both those working within the companies and those contributing as outside experts from research institutes or academia, which adds to the complexity of the communication needs. The integration of food technology and consumer science in NTD/NPD appeared different among companies. According to the interviews, some companies develop technologies in their R&D departments and hand the projects to the marketing department once the technology development stage is completed. Others integrate marketing/consumer science at the beginning of the projects. Companies are often under time pressure in their decision making decisions and it would slow down the innovation process to hold regular meetings with all actors.

Identify and involve all key actors

Different actors may be needed and become relevant at different stages during the innovation process. In the food industry, it is very common to subcontract certain stages and tasks of the innovation to external parties, including industry and academia. Thus, project descriptions and a division in work packages are commonly used to clarify tasks and thereby also support clear communication across actors. Especially when the innovation process is branched to several separate tasks, there is a need to have a clear picture of which parties are involved in different tasks and how communication flow between different subgroups is ensured.

Development of common language and shared vision across actors

'It is extremely important to align expectations. […] If this is not communicated clearly and expectations are not shared, then the hidden agendas may have a negative impact on the project.'

'Communication is most optimal if people try to listen to each other and try to implement what others are saying into their own work.'

Development of common language and shared vision across actors

- Food experts and consumer/market experts come from different scientific backgrounds and developing a common language that both parties understand requires time and effort from both sides. The NTD/NPD processes should allow time for developing this common language as it helps to develop a shared vision and goals for the NTD/NPD processes. If the whole team works more efficiently towards common goals, the likelihood of misunderstandings at the later stages of NTD/NPD will be reduced.

- A shared vision across actors was considered a prerequisite for most interviewees. For example, it was pointed out that an initial project briefing with all key actors is required to set goals for the project. Another example suggested was the use of a facilitator in meetings to assist the communication between people from different backgrounds. This could also balance the decision-making process by reducing the political power of some people or sub-teams in the process.

Organise cross cultural-functional teams

‘The R&D department doesn’t have much time for cross-functional teams and […] they try to include marketing people, but normally they aren’t interested until later when they can see the value coming in’

'If the technology people want something or need something to be done a certain way and the consumer people understand really why it is, and really are involved in finding a solution, then the problem would be more understood'

Organise cross cultural-functional teams

Cross-functional teams containing both food and consumer experts (and other relevant expertise) enable an on-going dialogue between different specialists. This promotes knowledge exchange in recent developments in technology and market environment. In cross-functional teams, the goal setting can take into account both the technological demands and boundaries set by consumer behaviour and market conditions. By providing organisational platforms for exchange of views, cross-functional teams are likely to also encourage informal communication between experts and even enable rotation of tasks from one discipline to another.

Organise cross cultural-functional teams

Similarly to the other recommendations, the experience with and use of cross-functional teams differed between organisations. Start-ups or SMEs did usually not work with cross-functional teams due to smaller project teams. However, it was also pointed out that while they may not work on in cross-functional teams, they often work with actors coming from other organisations on their projects. In large organisations, cross-functional teams established internally were more common, but still to different degrees. While some interviewees explained cross-functional teams as ‘the standard way of working’, others stated that they did not have cross-functional teams because of lacking interest from both functions.

Assess the novelty of innovation and uncertainty of market condition

Assess the novelty of innovation and uncertainty of market condition

The more radical innovation the new technology or product is, the more important it is to involve both consumer and product experts in the development process at early stages. The same applies to market uncertainty. Radical innovations or high market uncertainly indicate higher risk for consumer acceptance and therefore understanding the markets and being able to anticipate the market responses is crucial for the success of new technologies and products

Assess the novelty of innovation and uncertainty of market condition

'The technologists, the product developers, the people within the business, they have a much more informed knowledge about what they are trying to do, and they tend to lose sight of how the consumer will think and what will be a major issue to the consumer – often they don't even think about, because they have a very different perspective and view and understanding about what is being done and they don't take time to step back and look at the whole idea from a general consumers perspective.'

Balance between decentralization and formalization

Balance between decentralization and formalization

Decentralised teams are empowered to make decisions about how to proceed (or not) in NTD/NPD processes, but at the same time the decisions made in single teams may not be accessible to the whole organisation. Formalisation of activities will improve communication between marketing and R&D because the team members are forced to share information at scheduled face-to-face meetings or via knowledge management systems. Without these formal procedures, information sharing may happen ad hoc by specific initiative of the team members. A high level of formalisation leads to better integration between marketing and R&D due to less role ambiguity and conflict between functions, but should also allow the more informal encounters. Finding the right balance of empowering the teams to pursue their set goals and keeping up sufficient information flow from development teams to the other parts of organisation requires case-by-case assessment.

Knowledge management systems for both explicit and implicit knowledge

'It is important to create internal expertise and share knowledge by workshops or meetings, so that the knowledge doesn’t just get lost in a huge database. It’s like a manual that sits in a shelf and doesn’t get used properly.'

Knowledge management systems for both explicit and implicit knowledge

Gathering information in knowledge management systems makes it available to the whole organisation, but requires set procedures, time and resources to gather and manage the information. Some knowledge is not easily transferred to data bases and systems and exchange of this implicit knowledge carried by individual employees participating in the NTD/NPD processes requires possibilities for informal face-to-face discussions. Organisations need to consider what kind of information needs to be managed on data bases and which systems and practices support the most efficient exchange of implicit knowledge.

Top management support

'You cannot do anything related to NPD, if you don’t have top management support.'

Top management support

Top management needs to support the cross-functional teams and cooperation between food and consumer experts in NTD and NPD processes. Rewarding the innovation teams on their shared performance achievement of commonly set goals is important rather than rewarding each discipline based on their individual tasks. Top management support enables the necessary organisational and procedural decisions that will promote communication among experts

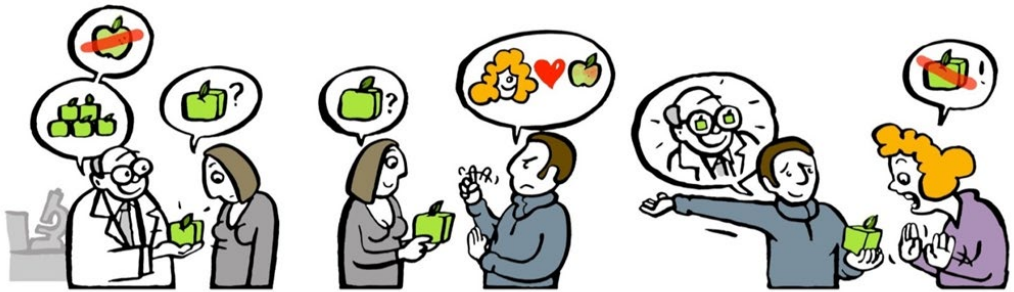
Summary internal communication

- Shared vision what to do and what to be done and how to do it.
- Improving dialogue
- Iterative feedback loops
- Invite people from different disciplines
- Invite people who want to cross the bridge.

External communication

External communication

External communication is considered to be the communication between food technology development and the final consumer (consumer groups, mass media, policy makers and NGOs) in eliciting consumer needs and delivering products.

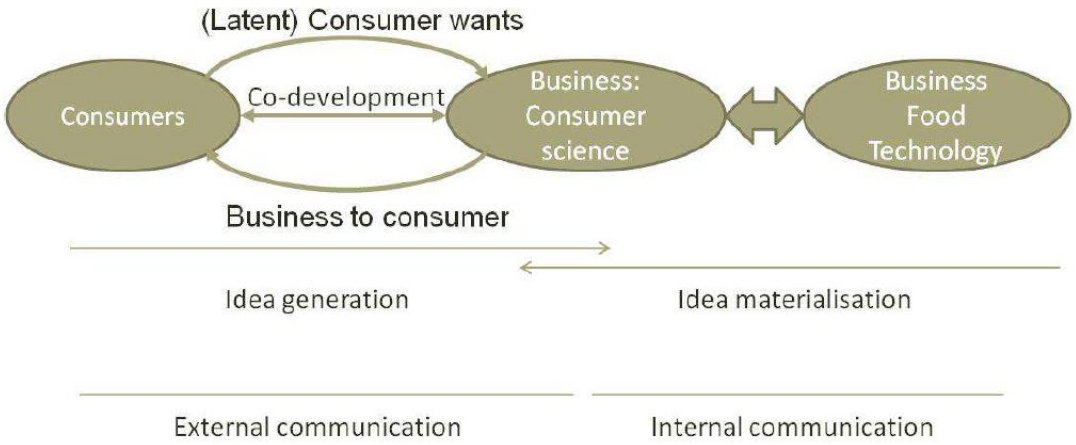


Consumers

Consumer/market needs and desires, co-development and dialogue and informing consumers

Three ways of external communication (Reinders et al., del 2.2)

- From consumer to business: Extracting information from consumers for use by business, identifying consumer wants.
- From business to consumer: Communication from business to consumer.
- Interactive communication: Co-development, communication between business and consumers.



Examples of dos and don'ts in external communication

Find out consumer responses to technological terminology

'It is very important and a company needs to be careful about small changes in the society (especially among youth) that can become great trends in the future. It is important for the consumers to see that the companies are sincere about the concerns.'

Find out consumer responses to technological terminology

Although consumers do not understand new technological terms, these terms can still create various associations in consumers' minds. These associations can be positive or negative and thereby lead to positive or negative attitudes towards the technology. As unique association can be triggered by a single word (or even part of a word) consumer responses to new technology terminology need to be studied case-by-case when deciding which terminology to adopt in communication to consumers.

Consider social and ethical concerns

'In R&D, responses to technology and terminology are not sought early on. Consumers are not seen as relevant in the early stages because it is difficult to discuss new technology with consumers because maybe they don't understand it.'

'Consumers seem to want natural and simple products and if technology is mixed into it, then the consumer may assume that it is something artificial and something that they don't want to have.'

Consider social and ethical concerns

Adopting new technologies typically implies changes in the way food is produced or processed. These changes may be linked to social and ethical concerns in consumers' minds and raise questions about safety and sustainability of new production/processing methods that go beyond formalised safety assessment. Food manufacturers need to take these concerns into consideration and engage in open dialogue or other transparent communication activities to discuss these concerns and assess their relevance and potential consequences.

Provide transparent and balanced information about uncertainties of new technologies

'Successful communication is achieved when the consumers understand the message from the science technologists and all concerns or doubts about a new technology have been explained openly and in an understandable way.'

Provide transparent and balanced information about uncertainties of new technologies

New technologies provide benefits to the production methods or end product quality, but these benefits may come with a cost or contain uncertainties. For long-term consumer acceptance, it is important to be open, not only about the benefits, but also about the possible disadvantages and uncertainties. This allows consumers to make up their own mind whether the pros outweigh the cons and what the possible risks related to the uncertainties are..

Consumer research on different product ideas

'Yet, that is not done much in the industry. It needs more resources in the beginning and companies often don’t see the effect on how they can save money.'

Consumer research on different product ideas

The earlier in the product development we can integrate the consumer views, the more cost-effective it is to reject the obvious failures from the innovation. Using appropriate methods to extract ideas that reflect consumers' needs and desires will enable to guide the development process and help to set the common goals for the innovation processes. For idea generation, qualitative and indirect methods, such as in-depth interviews, observing consumer behaviour and focus groups, are often most suitable. Consumer research has to be able to translate consumer responses into product characteristics that product experts can work on.

Consumer research on different product concepts

Consumer research on different product concepts

Once the project ideas have been tested, appropriate consumer research methods need to be applied to further develop and test product concepts and translate the responses into actionable product attributes. While idea testing is likely to require mainly indirect and qualitative consumer research methods concept testing will require both qualitative and quantitative approaches (such as rating concept descriptions, market introduction experiments).

Build systematic databases on successes and failures

'Something that could be a reason for success in one product can be the reason for a failure in another.'

Build systematic databases on successes and failures

- Learning from earlier experiences is important for any organisation. Having adequate formalised knowledge management systems enable gathering data bases on decisions that has been made at different stages of NPD. To combine these decisions with consumer data they were founded on and whether developed products passing through the different stages of development process become successes or failures provide an essential knowledge base for a company.
- Generally, companies did not have any database to track their successes and failures. A few (large) organisations claimed to be tracking their innovations, but did not have a structured process for this despite considering it important. One example given was having a shared spreadsheet where everyone can upload and communicate successes. However, this was not solely meant for new technology or product development projects.

Build systematic databases on successes and failures

- Similarly to the knowledge management systems, systematic databases on success and failure were not widely used in practice. Especially smaller organizations tended to consider this recommendation as too time-consuming to provide short-term value. It was stated that the project development differs from case-to-case and thus, the projects may be too different from each other to make the documentation relevant enough for future projects.

Consumer research on different product prototypes

Consumer research on different product prototypes

- Product prototypes combine the physical product attributes (sensory quality, nutritional composition) with those based on product concept and linked to the product with information (e.g. marketing claims, production method). Consumer acceptance of the physical product needs to be tested with the target consumer population and this testing should also include the additional information to get a more realistic picture of consumers' responses.

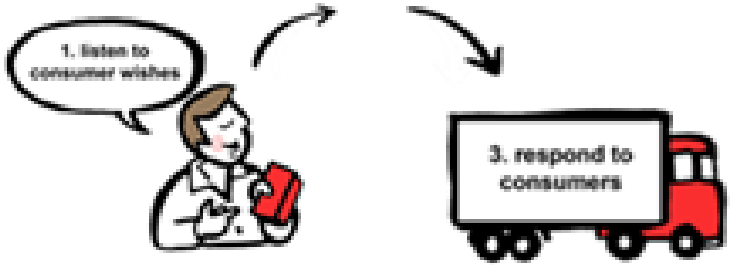
Tailor messages according to consumer segments

Tailor messages according to consumer segments

Consumers differ in what they value in products. When being informed about new products consumers are mainly interested in the benefits these new products provide them. Identifying consumers according to the benefits they desire enables to target the messages accordingly.

Summary external communication

- Consider consumer concerns
- Provide transparent and targeted information
- Consumer research in the different phases.



Assignment communication framework

Assignment for the internal communication framework

Internal communication

- Which problems do you experience in your work with regard to internal communication with colleagues from different disciplines?
- Position the problem in the model.
- How do others in the organisation handle these problems? (learn from one another)
- Recommendations - What would you need to resolves these problems?
- (e.g. to facilitate the use of a shared common language, acceptance of failure and an effort to learn, cross-functional teams).

Recommendation

- Clear roles should be assigned to each team or team member.
- Active engagement as well as a clear vision of the top levels of management.
- For communicating information regarding the uncertainties of new technologies, companies could use sources (e.g. external groups) that are deemed trustworthy by consumers. It was felt important that the information was translated in a way that was understood by the consumers.

Barriers

- Financial issues, time constraints and the lack of staff with the necessary background to conduct such research.
- Unpredictable risks, long-term consequences and an understanding of the media and how they convey the information.

Assignment for the external communication framework

- Which problems do you experience in your work with regard to external communication with contacts from different disciplines? (e.g. consumers often lack understanding of or misunderstand new ideas and technology).
- Position the problem in the model.
- How do others inside and outside of the organisation handle these problems? (learn from one another)
- Recommendations - What would you need to resolves these problems? (e.g. involvement of consumer groups).
- Example: consumers often lack understanding of or misunderstand new ideas and technology).

Case studies

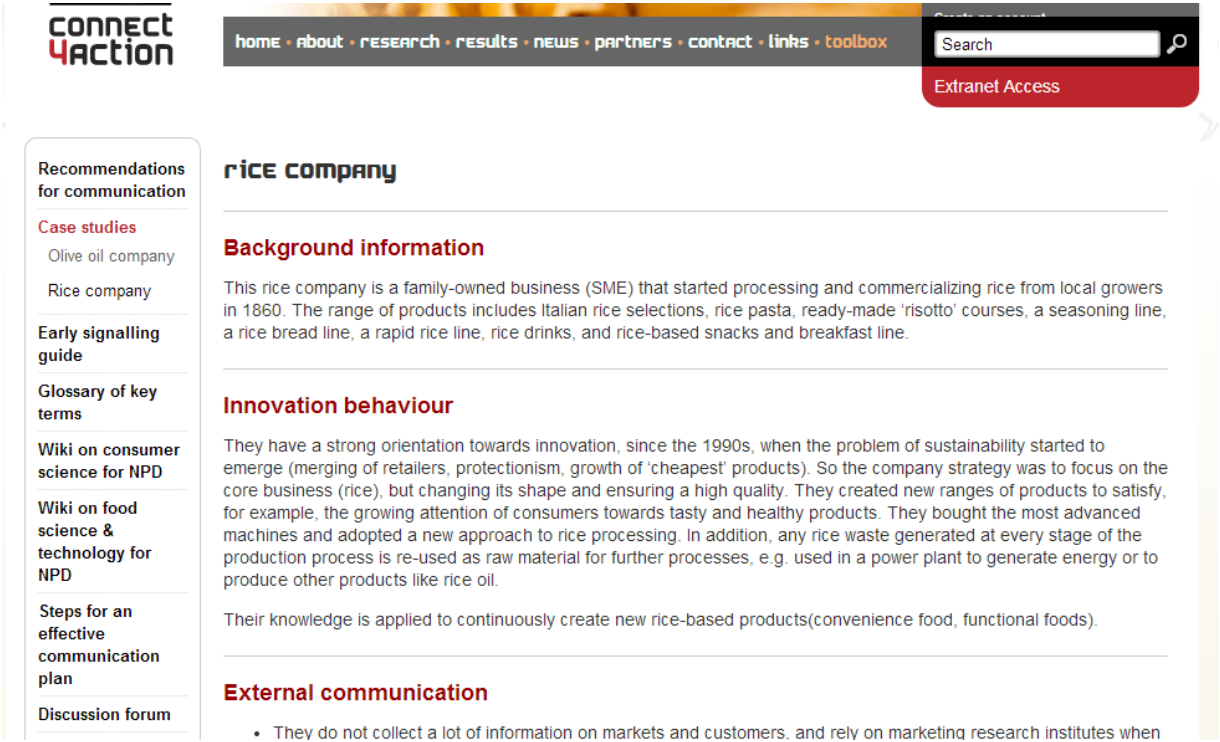
Aim

To give examples of concrete cases where communication has been proven to be a key element for the success or failure of food innovations, including the description of the challenges encountered and if and how they were faced.

Structure of the case

- Background information
- Innovation behaviour
  What is the innovation strategy of the company? What kind of innovations did it develop? Etc.
- External communication
  How does the company acquire information on consumers?
  How does the company communicate with consumers about new products?
- Internal communication
  How are information flows managed within the company, especially during food innovation development?
  Is there a multi-disciplinary team dealing with the food product/process innovations of the company?
- Lessons learnt about communication during the food innovation process
  Summarises the success and failure factors related to the communication behaviour of the company during the food innovation process.
- References

Case studies on the C4A website



Two case studies

- Olive oil company
- Rice company

Reference

- Massa, S & Testa, S (2009). A knowledge management approach to organizational competitive advantage: Evidence from the food sector. European Management Journal, 27:129-141

Case study - Olive oil company (1)

Background information

- Family-owned business (SME)
- Started as a typography business
- Started producing oil from local olive production and distributing it by mail in 1911
- Increasing demand -> started to buy olives and olive oil from selected producers in the Mediterranean area
- 1980s: production of preserves (containing olive oil)
- 1990s: new cosmetic line based on olive oil
- typography activity continues to the present
    - this is mainly linked to the olive oil production (printing price lists and communication with customers)

Innovation behaviour

Introduction of incremental product innovation or new combinations

- Not radically new products that also do not originate from customer needs
- Carefully planned and very time-consuming
    - Consumer involvement
    - Launch of small pilot projects
    - Long testing periods

Internal communication

- Data warehouse containing customer and sales data for the domestic market
- Marketing department performs all report design, data extraction and marketing activity
- ICT department is developing an intranet portal to archive and index documents (e-mails and postal correspondence to/from customers, press articles, etc.)
- New employees spend their first six months visiting all departments (thought to be important for absorbing the tacit knowledge permeating the firm)
- Intranet: main communication channel within the firm

Case study - Olive oil company (2)

External communication

- Customers represent a respected value
- Customer relationship management strategy: to achieve a stronger relationship and develop continuous learning
- Focus: on capturing external knowledge:
  - from customers (focus groups, direct contacts)
  - from marketing research institutes and from the main sectoral publications and trade journals (on market trends and competitors)
- Communication channels: e-mail, mail, phone, contact at fairs, etc.
- Front-line personnel (call centre staff, correspondence department, delivery service) directly and carefully selected by the head of the marketing department
- Exploits the information from its customers in order to create a company image that fully responds to customer expectations
  e.g. espresso coffee machine

Lessons learned

- Extremely focused on its customers
  - has an exclusive relationship with them based on loyalty and care
- Customers' preferences and needs are used to improve products and services
- Large data warehouse to store and manage large amounts of data concerning their customers and sales

- Special attention given to external communication. This is extensively used in order to develop innovative products and to launch them on the market
- Internal communication is used in terms of storing information acquired from customers and using such information to develop incremental product innovations based on customers' needs and preferences

Case study - Rice company (1)

Background information

- Family-owned business (SME)
- Started processing and commercialising rice from local growers in 1860
- Range of products: rice selections, rice pasta, ready-made 'risotto' courses, a seasoning line, a rice bread line, a rapid rice line, rice drinks and a rice-based snacks and breakfast line

Innovation behaviour

- Strong orientation towards innovation
  - Since the 1990s, when the problem of sustainability started to emerge (merging of retailers, protectionism, growth of 'cheapest' products)
  - Company strategy: to focus on the core business (rice), but changing its shape and ensuring a high-quality product
  - Created new product ranges to satisfy the growing demand of consumers for tasty and healthy products
  - Bought the most advanced machines and adopted a new approach to rice processing
  - Any rice waste generated at every stage of the production process is re-used as raw material for further processes, e.g. used in a power plant to generate energy or to produce other products like rice oil
- Knowledge is applied to continuously create new rice-based products (convenience food, functional foods)

External communication

- They do not collect a lot of information on markets and customers and rely on marketing research institutes when they need this information.
- The new products are rapidly launched on the market, as they are tested in a limited number of shops and then refined, thanks to partnerships with a few large retailers.

Case study - Rice company (2)

Internal communication

- The product committee (president and CEO, head of marketing, head of purchasing, communications manager and head of R&D) meets twice a month to develop ideas and generate new insights for the running product development projects
- Ideas often come from the feelings and experiences of their employees
    - required to commit to the company
    - a portion of their salary varies depending on the company's results
    - personnel turnover is very low
    - making mistakes is seen as necessary in the learning process
- Verbal and social communication 'culture':
- Social events (hiking trips, BBQs, camping, etc.) in order to foster interpersonal relationships, a collaborative environment, open communication and knowledge sharing
- Promotion of a strong sense of commitment and belonging in its employees
- Role of communication technology neglected:
- information system to store sales data and information on production procedures and formulae
- main storage 'device': human memory (turnover is very low)

Lessons learned

- More internal communication than external communication
- Success factors for internal communication
- Formal communication strategy (product committee)
- Informal communication culture (social events and a strong sense of belonging amongst all employees)
- Product committee as a multidisciplinary team

Conclusion

Consumer-oriented

Multidisciplinary

Innovation is needed

More information

Siet Sijtsema
siet.sijtsema@wur.nl
+31 (0)317 484 791

Wageningen University & Research
P.O. Box 35
6700 AA WAGENINGEN
www.wur.nl/economic-research

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