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VISION SCENARIOS FOR FOOD MANUFACTURING IN EUROPE

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Publication date:
2013

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Vestergaard, A., Lauridsen, H. A., & Johansen, J. (2013). VISION SCENARIOS FOR FOOD MANUFACTURING IN EUROPE.

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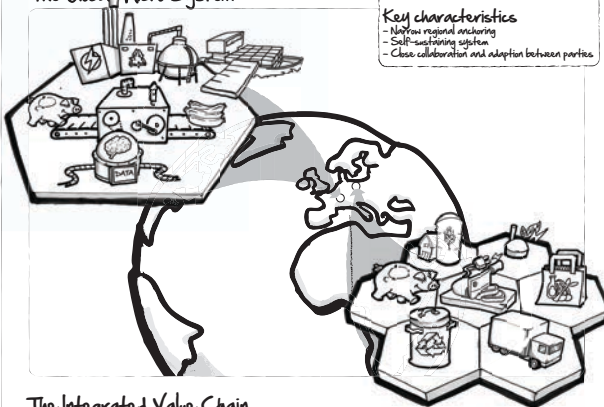
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VISION SCENARIOS FOR FOOD MANUFACTURING IN EUROPE

Focus Group N°1


The Global/Micro System



Key characteristics

- Notion regional anchoring
- Self-sustaining system
- Close collaboration and adaptation between parties

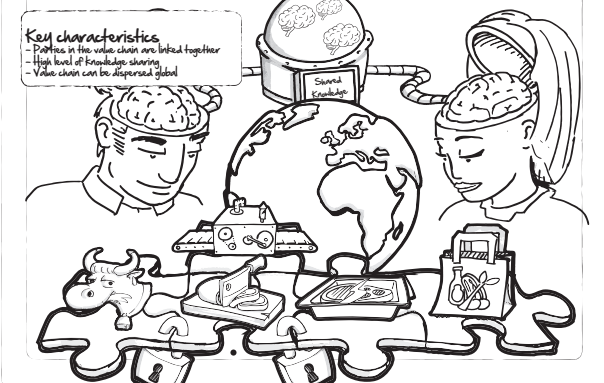
Ingredient Based Food



Key characteristics

- A mix of ingredients "extracted" from raw materials creates end product.
- Ingredients are a tradeable global commodity.
- End user might define the final solution (Flavour, nutrition, volume etc.)

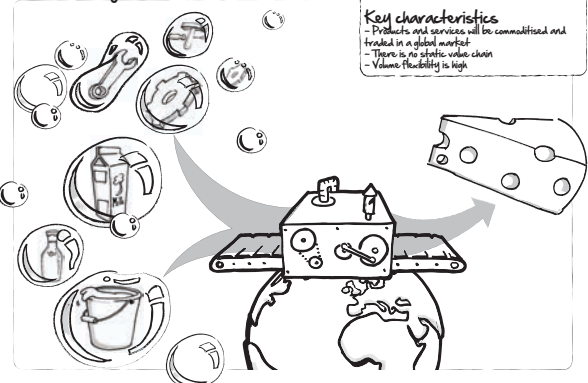
The Integrated Value Chain



Key characteristics

- Parties in the value chain are linked together
- High level of knowledge sharing
- Value chain can be dispersed global

The Disintegrated Value Chain



Key characteristics

- Products and services will be commoditised and traded in a global market.
- There is no static value chain
- Volume flexibility is high

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The publication was made as a part of deliverable 2.4 in the FP7 funded FoodManufuture Project. 2012

ISBN: 978-87-91-831-63-8

Abstract

This document presents the vision scenarios for the future European Food Manufacturing industry. The work takes its point of departure in the findings from the initial phase of the FoodManufuture Project where eight key research and innovation areas were defined. Based on these key research and innovation areas, the vision scenarios are developed based on numerous inputs from a broad variety of stakeholders within the Food and Manufacturing sector. Most important has been a large workshop in Copenhagen in March 2012, where more than 60 representatives from the European Food and Manufacturing sectors joined forces in an effort to discuss and formulate the vision scenarios for the common future of the Food and Manufacturing sectors in Europe.

The Copenhagen Workshop

The objective for the Copenhagen Workshop in March 2012 was to create inputs for the future vision scenarios for the Food Manufacturing Industry and the supporting manufacturing solutions. In order for that to happen eight predefined research- and innovation areas were appointed, and for each area, a focus group was formed. The eight areas were defined and validated in the previous Work package in the project.

The eight predefined research- and innovation areas were:

1. Energy and material saving, alternative material sources
2. Cost Efficiency sources
3. Flexible production and services, automation and/or monitoring systems sources
4. Food Chain Management, logistics and retail sources
5. New functionalities including smart packaging, hygiene control, etc. sources
6. Development of innovative and high quality food products sources
7. Business models sources
8. Technology Transfer and Education sources

For all these Focus Groups a number of experts from academia, industry etc. were invited to join the Copenhagen Workshop and thus support the generation of the future vision scenarios.

In order to challenge and inspire the participants, AAU generated four initial vision scenarios for the Food Manufacturing sector. The four scenarios were based on the outcome from the previous work undertaken in the FoodManufuture project in combination with a number of meetings and workshops with different stakeholders from the Food & Manufacturing sectors. The four initial vision scenarios were:

- The Global Micro System
- Ingredients Based Food
- The Integrated Value Chain
- The Disintegrated Value Chain

The vision scenarios will be elaborated later in this document. At the workshop, each of the research- and innovation areas were then to be addressed in context to the four vision scenarios. For each of the eight Focus Groups a coordinator was appointed among the project partners. It was the coordinators'

responsibility to facilitate the discussions in the Focus Group and to make sure the discussions and findings were documented.

From the workshop each focus group coordinators' assignments was to summarize the group discussions and organize all the discussed findings into relevant topics and forward these to the work package 2 coordinators at AAU for further processing. Each focus group coordinator delivered a written report with topics connected to their research and innovation area and evaluated up against the specific vision scenarios. These reports were created and specified descriptively in a template generated by AAU for easing the further processing.

Summarizing the Focus Group Results

The Focus Group summaries clearly depicts that many of the scenarios have connecting topics. Many of the discussed topics were relevant in more than one scenario. The Ingredient Based Foods scenario stood out from the other scenarios, due to its futuristic nature. It was also argued that the Global Micro System, the Integrated Value Chain and the Disintegrated Value Chain are variants of each other and thereby closely connected.

An important discovery was that most participants argued that the Ingredient Based Food scenario was the only one that could be defined as an entirely "new" future vision scenario. The other three scenarios already exist to some extent but they will definitely evolve and must therefore be elaborated much further in a future perspective.

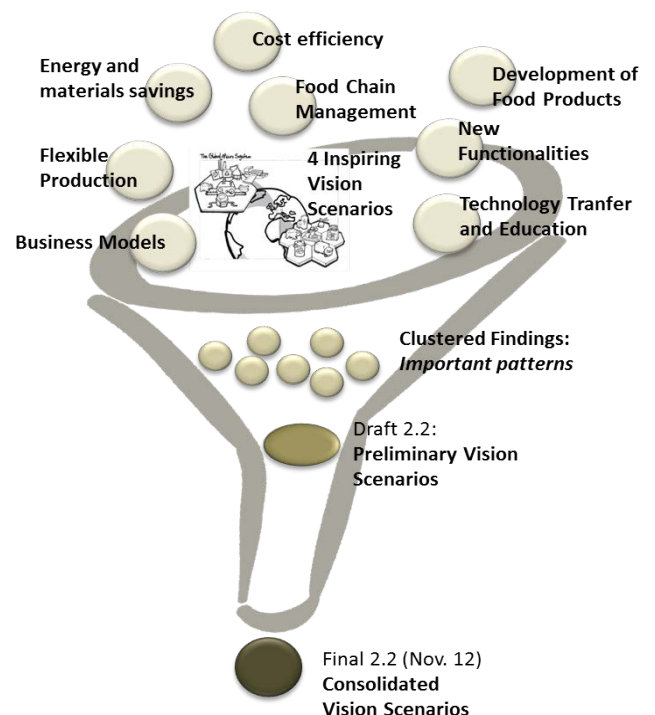
Processing the Workshop Findings

The output from the Copenhagen Workshop was as aforementioned eight written reports, one for each research and innovation area.

The written reports developed by the eight focus group coordinators were subsequently processed by CIP generating both the already described summaries and a data mining spreadsheet.

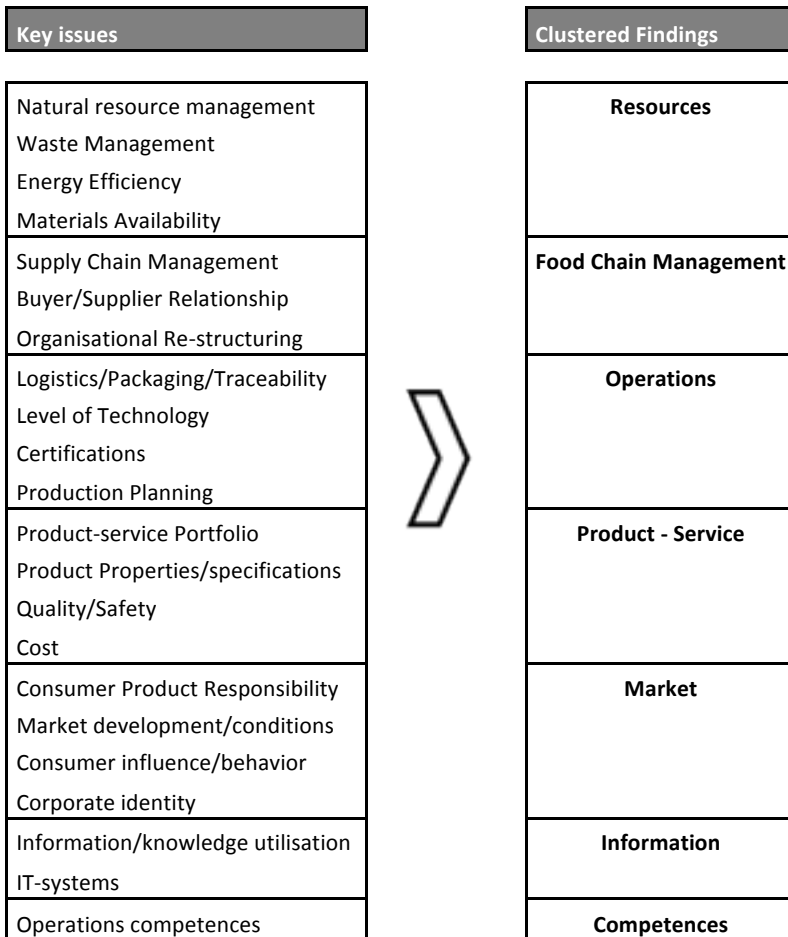
Data Mining Spreadsheet

All the individual focus group topics were integrated into a data mining spreadsheet, with the purpose a generating a matrix for bringing forth commonalities. Each relevant topic was placed vertically, and horizontally connected to related findings created by AAU, such as e.g. waste management, cost, market development etc.



The process of developing the Vision scenarios

After collecting all the data in the data mining spreadsheet several commonalities could be seen. These commonalities were deciphered and grouped under seven clustered findings with different underlying key issues (see table next page).



These seven clustered findings and the vision scenario grading, has been used for generating two figures (that can be seen in the appendix B section) that depicts the importance of each discussed clustered finding and how the groups have weighted their discussions in each vision scenario.

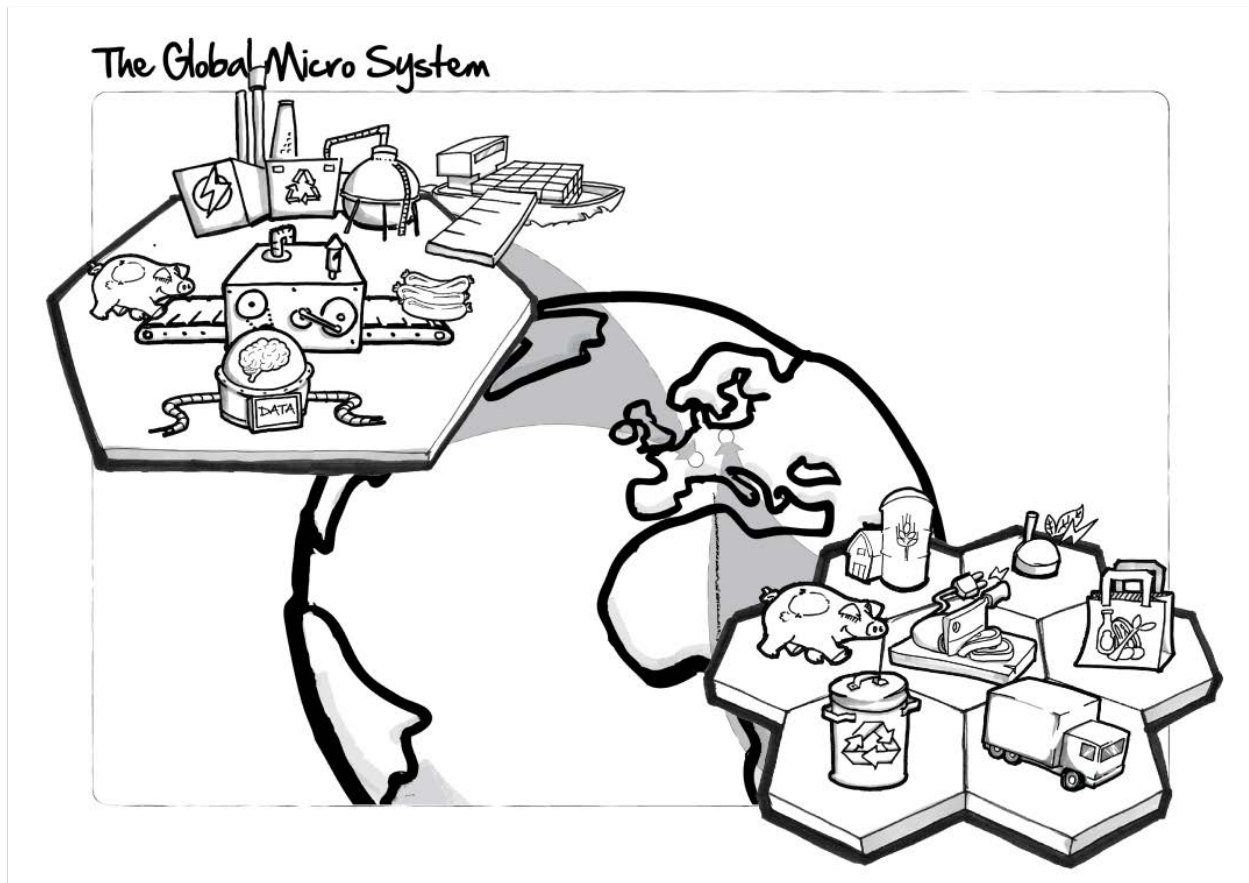
The figures, the data mining spreadsheet plus the coordinator reports has been used to generate a more qualified set of vision scenarios than the initial ones presented at the Copenhagen Workshop.

The Validated Vision Scenarios

We now have the basis to present a set of vision scenarios, which are based on inputs from various sources. Most important are the findings from the Copenhagen Workshop, where the results of the Focus Group discussions have been processed and merged into the initial vision scenarios creating four distinctive and validated vision scenarios.

The scenarios are indeed open to different interpretations. Most important here is to understand the overall mind-set underlying the four scenarios. Therefore the scenarios are presented both graphically and supported by a short text description where the characteristics of each scenario are elaborated. The four vision scenarios will be elaborated in text and graphically in the following sections.

The Global Micro System



Basic assumptions

The Global Micro System can be seen as a self-supplying partnership between a number of partners/entities in a defined narrow regional area. The Global Micro System is a partnership between

partners all along the value chain - also embracing energy suppliers, waste handling, recycle facilities, logistics, etc.

Key characteristics

- **Narrow regional anchoring**
- **Self-sustaining system**
- **Close collaboration and adaption between parties**

Relations and integration

Partners in a Global Micro System will be closely linked. Collaboration, loyalty and trust among partners will be a key value. There might be a shared ownership to one or more of the entities in the Global Micro System. Or one sole company could take ownership of the entire value chain. In some cases there would be a need for a “local chain integrator” – a company that take the initiative and has the knowledge to combine the right partners into a Global Micro System. This actor would act as a broker by creating the local chain according to external request and opportunities, taking care at the same time to preserve the local environment from over-exploitation and negative impacts.

The different partners will share knowledge and will thus have full information regarding materials, processes, volumes, quality etc. throughout the system.

As a system the Global Micro System might act in the global market when it comes to exporting end products. And knowledge from within the system will be shared with other micro systems around the world.

Products and Innovation

Products will be based mostly on raw materials available within the regional borders of the Global Micro System and they will be processed within the system. Products might be high quality and with regional characteristics in flavour etc. In these cases strong brands and corporate identity will be a key factor to consider.

But the Global Micro System could just as well produce high volume, standardised food, where the arguments for the regional location are either the availability of the raw materials needed to produce the end product and/or that the location is close to the costumers.

The close interaction between parties will enhance the possibilities for developing new products and to develop the different supporting systems (ICT, logistics etc.) to handle new products.

Flexibility and Speed

The different entities will be able to adapt their own processes and systems to the rest of the system, and thus supporting one large and optimized system integrating the entire value chain.

In cases where a large part of the value chain (or the full) is located at the same premises the Global Micro System will be extremely flexible and will be able to adjust and adapt processes very fast.

Availability of raw materials and capacity within the system could be a constraining factor when it comes to a fast response to an increase in demands or other seasonal fluctuations.

Prices and Market Mechanisms

The prices within the system will be adapted to suit the system as a whole. The number of suppliers within the system might be quite small and could hinder real competition. On the other hand the interdependency between partners will regulate prices to a reasonable level, not damaging the micro systems global competitiveness.

The Global Micro System may choose to focus on supplying consumers within the system or on nearby markets with standardised product and might then be competing with other micro systems or companies providing the same goods.

The Global Micro System could also choose to produce food with a strong regional focus (flavour, culture, storytelling etc.) and thus create a high priced product with a strong brand suited for high priced global exports. The rise of new markets such as BRIC countries will give the European food sector great opportunities for further exports. But will also increase the risk of counterfeit products, fraud resulting in damaged brand value.

Technology and Industrial services

The use and demand for technology will vary in the Global Micro System depending on the focus and structure. Some could be highly advanced facilities embracing the entire value chain and could be more or less fully automated and controlled by one sole “operations centre”. There will be a large potential for high scale industrial automation and for the development of new technologies and processes within waste handling, biofuels etc.

In the other end of the scale the Global Micro System focusing on high priced products with a regional identity might show a reluctance to accept the use of automation and other industrialised processes. It might damage the authenticity and the brand of the products if it is not “handmade”. Some technology will have to be developed to support the brand value. This could be information systems where the consumer can get information about the origin of the products (ICT based Storytelling, Traceability etc.). To overcome the risk of damaged brand value due to counterfeit products, systems to show and validate product authenticity will have to be developed – and perhaps integrated in smart packaging solutions.

Between these two extremes of Global Micro Systems we might find the need for technology development to support automated parts within the micro systems. An example could be the use of high tech, ICT and automation in farms and orchards supplying the Global Micro System.

The need of very flexible productions systems where producers do not invest in a lot of equipment that are only being exploited in shorter periods, calls for new industrial service models for sharing or leasing equipment.

Ingredients Based Food



Basic assumptions

The basic assumption in this scenario is that raw materials for food and drinks will be produced at the most optimal location and then are processed into a set of ingredients. These ingredients will then be transported to other locations, where they are mixed into different Ingredients Based Food products.

The optimal location for the production of raw materials would be determined by availability of the natural resources, climate, wage level etc. This could be cattle farming in the most fertile areas or the growing of fruits at the warmest locations.

In the Ingredients Based Food scenario the process of breaking down the raw materials will be refined significantly. It will be possible to process meat, vegetables, seafood etc. more advanced than today and thus creating a much larger variety of ingredients. Not only variety in terms of flavour but with different nutrition characteristics. In time it might be possible to produce many of the ingredients in a laboratory and thus be independent of actual farming etc.

Key characteristics

- A mix of ingredients “extracted” from raw materials creates end product.

- **Ingredients are a tradeable global commodity.**
- **End user might define the meal solution (Flavour, nutrition, volume etc.)**

Relations and integration

This scenario will favour large international manufacturers and suppliers of ingredients. The ingredients manufacturer will be highly dependent of the parties who produce the raw materials, and might own this part of the value chain to ensure future access to raw materials.

The ingredients will be considered as a tradable commodity and might be sold to a large number of independent retailers or manufactures that will combine ingredients into new Ingredients Based Food products.

The actual mix of ingredients might take place on different levels reaching from large international brand owners to the actual end user combining the ingredients on the go when a meal or drink is wanted.

There will have to be a strong focus on standardisations, regulations, safety and IPR to support this scenario. Otherwise there is a risk of unsafe/unhealthy food products produced by companies striving for fast profits.

Products and Innovation

The Ingredients Based Food scenario really opens the possibility to generate a large variety of products. Again reaching from worldwide standardised end-products to the mass customization by small entities or end user.

Products might be powder foods and drinks as we already know it but in a much larger variety in taste, volume and nutrition. Food/drink manufactures or end user will be able to combine ingredients and create “functional food” with regard to health, weight reduction or other desired properties. As the ingredient mixing process is being refined it might shift from “mix and add water” to actual reconstructing more of the original characteristics of the raw materials. An example here would be the possible to use some sort of 3D printing technology to actually printing a steak or a sausage using different meat related ingredients.

The Ingredients Based Food scenario will definitely stimulate innovations along the entire value chain. The potential for development of new food related products is almost infinite and a lot of new technological solutions will have to be developed. This could include “intelligent vending machines”, smart packaging solutions, “food reconstructing technological solutions” etc.

Flexibility and Speed

Ingredients might be condensed and can be transported worldwide weighing less than original product (“add water principle”). It will also be possible to produce more ingredients, which can be transported, stored and sold without the need of cooling.

The scenario will be very flexible and will be able to respond to shifts in demand with high speed. In principle the variety of products is infinite and the time to develop new products is only a matter of the availability of the right ingredients and a potential market.

With the ability to mix the final product very close to the end customer, the producers will be able to react very fast to shifts in demand, not only in terms of quantities (thus reducing overall inventories and their associated costs), but also in terms of variety, by creating new “recipes” based on existing ingredients.

Prices and Market Mechanisms

The ingredients will be traded as a worldwide commodity and market mechanisms will be dominated by a reduced number of large suppliers competing hard on price, variety and quality.

The scenario will be very user driven on the demand side and the price of the Ingredients Based Food product will be depended on two main factors: The price of the ingredients needed and the price for the technology needed to combine them.

As the technology advances and e.g. 3D food printing will become more widespread the market will experience temporary mental barriers from consumers, as it has been the case for previous larger technology leaps within the food sector (e.g. the introduction of the microwave oven).

When food and drink products are no longer limited by the need for cooling, a lot of new markets will develop. These new possibilities to produce convenience food will lead to new sales channels and new players moving into the food and drink retailing market. To meet this evolution known market structures and business models will have to be developed further.

The use of web applications and services where end customers can design and buy their personalised meal solutions will be developed. If information and data on individual and regional food preferences are collected and made available it will promote new business models utilising this information will arise, based on very deep markets segmentation.

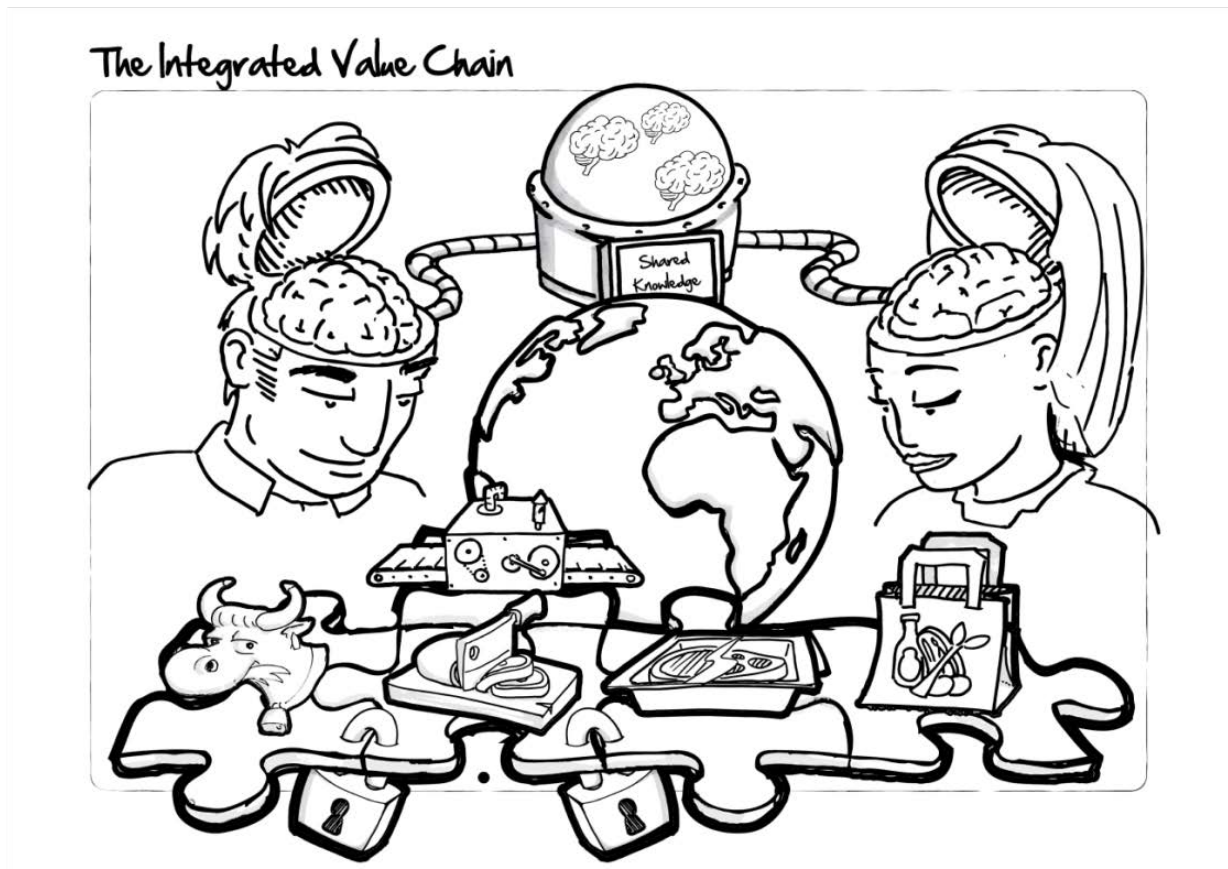
Technology and Industrial services

Technology development will be crucial to support the scenario on Ingredients Based Food. First of all the processing technology used to create ingredients from raw materials needs to be improved. Secondly the technology to mix or reassemble the food needs to be developed much further. 3D food printing as an example is possible today but is quite costly and primitive.

The packaging of the ingredients that can be dosed and mixed by the end customer also contains a lot of possibilities for innovation. Mass customized food “created” for and by people on the go requires new types of packaging, that can be handled in the train, car or at the office.

Furthermore, in order to meet the need of cost-efficiency and flexibility respectively in the upstream and downstream sides of the supply chain, innovative industrial services could be exploited, such as for example 3D machinery renting or “pay per ingredient”, or availability/capacity guarantee for ingredients making machines. These services offered by technology suppliers will require manufacturing equipment to be easily displaced and re-used.

The Integrated Value Chain



Basic assumptions

In the Integrated Value Chain the different partners have adapted their systems and operations to fit into the rest of the value chain. It can be optimized to an extent where the entire value chain can be perceived as one sole system.

The Integrated Value Chain can be organised on different geographical levels from large global value chains to small regional value chains. Strong multinational brand owners might own large parts of the value chain and thus dominate the Integrated Value Chain. But it can also be a close collaboration between smaller and more equal partners.

Key characteristics

- Parties in the value chain are linked together
- High level of knowledge sharing

- **Value chain can be globally dispersed**

Relations and integration

In the Integrated Value Chain, knowledge is generated and shared across the value chain and the relations between parties are very close. Due to the close interaction and knowledge sharing collaboration, the Integrated Value Chain will be based on trust, loyalty, contracts and perhaps exclusive agreements.

The parties in the Integrated Value Chain will be very dependent on each other's ability to deliver the right product, service, quality, volume etc. and at the right time. If a link in the Integrated Value Chains fails to deliver the entire value chain will be affected.

This scenario calls for an extensive knowledge about processes in a food value chain. If the individual partners in the Integrated Value Chain do not have this knowledge in-house they will have to acquire it – either by education and training or by collaboration with integrators who understand the complexity of the food value chain.

In some cases the “chain integrators” can just be brand owners who have the role of organising an entire value chain that can produce and perhaps even sell the branded product. In this case the brand-owning integrator could be seen as a puppeteer mastering the partners in the food value chain.

Products and Innovation

The ability to make innovations in the Integrated Value Chain will be high due to the close collaboration and the free flow of information between parties.

Products may vary from large multinational brand owners producing standardised low-priced products to smaller Integrated Value Chains producing regional high priced products.

If there is a focus on large international value chains producing standardised products for the global market logistics will be a key factor. There will be a need for product innovations that prolong the shelf life of the products ensuring that it can be transported worldwide without loss of quality, flavour etc.

Due to the integration of the value chain the basis for traceability will be optimal and it will be possible to make complex products and to ensure high standards in food quality and safety.

Flexibility and Speed

The Integrated Value Chain will have a large security of supply due to the binding collaboration or shared ownership in the value chain. Processes and logistics are optimised and the turnaround time in Integrated Value Chain will be short.

Because the entire value chain is fully optimised unit costs will be low but the product range might be quite narrow and difficult to extend.

But the close integration will also make the Integrated Value Chain relative inflexible and slow to respond to new demands for products, volumes etc.

Prices and Market Mechanisms

The price structures and market mechanisms between the entities in the Integrated Value Chain will not be very fluctuating. Fluctuating prices would cause instability in the system.

There is a risk of failing market mechanisms if the Integrated Value Chain is dominated or owned by strong, multinational brand owners who can obtain monopoly-like status.

The access to knowledge throughout the Integrated Value Chain and the close collaboration creates a lot of room for business models utilizing information to create added value – not only between the parties – but also in relation to end customer, if it is cooperatively shared among all the integrated chain actors.

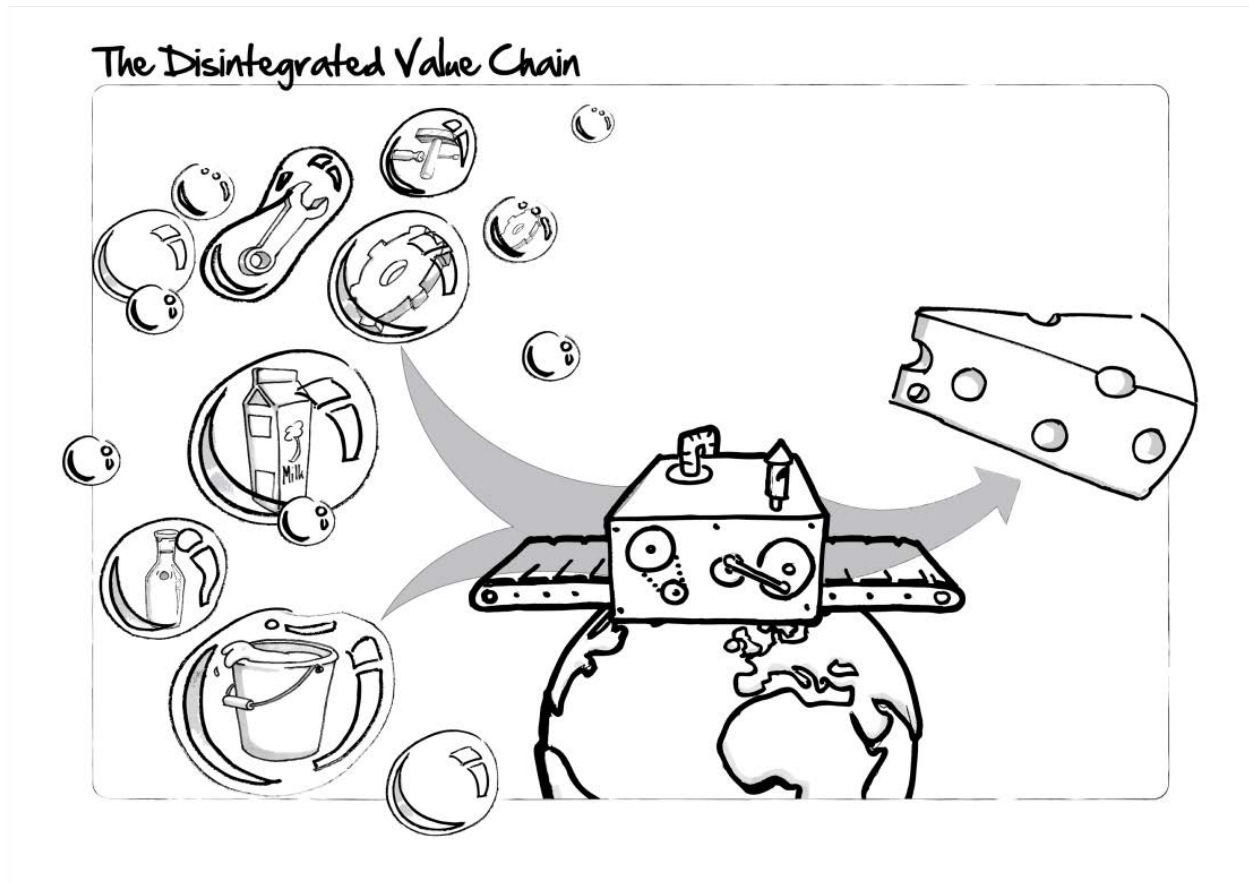
Technology and Industrial services

The Integrated Value Chain will be highly dependent on ICT systems ensuring full information throughout the value chain. This is also including the ability to forecast upcoming shifts in supply and demand. If the Integrated Value Chain is going to assimilate new partners, the ICT systems will have to be modularized and standardized – perhaps plug-and-play.

The high level of information across the value chain makes it easier to develop and implement standardised automation processes optimizing the entire Integrated Value Chain.

The characteristics and success factors of the integrated value chain call for the offering of innovative consulting services by equipment suppliers for optimizing the value chain. For example, process optimization consulting or research consulting (both with or without “improvement guarantee”).

The Disintegrated Value Chain



Basic assumptions

The basic assumptions in The Disintegrated Value Chain are that the market is based on pure and open trade. Materials and processes are perceived as pure and well-defined commodities that can be traded worldwide.

There is no static value chain based on long lasting relations. Instead the value chain is split into a number of independent entities that trade commodities with whoever can deliver the wanted products under the right conditions.

Key characteristics

- **Products and services will be commoditised and traded in a global market**
- **There is no static value chain**
- **Volume flexibility is high**

Relations and integration

The Disintegrated Value Chain is designed based on specific needs regarding product, price, quality, process, competences etc. Thus there are no long-term bindings between partners in the Disintegrated Value Chain.

There will be no need for close integration between parties but deep knowledge about global supply and demand of commodities will be a key issue to ensure the design of the most optimal food value chain.

The Disintegrated Value Chain could be dominated by a lot of small and equal players but larger players might dominate the Disintegrated Value Chain if they are the sole owners of specific key technologies or raw materials. In this scenario “chain integrators” with deep knowledge within food chain management will have the capability to organise and master entire value chains producing various products.

Products and Innovation

This scenario will favour private label brands where the end products are standardised and high volume, and where knowledge about the origin of the end product is less important to the end customer.

There will be little focus on systematic innovation due to the disintegration between parties. Innovation will take place within the different entities in the Disintegrated Value Chain. This may lead to sub-optimisation and opportunism that may damage the system.

Flexibility and Speed

In most cases it will be quite easy to replace or add partners delivering standardised goods or services. Therefore the flexibility and speed in the Disintegrated Value Chain will be high.

There might be large coordination cost related to the process of combining the optimal value chain. In the future these can be reduced through the use of more advanced ICT systems supporting global information flow.

Prices and Market Mechanisms

The entire value chain will be very market-driven. Due to the large number of potential suppliers and the standardisation of goods and services price competition in the Disintegrated Value Chain will be high. There will be a constant push from smaller and more agile producers who are eager to enter existing value chains. Thus there will be an extreme focus on cost efficiency through the entire value chain.

To ensure food safety and nutrition properties there has to be some kind of regulations to set minimum standards for quality, sustainability etc.

Technology and Industrial services

The different entities in the Disintegrated Value Chain will work hard to reduce cost and perhaps add value to their product or service. Consequently the motivation for technological innovations by the single entities will be high. New value adding technologies and services developed by single entities will be pushed into the existing value chains and will be regarded as an important competitive resource.

Technology development might be individual, but a key factor will be more or less open ICT systems (market platforms) to support the information flow and smooth trade between parties. New web-based services will have to be developed and will stimulate the generation of new business models based on global available information.

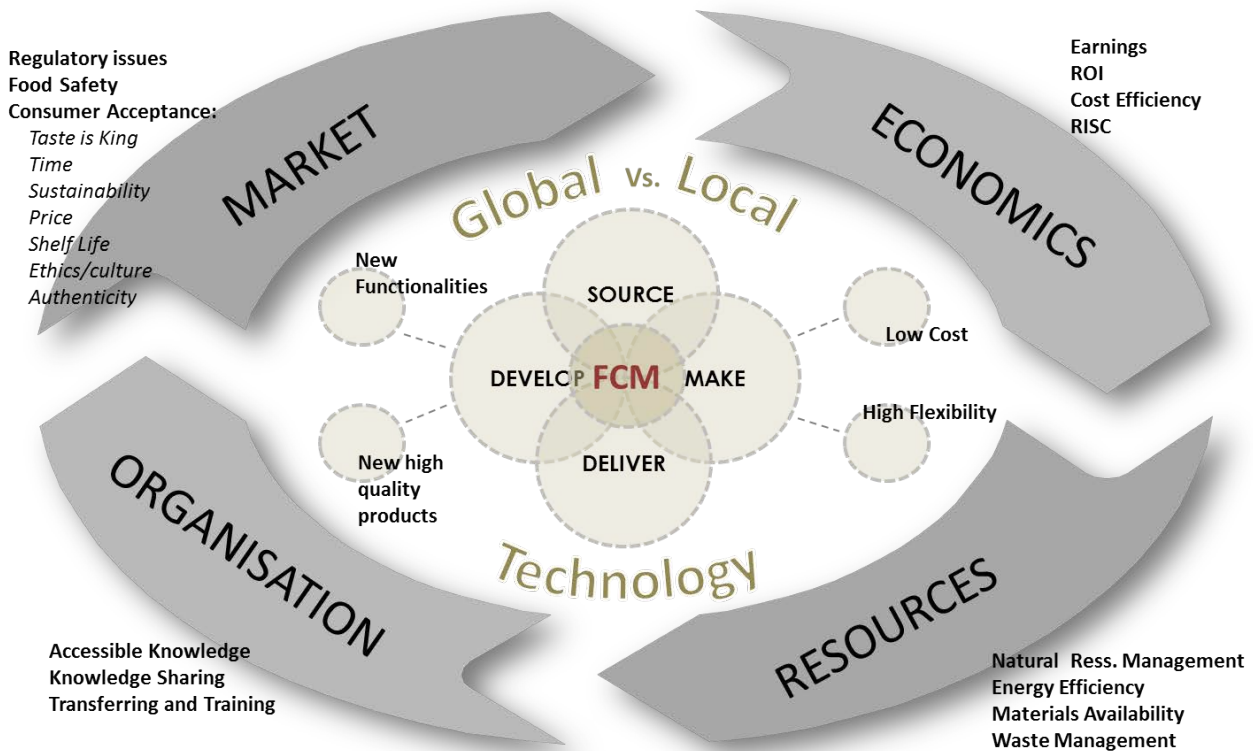
A framework for discussing the vision scenarios

A general conclusion from the workshop in Copenhagen is that the challenge of developing and discussing future vision scenarios for the food manufacturing industry cannot be solved by looking isolated at the manufacturing processes and the technology. A more widespread holistic approach has to be acknowledged if we are to embrace both the Food- and the Manufacturing sectors. Increasing consumer demands, the need for an increased amount of food, a foreseen lack of raw material, new technologies and an increased need for energy are all factors that must be considered when discussing the visions for the food manufacturing industry.

The following illustration has been created based on the output from the eight different research and innovation areas discussed in the focus groups. It is an attempt to create a framework of reference when discussing the validated vision scenarios.

The framework consists of different layers. The first layer is the dominant factors which are both internal and external oriented. They are illustrated as four arrows arranged in a circle to symbolize speed and dependence. They are closely related although not describing a sequence and all have an important role to play across all the predefined research and innovation areas.

The second layer is the **dimension of the physical presence** and the opportunities given by new and existing **technology**.



A framework for discussing the vision scenarios of the food sector and supporting the manufacturing solutions.

The core in the framework is the fulcrum and describes the value chain. A value chain strongly influenced by both the dominant factors, the dimension of physical presence and the available technology for manufacturing solutions.

All the factors in the framework have an impact of every vision scenario. The degree of the impact will however, depending on the scenario, have a different weight.

Layer one in the framework

The first dominant factor is **MARKET (external)**. Health and safety are closely related to regulatory issues and cannot be neglected. The same goes for the consumer acceptance and demands. “Taste is King”, time to consumer, sustainability, price, shelf life, authenticity and social, ethical and cultural aspects are factors that apply to defining the future market for food.

The second dominant factor is **ECONOMICS (internal)**. Most businesses are striving for growth and increased earnings even though their customers’ requirements are becoming more and more diverse and complex. Cost efficiency is a must both as of today and tomorrow. In fact, the importance of efficiency will increase manifold due to complex social and economic development with respect to diminishing resources, diversity of consumer needs and environmental challenges. There will be a need to devise innovative cost efficiency methods to meet those challenges.

The third dominant factor is **RESOURCES (external)**. The awareness of topics like raw materials availability, natural resource management, waste management and energy efficiency is a future necessity in all businesses. The consumers require food to be sustainably manufactured and processed.

The fourth dominant factor is **ORGANISATION (internal)**. It is about competencies, the ability to change, and adopting as well as implementing new knowledge.

Layer two in the framework:

In defining vision scenarios for the future Food Manufacturing industry the focus groups also positioned **Global vs. Local** and **Technology** as very important issues to be dealt with in general.

Global vs. Local could among other things depend on the availability of materials and resources, but also the location of the consumers. As a consequence the food chain management system has to be tailored specifically to take care of that.

New technology or simply adopting and implementing already existing technologies developed for other sectors than the food manufacturing sector, is crucial in order to stay in and be a part of the competitive race. As an example, the focus groups mentioned in monitoring systems based upon advanced or simple sensors could help increasing the quality and the existence of valuable information. This information can be used for making progress within for example Food Safety or used for optimization within the food manufacturing processes.

The core in the framework:

Develop, Source, Make and Deliver are defining the value chain also for the Food Industry. The four business processes are illustrated as overlapping circles describing the relationship between them. These relations can be more or less integrated in a perspective of fulfilling the consumer demands in a cost efficient manner. The previously mentioned dominant factors are all having an influence on all the processes in the value chain. **Food Chain Management** is “the glue” that thigs the business processes together from perspectives of cost- and energy efficiency, being close to the customers as well as minimizing the environmental impact. The goal for Food Chain management could be creating a positive mass balance, meaning that we get more out of the system than we put into the system.

The process of **Develop** was in this case spilt into: 1. New Functionalities including Smart Packing, Hygiene and Control Systems and 2. Development of innovative and high quality food products. New technologies within manufacturing and new materials have an impact in both areas. The market requirements and the resource availability are however the primary drivers and the challenge were appointed as the ability of integrating external researchers in the internal developing process.

The process of **Source** is highly related to the availability of the materials needed for manufacturing and processing the different food products. Lack of materials enforces increased focus on alternative materials and better utilization of the raw materials also meaning minimizing waste.

Make is the manufacturing process. Besides the food processing and packing, make also includes peripheral processes like cleaning. Food safety, high quality, waste utilization, equipment reliability, low cost and agile change-overs are all necessities in tomorrow’s operating food plant. As a fact, today’s very expensive

equipment can be a barrier for widening the product portfolio, simply because the investments needed for changing the machines are too high. Low cost and high flexibility are two opposing elements – do they have to be that way in the future?

The last process in the value chain is the **Deliver** process. Again it is the market requirements, which define the standards for the manufactured food products availability in the retail system. The product has to be fresh when we as consumers buy it. The challenges are therefore related to minimizing the time spent from leaving the production line to being available in the stores. Otherwise the value chain has to start all over again, simply by asking the developers if it is possible to extend the “shelf life” for the product – either by developing new packing materials, by adding enzymes to the food itself or other alternatives.

The framework illustrated is an attempt to simplify an on-going process based upon causes and effects. Business Models and their configuration developed on the basis of the above mentioned will vary depending on the chosen focus.

Conclusions

The complexity of the food industry and its dynamic contexts make almost endless number of scenarios possible. More scenarios could be developed and could be valid. The four vision scenarios presented here are generic and were derived from the opinion of experts; they can, however, overlap and can be combined in numerous ways. It is important to stress that these scenarios should not be seen as the final and only solutions for the future of European Food Manufacturing, but we believe that the future visions for the European Food Manufacturing sector should be developed within the boundaries of these four scenarios.

The scenarios and the presented framework are intended to open up a new and innovative solution space, which can subsequently form the basis for constructive and open discussions regarding the future of European Food Manufacturing.