

This fiche is part of the wider roadmap for cross-cutting KETs activities

'Cross-cutting KETs' activities bring together and integrate different KETs and reflect the interdisciplinary nature of technological development. They have the potential to lead to unforeseen advances and new markets, and are important contributors to new technological components or products.

The complete roadmap for cross-cutting KETs activities can be downloaded from:

<http://ec.europa.eu/growth/industry/key-enabling-technologies/eu-actions/rockets>

Potential areas of industrial interest relevant for cross-cutting KETs in the Agro-Food domain



This innovation field is part of the wider roadmap for cross-cutting KETs activities developed within the framework of the RO-cKETs study. The roadmap for cross-cutting KETs activities identifies the potential innovation fields of industrial interest relevant for cross-cutting KETs in a broad range of industrial sectors relevant for the European economy.

The roadmap has been developed starting from actual market needs and industrial challenges in a broad range of industrial sectors relevant for the European economy. The roadmapping activity has focused on exploring potential innovation areas in terms of products, processes or services with respect to which the cross-fertilization between KETs can provide an added value, taking into account the main market drivers for each of those innovation areas as well as the societal and economic context in which they locate.

Taking the demand side as a starting point, cross-cutting KETs activities will in general include activities closer to market and applications. The study focused on identifying potential innovation areas of industrial interest implying Technology Readiness Levels of between 4 and 8.

AF.1.1: Functional and lifestyle foods to meet diversifying dietary requirements of consumers

Scope:

To develop functional foods aimed at meeting diversifying dietary requirements of consumers of different age groups, life styles and health conditions. This can mean combining several functionalities in one food product, such as proper textures, high nutritional quality and ease of use in case of savoury foods.

Demand-side requirements (stemming from Societal Challenges) addressed:

- Tackle the “Food security, sustainable agriculture, marine and maritime research and the bio-economy” societal challenge
- Contribute at the same time to the “Climate action, resource efficiency and raw materials” challenge as well as the “Health, demographic change and wellbeing” challenge

Demand-side requirements (stemming from market needs) addressed:

- Improve health, well-being and longevity by food products
- Improve food chain management
- Improve food safety

Specific technical/industrial challenges (mainly resulting from gaps in technological capacities):

- Improving food products to fulfil nutritional, sensory and textural needs of the elderly and other consumer groups through bioactive ingredients incorporation in new structures
- Development of food structures with physiological beneficial impact, via gastro intestinal modelling approaches for digestion and metabolism-relevant processing (including probiotics, prebiotics, and gut microbiota characteristics)
- Development of tailor-made products for gut microbiota (e.g. effect of the food matrix structure on the functionality of foods modulating the gut microbiota)
- Improving effects of diet/dietary constituents in delaying/preventing the decline of cognitive functions in the aging human brain
- Improving the understanding of the variation in human metabolic energy efficiency - including the contribution of the gut microbiota to energy homeostasis
- Improving understanding on the role of diet in pregnancy on the outcome of offspring, preventing cognitive decline, treatment of low-grade inflammation, drug delivery, etc.
- Development of food-grade nano-formulations for effective nutrient delivery
- Development of food processing technologies for functionality and nutrient security
- Development of logistics and e-commerce solutions needed for life style food products

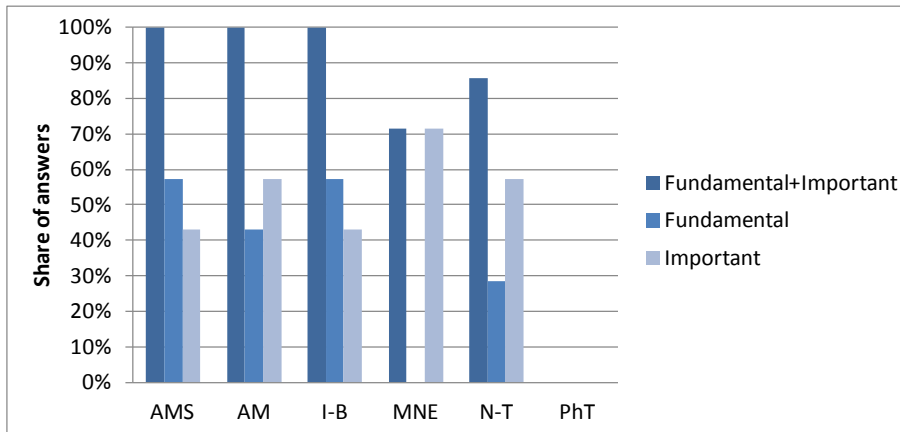
Contribution by cross-cutting Key Enabling Technologies:

In respect to this Innovation Field, the integration of KETs could contribute to the development of solutions to the challenges listed above, such as the modulation of the nutrients' composition as well as structure in food to be achieved thanks to the development of food-grade nano-formulations for effective nutrient delivery along with the development of food processing technologies, which may help in introducing more desirable traits in food by altering the food's structure or nutrients content.

To this aim, the combination of KETs experts' opinions collected through the dedicated survey (whose result is depicted in the below bar chart), the examination of KETs-related patenting activity in respect to this Innovation Field, and desk research activities, have allowed identifying a rather strong interaction of KETs with respect to this Innovation Field, with either fundamental or important contribution mainly by the following KETs:

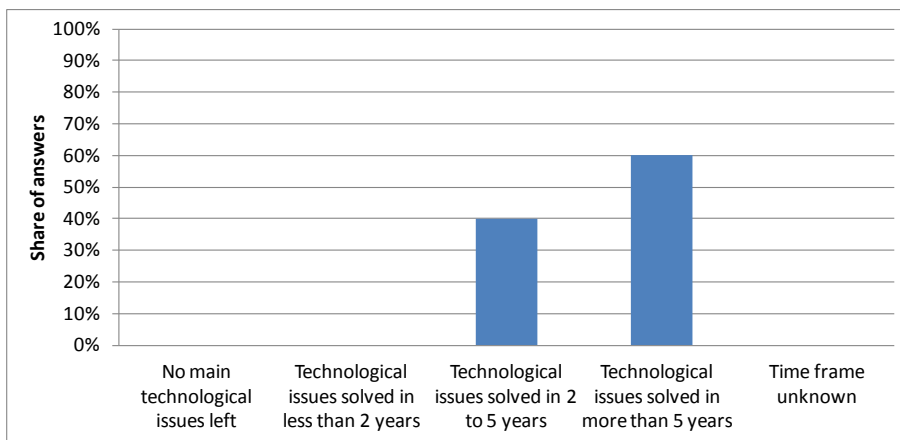
- Advanced Manufacturing Systems (AMS)
- Advanced Materials (AM)
- Industrial Biotechnology (I-B)
- Nanotechnologies (N-T)

- Micro- and Nano-Electronics (MNE)



Timing for implementation:

According to the majority of KETs experts' opinions (whose result is depicted in the below bar chart), desk research, and in line with the KETs-related patenting activity in this field, it is considered that the main technological issues holding back the achievement of cross-cutting KETs based products related to this Innovation Field could be solved in a time frame of more than 5 years, yet significant consensus by experts indicates also shorter periods being necessary:



Hence, depending on the specific technical and/or industrial challenges holding back the achievement of cross-cutting KETs based products related to this Innovation Field, the provision of support in the short to medium term should be taken into consideration within this framework.

Additional information according to results of assessment:

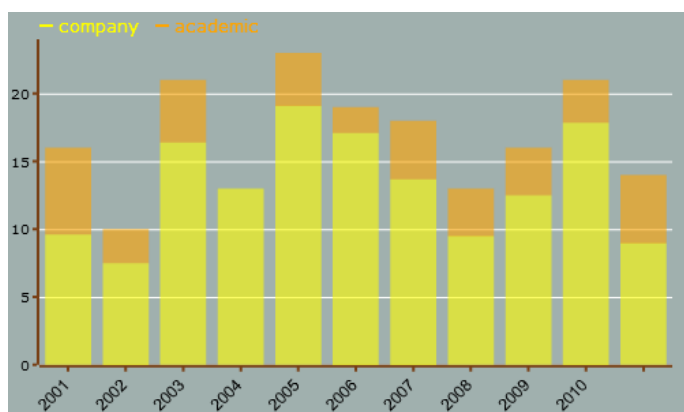
➤ **Impact assessment:**

- The food sector is one of the largest and most important manufacturing sectors in Europe. It is the second largest (after metal) in the manufacturing industry, with 14.5% of total manufacturing turnover (917 billion Euro for the EU27) (Source: <http://ec.europa.eu>).
- The employment in the food industry represents about 14% of the total manufacturing sector. However, the food industry is characterised by fragmentation. There are few European multinational companies competing worldwide with a wide variety of products, but 99% of all enterprises in the food sector are micro, small and medium-sized enterprises (SMEs) (Source: Accelerating regional competitiveness and sector-based excellence through innovation management tools and techniques; www.central-access.eu).
- One of the emerging trends in the modern food industry is represented by functional and lifestyle foods designed to meet diversifying dietary requirements of consumers. In 2013 the global market for functional foods and beverages was reported to be on track to reach 130 billion Euro, accounting for 5%

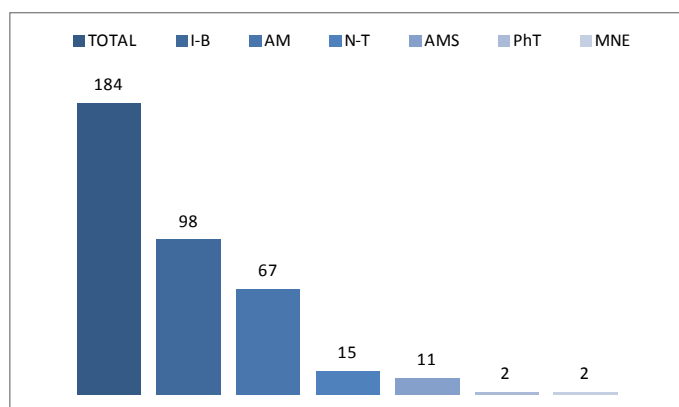
of the overall food market. As a result, the booming market for functional foods and beverages was reported to drive growth for the food industry as a whole (Source: www.nutraingredients-usa.com).

➤ **Results of patents scenario analysis:**

- 184 exclusively KETs-related patents identified in the period 2001-2011 for the specific Innovation Field
- Stable trend curve (number of patents per year)
- Shared between industrial and academic applicants:



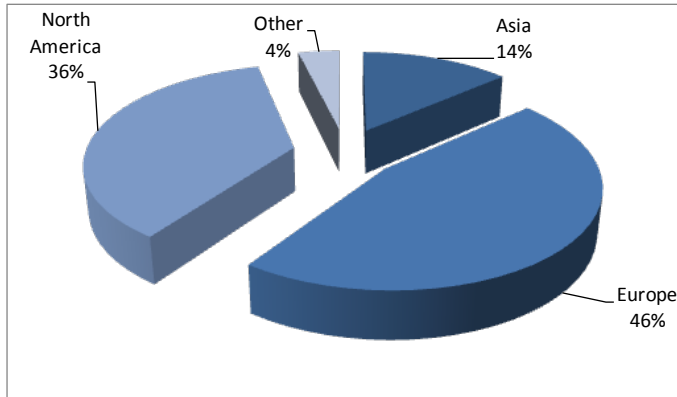
- Patents by KET(s):



- Patents by KET(s) and relevant combinations of KETs:

KET(s)	Number of patents
AM	67
AM / IBT	5
AM / N-T	2
AMS	11
AMS / AM	1
AMS / MNE	1
IBT	98
IBT / MNE	1
IBT / MNE / PhT	1
IBT / PhT	1
MNE	2
MNE / PhT	1
N-T	15
PhT	2

- Patent distribution by (Applicant) organization geographical zone:



- Patent distribution by geographical zone of priority protection:

