Research, innovation and the European food industry: Trends and challenges

The Food Industry is the largest manufacturing sector in the European Union in terms of both turnover (approx. €965 Bn) and the number of active companies (approx. 310,000). It is also the leading employer in the EU with 4.4 million employees.

Research and Development (R&D) investment of food and drink manufacturers has traditionally been relatively low in comparison to other industries. R&D expenditure (R&D investment as a percentage of output) in EU-15 has been the lowest when compared to a majority of developed countries (see Figure 1). The R&D expenditure levels are higher and continue to increase in Japan, the USA, Australia and South Korea, while EU-15 countries experienced marked levels of stagnation of approximately 0.37% in 2006, close to 2005 levels (0.38%).

European food sector SMEs face significant challenges in terms of their participation in the pan-European and global commercial competition, a trend expected to increase. Additionally, changing attitudes and behaviour in society, as well as new and emerging consumer trends necessitate constant renewal of food products and product concepts at an ever increasing pace. The food industry must, therefore, constantly innovate its processes and products in order to remain competitive and SMEs need to invest towards the adoption of new technologies, developed through research.

The European Food industry is dominated by SMEs which, in most cases, do not invest the necessary financial, human and other resources to ensure increased uptake of R&D outputs into their processes. Furthermore, the SMEs in question often lack the inherent capacity to develop their own R&D activities. Many Food SMEs confront difficulties in making the most of the existing opportunities, their awareness of the technological solutions is low or they are not well positioned to adopt R&D results.

At a European level, the Food and Drink Industry is driving innovation and uniting stakeholder communities in reaching strategic research objectives by supporting the development of the European Technology Platform (ETP) “Food for Life”. “Food for Life” was created in 2005 under the auspices of the Confederation of the food and drink Industry of the EU (CIAA) and aims to strengthen the European innovation process, improve knowledge transfer and stimulate European competitiveness across the food chain.

Figure 1: R&D investment in EU and non-EU countries (€ billion) by productive sector (Source: The 2009 EU Industrial R&D Investment Scoreboard, European Commission, JRC and DG RTD)
ETP “Food for Life” has identified the following social, consumer and science needs that the research and innovation of the food and drink industry should address:

![Figure 2](image2.png)


Several trends guide food innovation in Europe. They can be divided into 15 trends, grouped together in 5 axes: Pleasure, Health, Physical, Convenience and Ethics (see Figure 3 below). At a European level, the two leading trends are sophistication and variety of senses. The health category is equally composed of medical and natural trends.

<table>
<thead>
<tr>
<th>Trends of food innovation in Europe</th>
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<td>Pleasure</td>
<td>Sophistication</td>
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<td>Exoticism</td>
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<td>Variety of senses</td>
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<td>Physical</td>
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<td>Cosmetic</td>
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<td>Energy, well-being</td>
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<td>Convenience</td>
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<td>Ethics</td>
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<td>Ecology</td>
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<td>Solidarity</td>
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![Figure 3](image3.png)

Figure 3: Trends of food innovation in Europe, (Source: XTC world innovation 2008. Copyright XTC 2009)

Notes:

1. “Data & trends of the European Food and Drink Industry”, 2009, CIAA- Confederation of the Food and Drink Industries of European Union

The Agro-Food Sector in Greece

The agro-food sector in Greece is one of the most dynamic sectors of the Greek economy. It employs 124,000 workers, that is 2.9% of the country’s total employment. The gross value added of the sector is €3.528 million, thus contributing by 2.5% of the country’s total GVA. The labour productivity of the sector as gross value added per labour unit is €43.6 thousand. The participation percentage of the agro-food sector to the total value of the agricultural products exports is 71.7% and 16.4% of the value of the exports for all products.

The most important products of the agro-food sector in Greece involve:

- Live animals
- Milk
- Meet and eggs
- Fish
- Cereals
- Fruits and vegetables
- Sugar and honey
- Coffee, cocoa, tea
- Spices
- Food and drinks
- Oils and fats

All together, the agricultural food products supply chain connects three very important and diverse sectors of the national economy:

- agriculture (agricultural production branch)
- the processing sector and
- the distribution sector,

that together make a significant percentage of the national value added and of the employment and it is also essential for the economic, social and environmental welfare as well as for the health of the citizens.

The agricultural food products supply chain is characterized by the wide diversity of the factors involved in it: farmers, food processing companies, traders, wholesale and retail sales companies. Also, it shows a significant diversification regarding the number and the volume of production between large and small companies. Very large companies as well as small and medium sized companies or very small companies and households are active, as competitors, suppliers or customers. The relationships between them are often facing problems that hold back the full potential of the chain. Furthermore, the performance of the supply chain has direct consequences to all citizens, due to the fact that the agricultural food products represent a significant percentage of the household expenditure. High consumer prices remain a source of concern because they put pressure to the household incomes. These pressures are particularly high for the most vulnerable households which spend a considerably greater part of their income to agricultural food products.

Regarding the production branch of the agro-food sector, a comparatively small number, approximately 200 large companies, possesses 85% of the production and market share. On the other side, a large number of approximately 17.000 small companies produce the rest of the food products in the form of cottage industries and craft companies in the rural areas of the country. These companies, even though they lack in technological and staff training level, they contribute substantially to the employment of rural areas, to the preservation of traditional food products as well as to the diversity of nutrition. However, they lack in added value and need support regarding matters of adoption and development of innovations and technological modernization, improvement of quality, hygiene and safety of their products as well as strengthening of the official controls that will assure them.

Overall, the food and drink industry in Greece (including the agro-food products processing, sales and distribution companies) employs directly or indirectly approximately 360.000 workers, a number that corresponds to almost 26% of the industry’s work force.

According to data from the Federation of Hellenic Food Industries (SEVT), the total value of exports in the first quarter of 2011 showed an increase of 25% compared to the same period in 2010.

The first sector in exports is the fruit, vegetables, processed and packaged products sector, followed by the oils and fats sector, while in the third place in export activities is the dairy sector.

The average of the sector’s exports is approximately to 19% of its overall turnover and it reached 3 billion Euros in 2010, including drinks.
Nanotechnology: the incredible applications - 11/01/2010

The first sector likely to undergo an in-depth revolution is the food industry. ETC, a Canadian institute that monitors technological developments, believes that nanotechnology "will change every stage of food production and also change the people involved in it".

There is now an annual conference for "nanofoods", which is attended by researchers in the field. The latest was held in Los Angeles in June 2008 and showed that there was a market for such foods. Among the products already being sold are Shemen Industries’ active oil, which inhibits the entry of cholesterol into the blood, RBC LifeSciences’ chocolate, which tastes like the original but without excessive sugar, and Nanonutra’s food substitute Nanotrim, which the body recognises as food and which burns fat.

A cucumber that tastes like a tomato.

But this is only a start, as we also learn that nanofoods should be capable of creating ice creams that taste like traditional ice creams but contain no lipids or sugar, and sauces that you can enjoy in large quantities without worrying about putting on weight. Even better, some researchers have dangled the prospect of changing the taste of a food at will! In other words, a cucumber could take on the taste of a tomato. But that’s not all.

Also mentioned is packaging suitable for long conservation in that it absorbs the microorganisms that normally cause foods to perish.

The boldest even hold out the hope of putting an end to hunger in the world.

According to the German firm Helmut Kaiser Consultancy, the nanofoods market could be worth 20 billion dollars in 2010, with America leading the field ahead of Japan and China. The same firm says that there are hundreds of food companies carrying out research in the field. The concern, says American journalist Steve Boggan, is that most of the companies in question are keeping very quiet about this research due to public opposition. In fact, when there is talk of nano-elements taking up residence in the fields, capable of optimising harvests, a parallel is bound to be drawn with the case of GMO, so discredited in Europe?

We are told that nanocides (cf. pesticide) would be smart, that they would not harm useful insects such as bees, that they would be used in a much lower dosage than current pesticides, and that they would dissipate much more easily in nature. And yet there is a need for caution. How can we not remain on our guard when we learn that, among the companies developing nanocides, alongside BASF and Syngenta we see names such as Monsanto?

Source: http://www.futura-sciences.com
PACMAn state of the art

As far as Component 3 is concerned, during the meeting in Avignon (29th February - 1st March 2012) there was a presentation of the final reports on key factors and focus groups regarding the segments of the agro-food chain identified by each partner (Action 3.2). As regards the Action 3.3 (In depth analysis of the most relevant agrofood segments) partner approved the final version of the questionnaire to be filled in by 90 companies for each region by the end of June 2012. Partner also approved the final structure of the database (Action 3.4) that will include companies and other actors of the agro-food system. The database is aimed at supporting networking activities amongst the countries involved in the project and will be soon online on the project website (www.pacmanproject.eu). Reports on Best Practices will also be delivered by the end of June 2012. With respect to Component 4 – Sustainable Innovative Model of Med Agrofood Cluster – during the meeting in Avignon there was a first presentation of Action 4.1 - Definition of a sustainable model of reference of the agrofood cluster -, that consists of a collection of recommendations, according to the Application Form. Action 4.1 is just starting and will last until the end of the project. At this phase partners shared a common definition for concepts as sustainability and green economy and defined these concepts within a supply/value chain approach, that is the same adopted in the methodological guidelines (Action 3.1). The model will also provide guidelines for the Pilot Actions (Action 4.2). The partners started working on the first identification of pilot actions and thematic areas in order to discuss and share them in the next meeting in Kilkis (11th-13th July 2012).

!!! Next international conference will be held in Valencia in October 2012, 17-18-19 !!!
**www.pacmanproject.eu**

**www.pacmanproject.eu** is the first output of the PACMAn operation. Designed as a portal, it is structured in several thematic areas easily and immediately accessible, useful and flexible. The PACMAn portal responds to the aims of the project, through a clear vision of the overall contents of the project, a detailed description of the partnership and updated news and information of ongoing events at European level on the agrofood sector. Visiting **www.pacmanproject.eu** you will be able to find the project contacts and the state of the art of the activities and the final products will be downloadable as to inform the users on the project midterm and final results.

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