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Expectations of and Needs for Research, Innovation and Sustainability in the Potato Sector

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Abstract This contribution provides an overview of the potato processing sector in the EU and the needs for research, innovation and sustainability in the sector. It stresses the entrepreneurship of both the farmer and the processor and highlights the opportunities provided by the combination of a knowledgeable farmers' community, a strong technology and knowledge infrastructure, a very innovative processing industry and a large market of critical consumers.

Keywords Entrepreneurship · Frozen potato products · Innovation · Knowledge infrastructure · Potato chain

Introduction

The potato industry and in particular the frozen potato industry has been growing continuously in Europe for the last 30 years and is still making considerable progress with increasing exports to countries outside the continent (Table 1). Europe is becoming the biggest exporter of frozen potato products in the world. But the potato industry is more than frozen potato products. Europe also has a large potato flake and starch capacity, is a major potato chips producer and has an outstanding fresh potato trade. In Belgium alone, 18 potato processors transform over 3.5 million tons of potatoes into added value product per year, with direct employment of over 3500 employees. In Europe, over 15 million tons are transformed every year, by more than 15,000 direct employees.

Europe is one of the major potato-growing continents. The EU 27 is ranked 2nd in the FAO graphs (Fig. 1). Within EU 27, potato production becomes more and more 'centralized' in what is called the EU5 countries: Germany, with lower Saxony as the most important growing area, the Netherlands, Belgium, Northern France and the UK (Fig. 2). The major part of the growing area is even smaller: west of the Hannover-

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Table 1 Destination of EU and North American fry exports (tonnes)

	2013	Change (%)	2012	2011
EU	3,925,486	+0.4	3,908,043	362,911
Intra-EU	2,981,731	+2.3	2,915,024	2,903,625
To world	943,755	−5.0	993,019	725,586
World %	24.0		25.4	20.0
USA	955,818	+2.9	928,733	832,215
US to Canada	52,384	−10.6	58,594	68,311
To world	903,434	+3.8	870,139	763,904
World %	94.5		93.7	91.8
Canada	924,022	+5.0	880,425	898,531
Canada to USA	780,752	+8.8	717,740	725,641
To world	143,270	−11.9	162,685	172,890
World %	15.5		18.5	19.2

Data source: GTIS

Frankfurt-Paris-line. Good climate, good soil, knowledgeable farmers and good infrastructure built up over many years are the major ingredients for the success of this performing growing area. One could regard this area as a very promising 'potato cluster'.

In the supply chain, the potato processor finds himself between the potato producer, upstream the chain and the consumer and his distributor on the downstream side. Each processor has to find the right compromise between the expectations of the farmer on the one hand and the demands of the consumer for taste, health aspects and sustainability on the other hand.

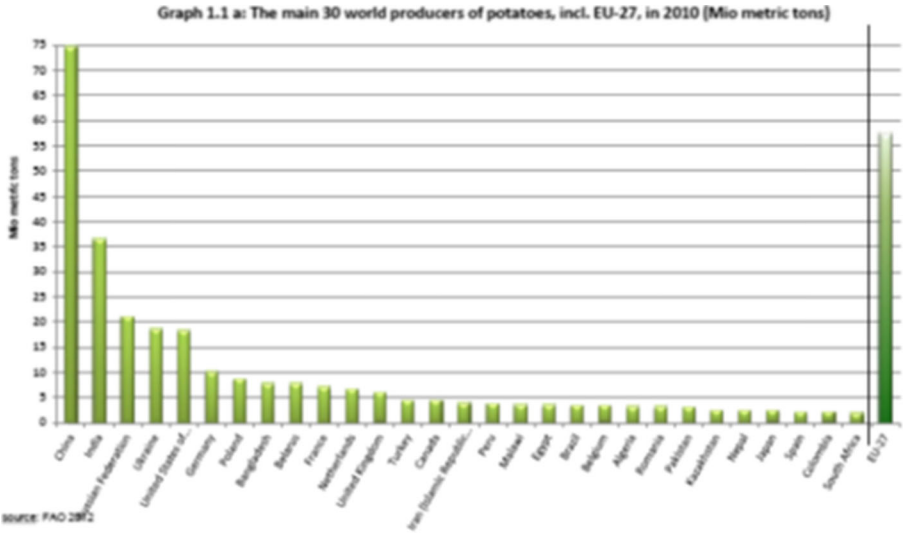

Fig. 1 The main 30 world producers of potatoes. Source: FAO 2012

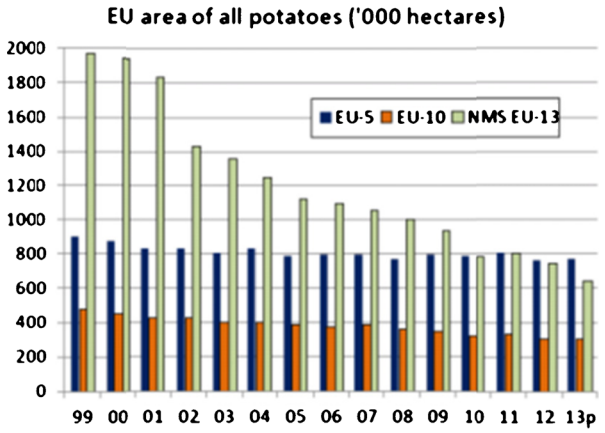

Fig. 2 EU area of all potatoes from 1999–2013 (last year predicted)

Entrepreneurship in the Potato Chain

A farmer is an entrepreneur in the first place. He is looking at optimizing and securing his business, by making the right choices on operational and financial risk. Obviously, the yield of the specific chosen variety and the robustness of this variety while growing or being stored are extremely important to him. He can spread his risks eventually further by choosing products that can go into different markets, even under different contracting agreements. If growing potatoes becomes too risky or does not bring him a sufficient return, he might eventually change to alternative crops (Table 2).

The processor, also an entrepreneur, is also trying to optimize and secure his business model. For a processor, price and availability of the raw material throughout the year are of extreme importance. He is looking for good quality product the whole year through. Since he made fixed contracts with his client, he is looking to hedge this risk, by spreading his contracting agreements. He is also looking for good quality, even after several months of storage. Not all varieties can be used until the end of the storage

Table 2 Relevant deliberations for farmers and processors

Farmer	Processor
Yield/ha in kg and €	Availability through the year
Price and availability of plant material	Price through the year
Free or monopoly variety	Sourcing area and transport distance
Possibilities of contract or free buy	Possibility to contract and/or free buy
Possibilities of table, industry, export as a market	Technical parameters: shape, dry matter, sensitivity to defects
Sensitive and/or difficult crop and variety	Possibility to use for fries, mash, cut specialities, flakes, …
Sensitive and/or difficult storage	% small tubers
Possibility of alternative crops cereals, vegetables, …	

season. The starch can degrade quickly or the variety is sensitive to all sorts of diseases while being stored, reducing the availability of raw material (Table 2).

The processor also looks to specific technical parameters. Long tubers for long fries or small tubers for cut potato specialties. His customer wants either crispy fries or thicker fries with a more tasteful flesh inside. Sensitivity to black spots, sugar ends, degrading starch and quality of the peel will determine to a large extent the yield of the raw material and thus his profit.

The consumer wants 'his' fries to be: long, crispy, short, thick, tasty, coloured, battered, yellow flesh, white flesh, for the oven or to be fried in oil….. He does not like black spots and very small fries and he certainly does not want to pay (too) much. The retailer will usually make sure that the processor is being monitored. The consumer is also sensible to health issues and sustainability issues. He wants food that does not make him sick and he does not want the supply chain to ruin his environment.

One way or the other, all these expectations by all the players in the field, being the farmer, the processor or the consumer need to come to some kind of compromise, which is 'sustainable'. A profitable and sustainable crop for the farmer guaranteeing him a sustainable income, a process that valorizes not only the finished product but also the side streams, without ruining the environment and without ruining the processor himself and last but not least, an affordable product with the right taste for the consumer. That is obviously a complex exercise.

The Potato Cluster

Coming back to the EU5 potato-growing countries, one could see it as a cluster, described by Porter as: 'a geographic concentration of interconnected companies, specialized suppliers, service providers, related industries and associated institutions'. In this rather small area, if you would compare it to the world, the EU5 grows 25 million tons of potatoes. The EU5 has a very competitive processing environment, smaller and bigger companies, keeping each other every day 'on alert'. The EU5 also has a very large consumption for frozen potato products. Many technical suppliers either on the farming side, the storage side or the processing side are based in this area, renowned all over the world and delivering their services all over the world right out of the EU5. Some of the universities in this area are really 'world class' as far as potatoes are concerned and finally, many institutions have been created to help either farming or processing, but also to help the whole supply chain to become more efficient. All these result in a promising and performing cluster, with unique competitive advantages as far as potato processing is concerned. All partners in this cluster should be aware of and all partners in this cluster can add to its sustainability.

A wide range of factors or subjects have been described here that influence the potato business as a whole, starting from the agronomy, to storage and processing up to technical aspects of starch or potato taste where applied science can play an important role. Even the larger economic context should not be forgotten.

Both the individual companies and the national or European branch organizations have shown that this awareness has resulted in a number of research projects. Most of the projects aim for a more sustainable raw material supply.

A short and non-limitative overview to illustrate this:

- At EU-level EUPPA, the European Potato Processors' Association and Belgapom have developed a 2-year study in the framework of Flanders' Food together with the Ghent University to look for alternative process tools to reduce the acrylamide in French fries.
- Belgapom, the Belgian potato trade and processors' association, has set up a number of study projects, in collaboration with different research institutes and partners in the potato chain:

– Ipot : a project with VITO, CRA-W and the Liège University to develop a web-based tool which will link all (potato) field data with all available information gathered by satellites and drones to improve yield and quality of the crop.
– Reskia: another project introduced in Flanders' Food, the Flemish agro food industry innovation institute, which aims for a low residue potato storage. This is a Belgapom project elaborated with PCA and INAGRO, which focuses on the scope of Belgian varieties for the fresh and processing market.
– Cisgene Bintje: Belgapom, together with the Belgian farmers' union, will support the development of a cisgene Bintje (which is the most popular variety in Belgium being used for the production of the well-known 'Belgian fries'), which will be resistant to late blight. This project is set up with the Flemish biotechnology institute VIB, ILVO and the Ghent University. Although this is not the easiest way, the Belgian potato industry believes that this plant-to-plant technology applied on potatoes could change the future of the technique and its application in the food sector. Reducing the usage of pesticides and keeping the usage of the seed potatoes in the hands of farmers, making use of a technology which takes into consideration a lot of the arguments of opponents, could lead to a breakthrough in the European agro food industry.

But apart from these industry efforts mentioned, there is a treasure throve of other study objects, just waiting to be developed, by enthusiastic 'potato' scientists.

As chairman of the processing sector of Belgapom, I make an appeal to the scientists of Europe and the world, to continue to invest into fundamental and applied research in the potato sector. The United Nations international year of the potato in 2008 has illustrated the potentials of the humble potato to feed the world. The role of the scientists to achieve this aim is crucial.