



Sveriges lantbruksuniversitet  
Swedish University of Agricultural Sciences

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UPPSALA 2016

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# Food Chain Sustainability in Sweden

Value Creation  
through Research?



# Food Chain Sustainability in Sweden



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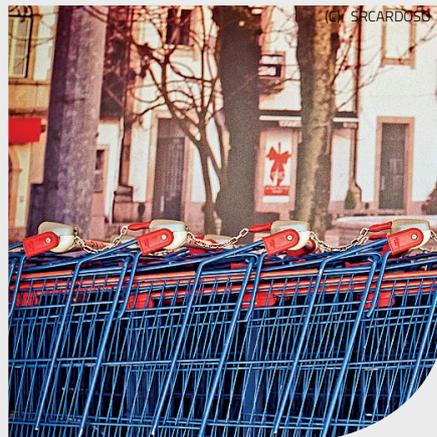


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Stephan Tolstoy

# Foreword & Acknowledgements

Swedish food sector is at an interesting juncture where productivity has increased but not competitiveness, production volumes are increasing but not the industry size. On one hand, smaller companies have been merging to achieve scale economies but on the other, this has created concerns over the sustainability of the sector.

In this context, the present report looks at the Swedish food chain from a domestic and international perspective and argues for value creation through research. This is in congruence with the Södertälje Science Park (SSCP), presently under formation, which will have three focus areas when it opens up during the first part of 2017.

These areas are Sustainable Production, Life Science and Food Chain Sustainability. Some of the existing partners behind SSCP are the Municipality of Södertälje, Scania, AstraZeneca, KTH and Acturum. Behind the focus area of Food Chain Sustainability, are the Municipality of Södertälje with Matlust, Saltå Kvarn, Acturum and SLU. This Acturum-SLU Food Chain Sustainability Report will form the basis for the process of selecting future research areas for SSCP in cooperation with other interesting parties. Therefore, it is my pleasure to welcome the readers to this report.

Stephan Tolstoy  
Chairman Acturum Development AB\*

The authors would like to extend their gratitude to Johan Ununger, whose vision and motivation led to the conception and execution of this work. Our special thanks to Stephan Tolstoy whose belief in us and commitment to the subject matter made the process fulfilling, and Carl-Johan Lagerkvist whose consistent encouragement and support helped us sail smooth. We are very grateful to Per Baumann for providing critical and useful comments. We thank Kostas Karantininis for timely inputs. All the remaining errors are sole responsibility of the authors.

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Agricultural Sciences  
Department of Economics  
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SE-750 07 Uppsala, Sweden

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#### REPORT

# 168

#### ISSN

1401-405X

#### ISRN

SLU-EKON-R—168—SE

#### FRONT COVER PHOTO

Hernán Piñera - Apple

#### PRINT

Service/Repro, SLU 2016

#### LAYOUT

T. Pribil, Lesenswichtig.eu

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The report is authored by SLU researchers Mattias Eriksson, Nathalie Pano and Ranjan Ghosh. The work was supported by Acturum Development AB. Any opinions, findings, conclusions, or recommendations are those of the authors and do not reflect the views of either SLU or Acturum Development AB, their employees or their administration.

\*Acturum Development AB is the parent of a group of companies owning AstraZeneca's earlier research site in Södertälje. The purpose of Acturum is to create a competitive, sustainable and dynamic business park through the development of a world-class environment in Södertälje for research, innovation and entrepreneurship. The group is partly owned by FAM, the investment arm of the Wallenberg Foundations and the construction company PEAB.

# Executive Summary



The productivity in Swedish food sector has significantly increased during the last decades as has the capacity in distribution networks. Food company mergers combined with reductions in relative price on input resources has created a food production system that is economically more efficient. On the other hand, with some businesses growing disproportionately in comparison to others, a few big players dominate nearly the entire Swedish market. This is especially relevant in the retailing sector and raises concerns on distribution of bargaining power. This could potentially affect economic viability and innovation opportunities of smaller producers and businesses, although the direction of these effects is ambiguous.

There are newer trends like private labelling, food frauds and presence of inefficient practices in the chain which need to be understood. There are also concerns such as low Swedish competitiveness, inefficient price pass through and food waste which need to be addressed. This way the sector is confronted with challenges whose interplay is unknown territory. In the face of a dynamic food sector and evolving consumer behavior, the previous successes of the Swedish food industry may have unintendedly become threats to its future sustainability.

This report, therefore, scopes the need and potential for greater scientific investigation on challenges in Swedish food sector with the objective of augmenting the sustainability of the overall sector. In doing so, it describes the research front on sustainable food production from a value chain perspective with a focus on the retailer-supplier interface. The report concludes by discussing briefly some challenges and the related potential research directions. The aim is not to provide answers but to illustrate the potential of value creation through systematic analysis.

# Introduction & Purpose

The current goal for Sweden's food-related policies is 'an environmentally, economically and socially sustainable production and a consumption that reflects the demands of the consumers'<sup>1</sup>.

“How should appropriate incentives for stakeholders be designed for a sustainable transformation?”

The productivity in Swedish food sector has significantly increased during the last 50 years mainly due to intensified primary production and heavy reliance on inputs from fossil fuels and mineral fertilizers. Increased capacity in distribution networks has also had a positive impact. Similar to the trends in other sectors, a number of food companies have merged to generate larger production units to achieve scale advantages. At the same time the relative price on energy and basic resources has decreased which also helped in the transition. This has created a food production system that is more efficient from an economic point of view,

but with a high indirect use of fossil energy. Such development has been successful in providing larger volumes of food at a competitive price but is not sufficient to meet the current challenge of maintaining competitiveness and yet achieving the Swedish sustainability goals. The previous success has become the new challenge.

During 2015, Sweden started to work on a new food strategy to form the future politics around a sustainable food chain<sup>2</sup>. The strategy is supposed to develop and strengthen the Swedish food production and the food supply chain in order to create a sustainable growth in the whole country, including increased production and food export. With this new strategy Sweden has the opportunity to develop policy instruments that lead to a sustainable transformation. The question, however, is how appropriate incentives should be designed for the involved stakeholders. Moreover, the political economy and low level of environmental taxes<sup>3</sup>, does not generate sufficient pressure to transform the Swedish food business into environmental sustainability<sup>4</sup>. This means that despite the ambitious goal, the policies are unlikely to lead to a sustainable transformation of the Swedish food production.



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<sup>2</sup> Näringsdepartementet (2015).

<sup>3</sup> For the food processing and retailing industries the carbon tax constitutes approximately 0.1% of the companies' total operating costs. The average for Swedish enterprise and industry is 0.3% (Tillväxtanalys, 2014).

<sup>4</sup> Tillväxtanalys (2014).

<sup>1</sup> Landsbygdsdepartementet (2010).

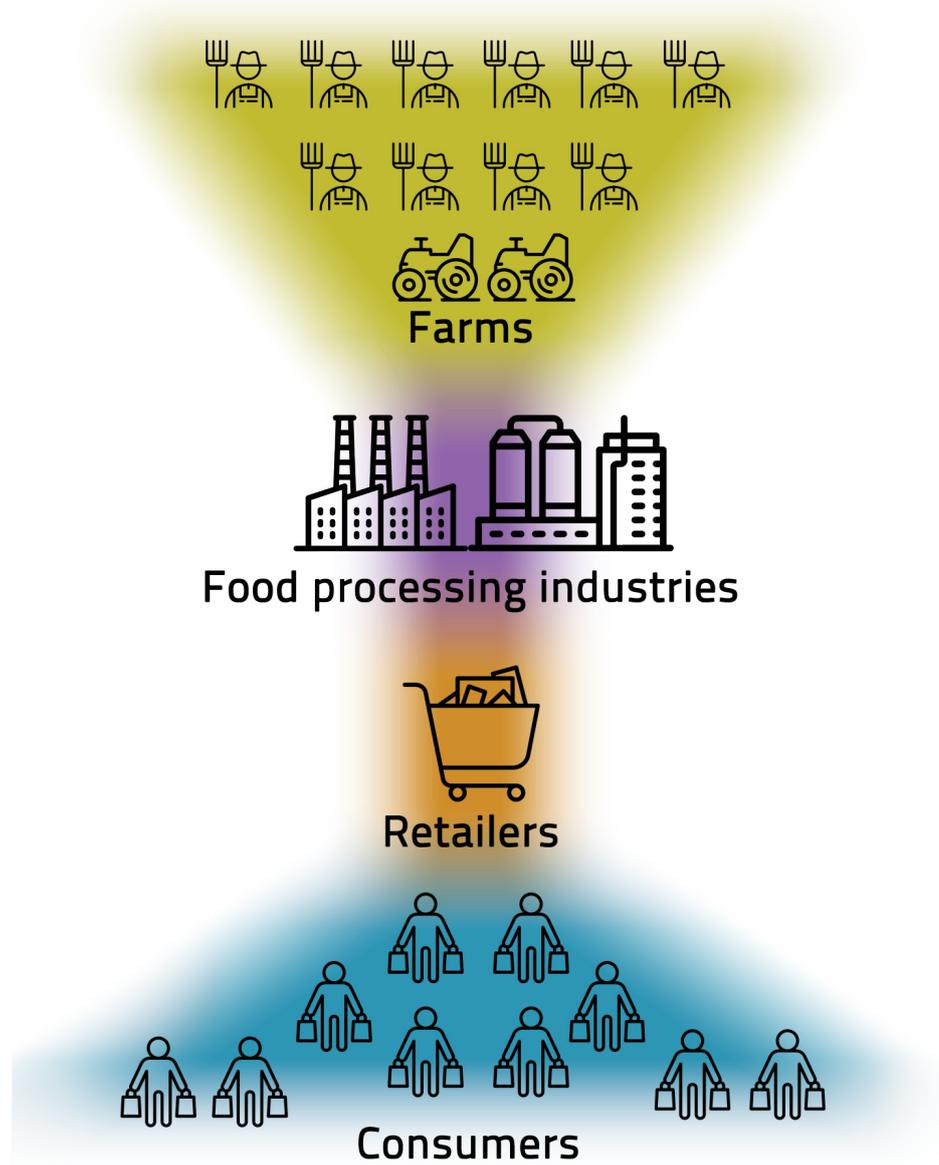


Fig. 1: Agri-food value chain schema (adapted from Li Feng 2014)

This report briefly summarizes and describes the research front on sustainable food production from a chain perspective. Agri-food chains include providers of inputs and services as well as processing, industrialization, transportation, logistics and other support services, such as financing and information support<sup>5</sup>. However, the concept of value chains is to analyze the value added in a product as it moves along the supply chain through economically efficient processes and reliable networks. This requires prudent organization, a robust institutional structure and strong information flows. Analysis of agri-food supply chain conventionally begins with the farmer, moves to the processors, distributors (retailers or wholesalers) and ultimately to the end consumers.

As food travels from 'farm to fork', generally it takes the form of an hourglass as shown in Fig. 1. While numbers of farmers and consumers are quite high,

there are relatively lower number of actors in processing and retailing. This stage, which we call the supplier-retailer interface, is where the potential for highest value addition exists and hence is populated almost entirely with, small or big, business enterprises. For instance,

**"Presently the top 15 global retailers account for 30% of world's supermarket sales"**

presently the top 15 global retailers account for 30% of world's supermarket sales<sup>6</sup>.

The objective of the present report is to emphasize the importance of this interface in overall sustainability and

<sup>5</sup> Garcia-Winder et al. (2009).

<sup>6</sup> USDA, Economic Research Service (2016).



Fig 2: Three spheres of sustainability

growth of the food sector with the aim to draw greater research attention. Sustainability is a complicated concept but can generally be understood to have three dimensions as shown in Fig. 2 – social, economic and environmental.

While we touch upon the other two aspects and consider them equally important, the theme of this report is primarily centered on the economic dimension. In that sense, a sustainable food chain must contribute to the society in a way that the economic viability of all the actors is maintained. The economic dimension contains business development, business climate and other things related to direct economic activity while the indirect economic dimension of the food chain concerns social (such as social security, employment and health) and environmental components (such as environmental friendliness, animal welfare etc.).

To make food chains more sustainable, the interests of all stakeholders concerned in the production should be considered. This means not just product innovation but also organizational innovation is important. A simple (though non-exhaustive) schema of attributes which need to be considered for sustainable chains is as shown in Fig. 3. It is inclusive of the four sub-dimensions: product, process, social and governance. Although this is not representative of any strict framework for the report, we will touch upon several of these aspects in a later part where some research directions are elaborated. With this perspective, we begin with presenting an overview of Agri-food chains in the European Union (EU) and pointing to some important trends and challenges. As of 2014, approximately 12.3 % of EU

household expenditure is spent on food and non-alcoholic beverages<sup>8</sup>. It is important not only in terms of expenditure but also in terms of employment and trade. Food production (agriculture and the food processing industry) provides for 7.5% of total employment in the EU and a gross value added (GVA) of more than EUR 420 billion, which represents 3.7% of EU's total value added in 2011.

The food processing industry is the biggest branch of the EU industry, representing about 13% of total industrial GVA and about 15% of total employment in this economic sector<sup>9</sup>. The food and drink industry is the biggest employer in manufacturing in more than half of the member states and in Sweden it is the fourth largest.

## Food and Drinks Industry in Europe

Largest manufacturing sector: turnover 1.244 billion EUR  
Value added: 1.8% of EU Gross Value Added  
Household expenditure: 14% on food and drinking products  
18% market share of EU global exports  
Trade balance: 27.6 billion EUR  
Exports: 91.7 billion EUR  
Imports: 64.1 billion EUR  
Leading employer: 4.2 million people employment  
Number of companies: 289.000  
Small- and medium size enterprises:  
49.6% of food and drinks turnover  
63.3% of food and drinks employment  
Research & development expenditures: 2.8 million EUR

(Data: Food and Drink Industry, 2015)

Fig. 3: Indicators for the economic performance of a food industry (adapted from Foodmeters project)<sup>7</sup>

<sup>7</sup> Foodmetres (2015).

<sup>8</sup> EY analysis based on Eurostat, (TSDPC520): <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=tsdpc520>

<sup>9</sup> EC (2015a).

# European Agri-food Chains

One of the most important stages is 'retailing' due to the high value addition in the process of procurement of final product from suppliers and selling it to the consumers at flexible profit margins. According to the latest figures, retail sector represents 4.3% of the GVA in the EU economy, with over 8% of total employment and consisting of 3.7 million Small and Medium-Sized Enterprises (SMEs)<sup>10</sup>.

## Key trends identified that has affected the development of the retail sector:

- Increase in the number of shops and commercial sales areas
- Structural changes in retail (e.g. from traditional to modern stores)
- Development of private labels
- Mergers and expansions

## Choice and innovation

Over the past two decades, the retail sector in EU has transformed in several ways. For example, consumers in EU have a greater choice as compared to what they had two decades ago. According to a report<sup>11</sup>, the choice in alternative products for an average consumer increased at an annual rate of 5.1% from 2004-12. The pre-crisis period of 2004-08 showed a very high growth of 7.9% as compared to post-crisis growth of 2.4% during 2009-12<sup>12</sup>. There have been similar trends in the variety of product sizes, the number of brand suppliers, and the number of shops. The number of shops that consumers have access to grew at an annual rate of 1.6% between 2004 and 2012. Innovation in products within EU has shown broadly a reverse trend in the last decade.

The share of innovations in total number of products in EU decreased from 43% in 2006 to 30% in 2012. Before the economic crisis of 2008-09, innovation was higher in prosperous rural areas and poorer urban areas.

However, in the post-crisis period innovations increased only in poorer urban areas. Within retail categories, innovations were observed to be higher in discount stores and hypermarkets compared to supermarkets. Most of the innovations have come in new packaging whereas innovations in new varieties and range extension have shown a decline (ibid.). But over the past decade, a number of new consumer preferences have gained influence, and have had an impact on the grocery retail market in Europe, including health awareness leading to newer food trends; development of ethnic food; increase in environmental awareness; and, focus on convenience for time-constrained consumers.

## Modern retailer's concentration

In the EU around 12 million farms produce agricultural products for processing by about 300 000 enterprises in the food and drink industry. The food processors sell their products through the 2.8 million enterprises within the food distribution and food service industry, which deliver food to the EU's 500 million consumers<sup>13</sup>. As far as the industrial structure of food markets are concerned, they are more oligopolistic than purely competitive since a small number of companies control a large share of the market. This weakens the negotiating position for other actors in the chain, especially smaller producers and suppliers.



<sup>10</sup> EC (2014).

<sup>11</sup> EC (2014).

<sup>12</sup> EC (2014).

<sup>13</sup> EC (2015a).

<sup>14</sup> EC (2014).



The share of innovations in total number of products in EU decreased from 43% in 2006 to 30% in 2012

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In the retail sector, Bulgaria, Poland and Romania are least concentrated while in Sweden, Denmark and Finland, the concentration levels are the highest. This variation across Europe can be partially explained by differences in regulation and legal systems that give rise to barriers to entry. However, there may be other structural reasons which still need to be investigated. During the period 2004-12, increased retail concentration has been observed in the edible grocery market in 22 out of 26 EU member states.

The largest modern retail groups increased their market shares at the European level while in 16 out of 26 member states, retail concentration decreased due to growth of smaller retails. Supplier concentration increased for 20 of the 23 product categories in majority of the sampled EU member states<sup>14</sup>. Highest supplier concentration levels were in frozen cooked meals, baby food, cereals and coffee while the lowest were in deli, cheese and fresh packed bread.

2012	Enterprises Holdings (Million)	Persons employed (Million)	Value added (EUR Mio)
Total for EU-28	15.4	47.4	826 021
Agriculture *	12.2	25.5	207 925
Food processing, beverages and tobacco industry**	0.3	4.6	216 184
Food retail and food services	2.8	17.3	402 811

\*2010 data for holdings and persons employed in agriculture

\*\* Estimated EU-28 total for 2012

## Structural trends

Among the total number of outlets in EU, supermarkets constitute 56%, discount stores have 38% of the share and the remaining 6% are hypermarkets<sup>15</sup>. In the last decade, discount stores have had the highest growth rate followed by hypermarkets and then supermarkets. The average shop size has grown over the last decade. Discount stores have grown on an average by 2% and supermarkets by 1.1%, while hypermarkets have decreased by 0.5%.

With regards to private label, their market share has increased. Frozen vegetables, ice cream, desserts and ready cooked meals have seen the highest growth in private labels while baby food, chocolate and tea have seen the lowest. Sales turnover by product categories increased on an average annually by 2.9% and this growth in sales was much higher at 4.5% before the crisis and reduced to 1.4% during and post-crisis. The largest product categories are fresh pre-packed bread, cheese and deli while the smallest have been starters/pizzas, tea, ready cooked meals and cereals.

perception that organic products are healthier leading to an increase in demand for organic food and drink products. EU consumers spent nearly €22 billion in 2013 on organic products leading to a growth of 6% in organic market from 2012<sup>16</sup>.

**Food waste:** In the EU, food waste is expected to rise to about 126 million tonnes<sup>17</sup> a year by 2020, from a baseline of 89 million tonnes in 2006, unless action is taken to halt this trend.

**Changes in the supply chain:** Increasingly chains are getting transformed to include higher retailer concentration leading to perceived unfair trading practices in contractual relations potentially impacting the economic viability of actors with weaker bargaining power<sup>18</sup>.

**Access restrictions and the interconnectedness of global commodity markets:** Since 1997 the EU has worked on the implementation of a standard known as EUREPGAP (Euro-Retailer Produce Working Group on Good Agricultural Practices). The standard consists of a number of rules that place high technical and environmental requirements on producers that intend to export products to affiliated retail chains in Europe. EUREPGAP contains 24 'major musts'



## Existing and future challenges in the EU

Having given a snapshot of some key trends the EU food sector, it is important to note that there are some major challenges facing EU food chains, such as:

**Population and affluence:** An increase in population, especially a large middle class with high spending power, will create demand for more varied, high quality diet.

**Food prices / volatility / availability:** Investigations done by the National Competition Authorities (NCAs) and other studies have shown that there has been steady and homogenous increase in consumer prices without a real increase in production cost.

Moreover, this increase in price has not been transferred back to the primary producers suggesting that retail margins have expanded, and most likely, in larger proportions in comparison to the benefits other actors have received in the chains.

**Changes in diet:** Increasingly, consumers are inclined towards healthier lifestyles and there is a strong

(absolute requirements), 70 'minor musts' (less strict requirements), and 54 recommendations. All the absolute requirements focus on product security, majority of which concern with the use of pesticides: those that may be used and how they may be used. Other voluntary certification systems are organic and ethical labelling systems, for example KRAV and Fair Trade<sup>19</sup>.

**Increasing vulnerability of food production systems to climate change:** Recent scientific research has given enough evidence that climate change will limit agricultural activities in some part of the world. However, in the long term this can mean a warmer climate suited for new agriculture activities in the Nordic countries<sup>20</sup>

<sup>15</sup> EC (2014).

<sup>16</sup> European Parliament (2015).

<sup>17</sup> EC (2015b).

<sup>18</sup> EC (2015a).

<sup>19</sup> Agebjörn & Björstrand (2006).

<sup>20</sup> Olesen (2015).

# Swedish Food Sector

Let us now turn our attention to the Swedish food sector which represents 2% share of the total production of food within the EU. With a production value of SEK 170 billion and 56 000 jobs, the food sector is the fourth largest in Sweden, counting for 9% of the Swedish industry's total production value and job opportunities<sup>21</sup>.

## Swedish Food Industry <sup>22,23</sup>

**4th largest industry in Sweden**  
**170 billion SEK production value**  
**58 billion SEK exports**  
**56 000 employed**

**Export value** 2012: 56,9 billion SEK  
 70% of the total export value is to Denmark, Germany, Finland and France.

**Import value** 2012: 100 billion SEK  
 70% of Food import from the EU

**Domestic Products:** Dairy, Meat, Cereals  
**Seasonal Products:** Fresh vegetables, temperate fruits  
**Self-sufficiency:** 55-60%

**Produced outside of Sweden**  
 Most fruit items, Green coffee, tea, cacao, Spices, herbs, Wine

**Imported in large quantities**  
 Fish & Seafood, Fresh meat, Sauces, dressing, vinegar, oils  
 Ready to eat & other convenience products  
 Frozen canned & dried food  
 Animal feed

Although there are many small food manufacturers in Sweden, the food sector is highly concentrated. There are over 3000 companies in the food industry, among which over 1300 are one man businesses without employees<sup>24</sup>.

“In the Swedish food industry, more than 99% of firms are small and medium-sized enterprises”

More than 99% of the firms are classified as small and medium sized enterprises<sup>25</sup>. Only approximately 650 companies have more than 10 employees. About half of the Swedish food consumption (in value) is produced domestically<sup>26</sup> yet the Swedish self sufficiency decreased steadily since 1990. Changes in agricultural policies and reduced profitability for farms due to increased costs have resulted in a drop in Swedish production, especially when it comes to the meat (pork and cattle) which is increasingly imported. The total degree of self-sufficiency is at present estimated to be about 55-60%, and thus 40-45% is imported<sup>27</sup>. It should be noted that several of the largest export items, especially roasted coffee, chocolate bars, processed fish and seafood products, and refined oils and fats, fully or to a large extent are made from imported raw materials (Fig. 4).

<sup>24</sup> Olofsdotter et al. (2011).

<sup>25</sup> Goudarz (2010).

<sup>26</sup> EY (2014).

<sup>27</sup> Chamber Trade Sweden (2013).

<sup>22</sup> Livsmedelsföretagen (2015).

<sup>23</sup> The Swedish Chambers of Commerce (2011).



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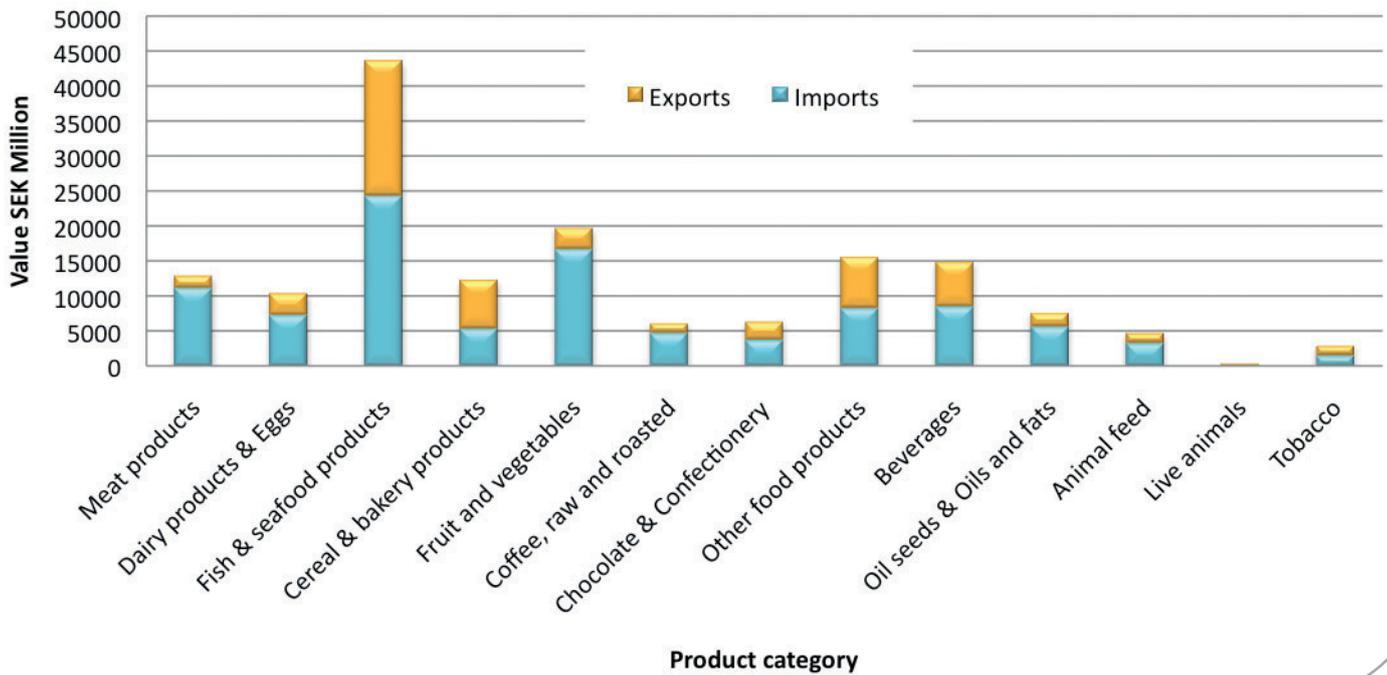


Fig. 4: Imports, exports and net imports of food by value (SEK) in 2012<sup>28</sup>

As of 2013<sup>29</sup>, Sweden has around 3593 food processing companies with 52,200 employees involved<sup>30</sup>. The estimated net turnover amounted to approx. SEK 170 billion (€19.0 billion), which means that food manufacturing accounted for about 10% of Sweden's total industrial output. The most important sectors within the Swedish food industry are bakeries, meat plants, and dairies, with more than 50% of the value of output. Traditionally, the Swedish processing industries were largely dominated by cooperatives that divided the market between themselves. Therefore, there was not much competition either for members/farmers or for trade and consumers. The deregulation of food sector and encouragement of imports by the government in 1990s have changed the situation<sup>31</sup>. Nowadays cooperatives dominate only in the sector of dairy products<sup>32</sup>.

During 2012, sales within the total food retailing market, reached SEK 276 billion (€ 31.7 billion), about 4 percent higher than the preceding year, and 2% higher in volume. Besides food and beverages, this is also inclusive of assortment of other daily commodities and non-food products (Fig. 5). The Swedish food retail market is one of the most concentrated markets in Europe and the degree of concentration has been growing. In general, the EU has been giving a high priority to the abolition of certain types of (anti-competitive) agreements and dominant positions<sup>33,34,35</sup>. This was indicated already by the prohibitions codified in the EEC Treaty (articles 81 and 82 EC). Barriers can, however, also be 'inherent' in

certain production and marketing activities, which often imply that they are not within the reach of legislation and policymakers<sup>36</sup>. Such barriers include 'advantages that accrue to first entrants as a result of economies of scale (fixed costs), advantages due to the superior knowledge of incumbents (e.g. learning by doing) and advantages due to market niches with particular consumer loyalty.'<sup>37</sup>

Swedish grocery stores are becoming significantly fewer and bigger. The total number of Swedish grocery stores decreased by 16% during the period 1996–2002 while in absolute numbers, it decreased from 6100 stores in 2009 to 6000 in 2012. During 2009–12, the number of hypermarkets declined from 160 in number to 150, supermarkets from 2330 to 2300, convenience stores from 3170 to 3100 while discount stores increased marginally from 440 to 450. However during the same period, sales increased from 220 billion SEK to 243 billion SEK.<sup>38</sup>

Swedish markets are characterized by the dominance of a few large retailer chains. The three largest chains, ICA, Coop and Axfood, together controlled over 73 percent of the national market in 2012<sup>39</sup>. This has given them greater leverage in specifying food requirements to food processors and producers (Fig. 6). ICA, for instance, has participated in the EUREP (Euro Retailer Group) and GAP (Good Agricultural Practice) initiative and imposed environmental demands on its products and on its suppliers.

Structurally the market is affected by low population density and characterized with high entry costs.

28 Chamber Trade Sweden (2013).

29 The number of companies in 2015 was 3578 but there are no figures on employment available for 2015 (SCB, 2016).

30 SCB (2016).

31 Nilsson (2006).

32 Olofsdotter et al. (2011).

33 Hultén & Bonnedahl (2005).

34 [http://ec.europa.eu/competition/legislation/treaties/ec/art81\\_en.html](http://ec.europa.eu/competition/legislation/treaties/ec/art81_en.html)

35 Sauter (2004).

36 Graham & Lawrence (1996, p2-3).

37 Graham & Lawrence (1996, p2-3).

38 Chamber Trade Sweden (2013).

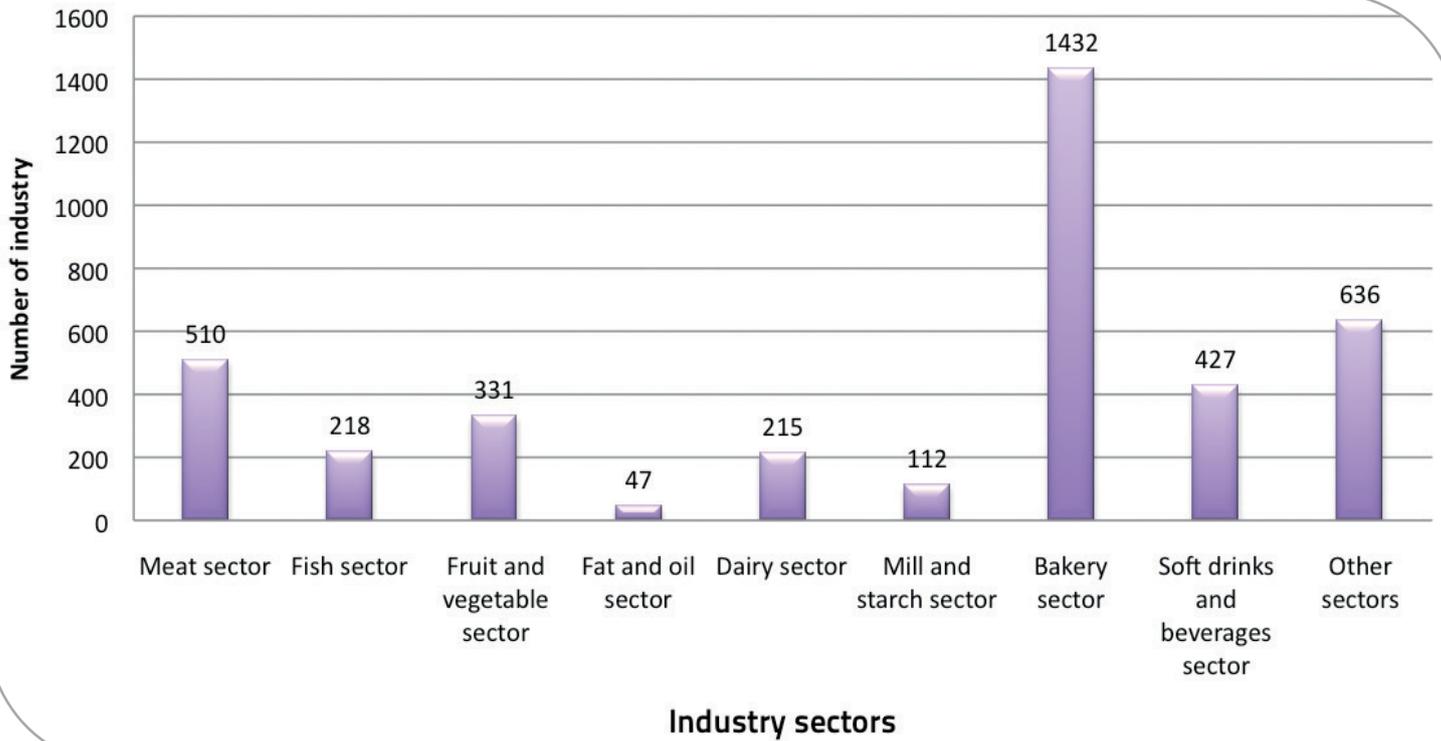


Fig. 5: Food processing industries by sector of production (2011)

Because of Sweden's geography, the retail sector displays relatively large transport distances as well as lack of scale in many regions. As a result, transportation costs are high and vary across different parts of the country. In the north, the sparse population, the large distances and thus the large distribution costs and required investments prevent small chains from establishing<sup>40</sup>. Only the largest chains can afford a successful operation in those remote areas. This could explain why Swedish food prices have long been

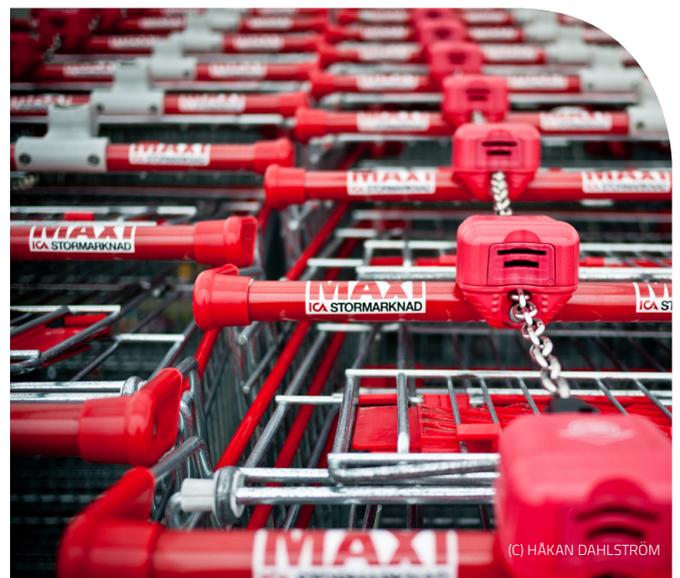
*"In Sweden, the three largest chains, ICA, Coop and Axfood control 73% of the national market"*

considered to be much higher than the average in the EU (excluding Scandinavia).

One of the most important motivations for economic activity is to claim a share in value addition. But a normative dimension of value chain analysis is that it specifically engages with fairness and equity in the redistribution of added value among all the actors along the chain. From the overview of food chains in Sweden and around EU presented above, the high relevance of food business in the society is amply clear. When coupled with the vision for sustainable transformation, it becomes even more important to analyze the

different elements of food supply chain in microscopic detail. In this report we keep our focus on the retailer-supplier interface as the primary interest is on food businesses.

Therefore, in the next section an indicative list of important issues are identified that need greater investigation and research. The aim is not to provide any answers or to be exhaustive in identifying all the important issues around Swedish Agri-food chains. It is to illustrate that there is a potential of value creation through systematic analysis.



39 Chamber Trade Sweden (2013).  
40 Myte (2012).

Market shares of Swedish food retailers

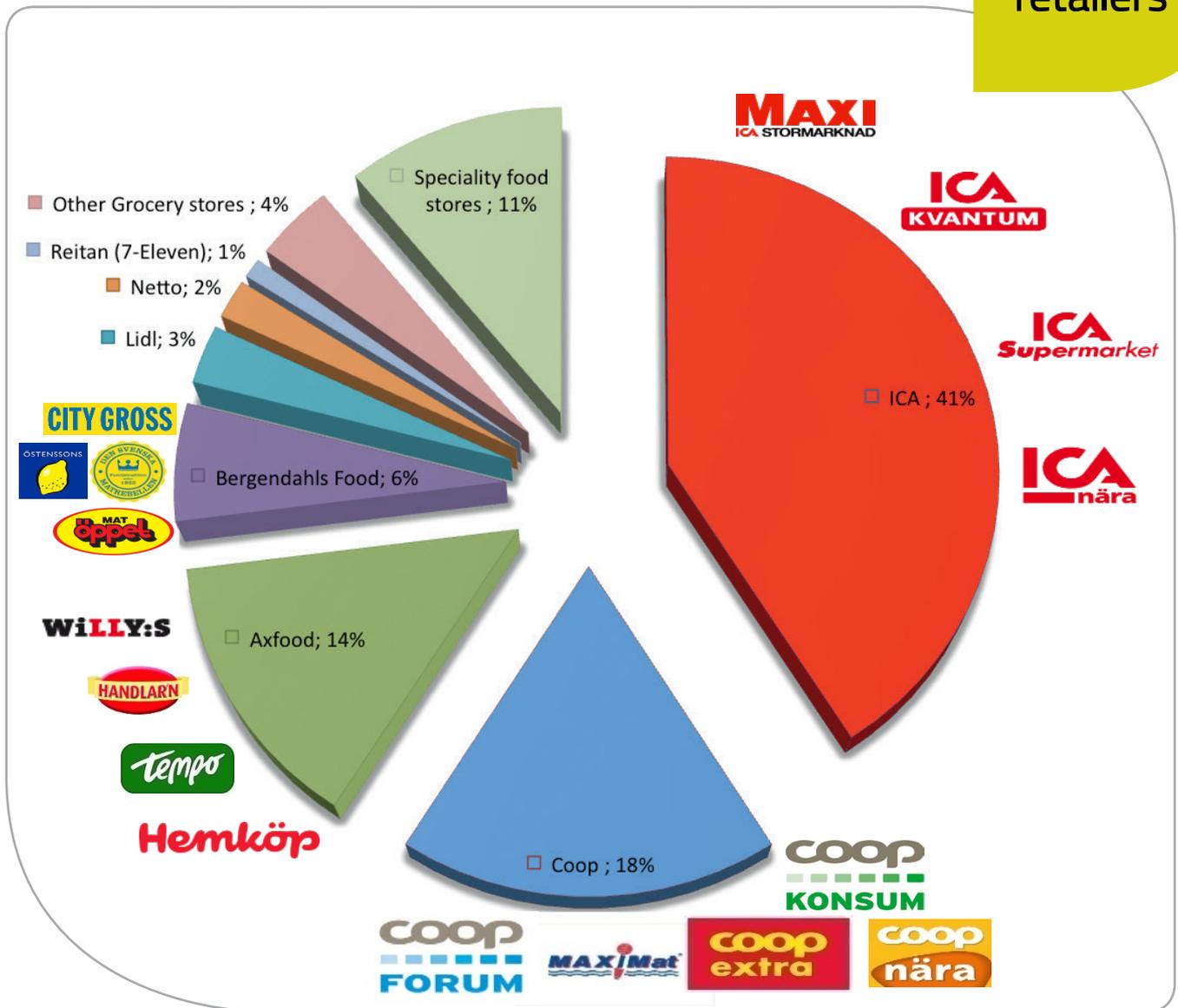


Fig. 6: Market shares of Swedish food retailers

# Value Creation through Research?

There are large gaps in the research concerning incentives and industrial structure that leads to a sustainable food production and consumptions<sup>41</sup>. So far research has largely focused on consumer preferences for different sustainability criteria and their willingness to pay for organic food. However, we present a few concrete research topics or problem areas where further investigation is considered important in order to support the development of a sustainable food supply chain in a Swedish perspective.

## 1: Effects of retail concentration and market power

In Sweden three big retail chains, ICA, Coop and Axfood alone constitute about 73% of the market share which shows high levels of concentration. High concentration in Swedish food retails segment may not necessarily lead to a welfare loss for the consumers if it increases efficiency, provides wider product choice and reduces final consumer price<sup>42</sup>. However, high concentration levels can increase the retailers' bargaining power over suppliers and the use of such power could lead to perceived unfair trading practices. One effect of high retail power is tougher competition for shelf-space<sup>43</sup>. Because retailers control the scope for distribution, they control the physical placing, marketing channels and substitutes for particular products.

This induces fierce competition among suppliers who adopt various strategies to access shelf-space such as: accepting lower prices, paying annual bonuses and slotting allowances. Moreover, the increased use of retail private labels take away more space from producers own products. Such tactics squeeze the profit margins of the producers and suppliers<sup>44</sup> making them more vulnerable.

<sup>41</sup> Tillväxtanalys (2014).

<sup>42</sup> Jörgensen (2011).

<sup>43</sup> Nordic competition authorities (2005).

<sup>44</sup> Supplier concentration is also an important issue wherever cooperatives have been dominant, as in Sweden. In such cases retailers are unable to deal directly with the primary producers, possibly giving power to suppliers and processors. Like retailer concentration, this could be an important factor to address.

## Research Directions:

Further analysis is needed to understand several facets of this structural issue, for example: the impacts of market power on other food chain actors, measures to ensure the sustainability and financial viability of agro-industries, efficacy of laws and regulations that control the inefficient trade practices and their adaptiveness, policy instruments needed to equalize bargaining power equations between different actors in the chain.

## 2: Private labels and control over innovation

Private labelling is a remarkably growing feature in Sweden as in most other industrialized countries<sup>45</sup>. Private labels are used by retailers as an important tool for building client loyalty and strengthening banner image<sup>46</sup>. In addition of being low-cost alternative, private labels allow high quality products to compete with the manufacture's brands. With 26%, Axfood has the highest private label share in the retail food market in Sweden<sup>47</sup>. When big retailers build their own labels, there is a possibility that they can purchase large volumes and therefore, negotiate favorable terms. In addition to having high quality, the retailers can also develop completely innovative products<sup>48</sup> that match with the consumer's needs such as lactose-free dairy products, gluten-free bread, or the gluten free range of products produced by ICA.

<sup>45</sup> Feng (2014).

<sup>46</sup> EC (2014).

<sup>47</sup> Axfood (2015).

<sup>48</sup> Chauve & Renckens (2015).



(C) HERNÁN PIÑERA

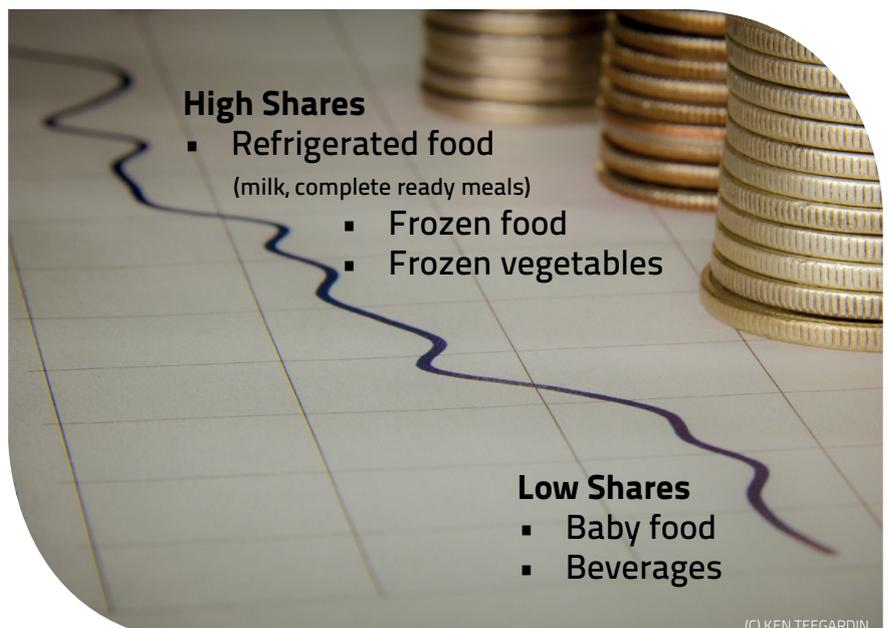
According to market studies<sup>50</sup>, some private labeled products have gained higher shares than some other (Fig. 7). For example, baby food and the beverages have a very low range of private labels as compared to other categories like dairy. It is not clear why this difference exists between the food categories. It could be because people don't trust the private labels when it comes to children or because producer brands in baby foods have strong advertising and a loyal clientele. Under the current circumstances where there is very high retail concentration in Sweden, private brands further tend to increase bargaining power of retailers over producers and suppliers<sup>51</sup>, however, this is an empirical question which needs to be further investigated.

Very often, private label products are procured at lower cost and sold at lower prices. This may discriminate against consumers that prefer to buy manufacturer brands irrespective of price levels. Private labelling also endows retailers a new role in production and innovation of food as they, being in direct contact with consumers, know the market better than producers in terms of consumer preferences. In the presence of market power, this may give retailers unfair advantage. On the other hand, the 'private-label challenge' may provide additional competitive pressure on manufacturers to be innovative.

**Research Directions:** There is a need for wider analysis on the interaction and effects of market power and private labels on innovation. Since retailers have better access to information on consumer behavior, it is not known if they transfer this to the agro-industry actors in the chain or if they use it as an instrument to monopolize innovation. Since development of private labels requires high and specific investments in innovation, which can be better made by larger businesses, it is not clear how this will impact the future industry structure.



(C) USDA



(C) KEN TEEGARDIN

<sup>49</sup> Nordic competition authorities (2005).

<sup>50</sup> Nordic competition authorities (2005).

<sup>51</sup> Myte (2012).

<sup>52</sup> Riksrevisionen (2014).

<sup>53</sup> Statskontoret (2015).

<sup>54</sup> Femrell (2013).

<sup>55</sup> Svenskt näringsliv (2010).

<sup>56</sup> Femrell (2013).

Fig. 7: Market shares for private labels according to food type<sup>49</sup>

### 3: Variation in food control resulting in increased cost

The Swedish food control can, in a European perspective, be described as very decentralized. Control over local restaurants, stores and canteens are handled by the local food authorities which is a municipality or a joint authority office where several (often small) municipalities participate. Larger industries are often controlled by the national food agency (Livsmedelsverket) which also handles border control and large slaughterhouses. The primary production at farms is controlled by the County administrative boards (Länsstyrelserna) for each county. Besides this, the Swedish armed forces have its own food authority (Generalläkaren) controlling military restaurants.

So overall there are approximately 300 independent authorities that control food companies. A decentralized organization does not have to be problematic, but several reports<sup>52,53,54,55</sup> have concluded otherwise, especially for the smallest authorities. The problem description is often focused on the cost for control that companies pay to the local authorities, probably since these numbers are easy to measure. And there is clear variation in what companies have to pay for ordinary inspections, and for follow up inspections. It has been estimated that the cost that local authorities charge per hour for inspections vary from 500 SEK/h in the cheapest municipality to 1252 SEK/h in the most expensive municipality<sup>56</sup>. It is of course not reasonable that one inspection hour can cost more than double in one municipality in comparison with another one, but the problem is bigger than this.

Since many authorities have problems to recruit and keep the inspectors, there is both a lack of manpower and experience in many places. This means that companies actually don't get the control they are paying for which can jeopardize the food safety<sup>57</sup>. It can also result in unnecessary costs if one food inspector "advises" a restaurant to renovate even though another inspector finds the renovation unnecessary from a food safety perspective. The same variation of legal practice can result in food waste<sup>58</sup> if one inspector believes a certain practice is important or forbidden. Since food waste problems is often found in the gray zone between what is clearly legal or clearly illegal, it is really up to the local interpretation of the law to set the limit for what food can be served later, what can be saved, what can be re-used and what has to be discarded directly.

**Research Directions:** A first step towards investigating the problem of different legal food practice within Sweden would be to estimate the cost difference for food companies due to different practice and not just due to different fees. Since Swedish authorities already collect large sets of statistics it would be a good start to use this statistic to approach the problem of variation.

<sup>57</sup> Statskontoret (2015).

<sup>58</sup> Martinsson (2014).

<sup>59</sup> [http://ec.europa.eu/food/safety/official\\_controls/food\\_fraud/index\\_en.htm](http://ec.europa.eu/food/safety/official_controls/food_fraud/index_en.htm)



(C) DAVID HUANG

### 4: Detection mechanisms and effects of food frauds

There have been instances of deviations from legislations and standards, for example where horse meat was sold as beef without declaration in 2013, or the incident more recently in January 2016 when a company in Stockholm was selling cheap imported meat in the name of expensive locally produced organic meat. Another recent example from 2015 is a company delivering organic fruit baskets to different offices but actually using conventional fruits. Not only that, it was also delivering lesser quantities than agreed upon. All of these examples highlight how sensitive the food supply chain is to organized food fraud since it appears very easy to replace an expensive product by a cheaper one and then charging the higher price. There is not enough attention accorded yet to the impacts and effects of food frauds or intentional violations as is evident from the EU statement that 'the EU agri-food chain legislation does not contain a definition of "food fraud", nor specific tools and mechanisms to counter the criminally relevant facts that are to be brought to prosecution in accordance with applicable national rules'<sup>59</sup>.

**Research Directions:** There is a need to analyze how such fraudulent activities affect the chain actors, especially consumer behavior, small retailers, certifiers and the brand owners. More analysis is also needed to look at the incentives for such frauds and the loopholes in the control mechanism responsible for prevention. Doing so may lead to additional value creation (or at least prevent losses in value – for example trust and reputation) by maintaining high level of controls in the chain through traceability and transparency.



(C) GUNNAR MAGNUSSON

## 5: Swedish competitiveness

Globalization has made movement of goods cheaper across geographically distant territories and has lowered the transaction costs of international business through increased information sharing<sup>60</sup>. On the other hand, globalization has also made world prices very competitive. With emergence of stronger global chains and networks, primary sectors in developing countries are much better connected to international markets and as a result, the European agro-food sector has witnessed an overall decrease of its share in the world market<sup>61</sup>. Within Europe too there is increased price competition among member states. Although Swedish food export has increased from SEK 16.7 billion in 2002 to SEK 56.9 billion in value in 2012, high costs of production in Sweden make it non-competitive<sup>62</sup>. Globalization on the other hand can be a shot in the arm for the retail sector specifically as it gives it an opportunity to expand outside their domestic markets through acquisition of local retailers in foreign countries, joint ventures with foreign retailers or investors, setting-up of own subsidiaries in other countries and franchising<sup>63</sup>. Yet, Swedish retailers have hardly been able to expand in countries other than Scandinavia and the Baltic.

**Research Directions:** More investigation is needed in the future to find out what factors can help Swedish producers increase their competitiveness in EU and world markets. Are technological innovations sufficient or there is a need for greater emphasis on organizational innovations? A better understanding of strategies to communicate the added value of Swedish food products (such as the Fairtrade, non-child abuse, animal welfare), to consumers outside domestic markets, is needed.

## 6: Price transmission and sustainable food chains

Asymmetries and non-linearity has been detected in the price transmission mechanism in European countries including Sweden. Price transmission or pass-through takes place when changes in price of one commodity, say an input, causes a change in the final consumer price. The pass-through rates of agricultural commodity prices to final consumer prices have varied significantly between EU Member States<sup>64</sup>. While rising input costs do drive consumer prices upwards to some extent, commodity traders, speculators, big food manufacturers and retailers may not allow a fair share of the prices to be passed on to farmers and smaller chain actors. This is an indication of the existing market power of food manufacturers and grocery chains<sup>65</sup>. However, there is not adequate understanding of this in Swedish agri-food chains and requires further investigation. Since Sweden is characterized by high concentration of food retails, the

<sup>60</sup> EUC in its report on competitiveness of the European Agro-Food Sector (March 2009).

<sup>61</sup> Jacques Berthelot: The European agricultural cooperatives, promoters of the unequal globalization - 11 August 2012 page 11; <http://www.solidarite.asso.fr/-Anglais->

problem of asymmetric transmission becomes even more acute. Price leaders through coordination, by watching each other, or through coercive contractual practices, refrain from lowering the price<sup>66</sup>. This makes sustainable food production challenging along the chain as the distribution of value added is uneven. If the food retail and service actors have a disproportionately higher share of the value added, it will negatively impact the long term viability of non-retail actors.

**Research Directions:** In this context, some of the themes which can be investigated are, for example, how quickly and to what extent are farm prices transmitted to the retail level and vice versa. Is it that price reduction at farm level is transmitted only slowly to end-consumers whereas cost increases at farm and processing level are passed on very quickly? The proportion of this imperfection also needs to be estimated which can be attributed to high bargaining power that retailers and big producers have over other actors in the chain?

## 7: Inefficiencies due to contractual practices in the food value chain

Bread is a product associated with large losses in the supplier-retailer interface. This could be due to the practice of take-back policies which force the bread supplier to manage not only reclamations but all unsold bread. This means that the suppliers are responsible to remove and pay for all bread that was not sold within the selling time, which for packed bread is normally three days before the best before date<sup>67</sup>. This practice results in a conflict of interest where the supermarkets want as full shelves as possible in order to attract customers but let the supplier take the full risk if the overstocking leads to wasted products. The remarkable part of this practice is that the supermarkets can keep a high fill rate without the risk of waste. It has also been demonstrated that larger supermarkets are more likely to be able to negotiate the full take back service than smaller supermarkets<sup>68</sup>. One potential benefit of this system is that some bread suppliers believe themselves to be better in finding the right supply rate than if the supermarket would have ordered it themselves.

<sup>62</sup> Azar (2010).

<sup>63</sup> EC (2014).

<sup>64</sup> ECN (2012).

<sup>65</sup> Feng (2014).

<sup>66</sup> Feng (2014).

<sup>67</sup> Willys (2010).

<sup>68</sup> Ismatov (2015).



**Research Directions:** Since there are arguments that this practice both leads to more waste and less waste, it needs to be further investigated to find out how the situation can be improved. A good starting point of such an investigation would be to quantify the problem by compiling the waste statistics from the main Swedish bread suppliers. Since the practice differs between individual supermarkets, the quantities data could be used to analyze to which extent the different policy versions correlate to increased waste of bread<sup>69,70,71</sup>.

## 8: Food waste in a circular economy

In Sweden approximately 1.2 million tons of food waste is generated every year excluding those from primary production<sup>72</sup>. This makes Swedish food supply chain less sustainable since natural resources are used in vain and profits are reduced. However, it can still be argued that Sweden has a good circular economy regarding food since almost all food waste are recycled, due to the ban on landfilling organic waste<sup>73</sup>. The problem with this argument is that wherever recycling and energy recovery of food is found to be inefficient, the waste emissions got reduced only to a small extent<sup>74</sup>. The same study also finds that the different valorization options like incineration, composting and anaerobic digestion, are significantly less efficient in waste reduction when compared to the option of prolonged shelf life. In a circular economy products are designed so they can be reused/recycled and so that they last longer and can be used more effective.

With this in mind the Swedish food chain could be seen as already adapted to a circular economy since nutrients from sewage sludge are already recycled, even though there is room for improvements in this recycling. The whole idea is however based on the fact that the products are used before they are recycled, and food waste has therefore no place in a circular economy, even if they are recycled, and EU has therefore set up goals on food waste reduction in the circular economy and zero waste program<sup>75</sup>.

**Research Directions:** This subject matter requires further investigation and a starting point could be to evaluate food rescue initiatives where food is used as food instead of being used for energy production<sup>76,77</sup>. One could also



aim to find working prevention measures where source separation is possible<sup>78,79</sup>.

## 9: Incentive alignment for food waste reduction and sustainability

Reclamations of fruits and vegetables have been pointed out as a significant source of food waste in Swedish supermarkets<sup>80</sup> and the savings potential through waste reduction is large<sup>81</sup>, but only for the supplier, not for the retailer. The basic problem is that supermarkets can use reclamations as a way to reduce the risk of generating food waste, but with the consequence that more food is actually ending up in the waste<sup>82</sup>. In a study<sup>83</sup> bananas were used to exemplify how one supermarket could significantly reduce the cost of wasted bananas by launching a stricter reclamation policy. The problem with this stricter reclamation policy was that the total amount of wasted bananas increased at the same time as the supermarkets decreased its cost of wasted bananas.

Since the incentives structures regarding food waste in the supermarket encourage the staff to decrease economic loss, but not actually to waste less, it is logical that the supermarket tries to move the cost of waste to the supplier rather than to make extra effort to sell the products before they turn bad. In the example above a complicating factor is that both the supermarkets and the supplying company belong to the same corporate group, which means that the possibilities to achieve efficiency on an overall level should be higher than if it was different owner interests involved.

**Research Directions:** In order to address the problem of incentive alignment that results in increased losses from an overall perspective there is a need to fully understand how these systems are working, both within companies but also in the perspective of the global food supply chain. A well described and quantified overview of this problem in the supply chain can lead to a design of policy instruments which aim to put the cost of losses on the unit that have the power to reduce the losses.

<sup>69</sup>Scherhauser & Schneider (2011).

<sup>70</sup> Lebersorger & Schneider (2014).

<sup>71</sup> Stensgård & Hanssen (2014).

<sup>72</sup> Naturvårdsverket (2013).

<sup>73</sup> Miljö- och energidepartementet (2001).

<sup>74</sup> Eriksson (2015).

<sup>75</sup> EC (2014).

<sup>76</sup> Eriksson et al. (2015).

<sup>77</sup> Spångberg & Eriksson (2016).

<sup>78</sup> Eriksson et al. (2016).

<sup>79</sup> Eriksson & Strid (2013).

<sup>80</sup> Eriksson (2012; 2015).

<sup>81</sup> Eriksson & Strid (2013).

<sup>82</sup> Eriksson (2015).

<sup>83</sup> Eriksson (2012).



## 10: Logistical challenges due to geographical characteristics

The geographical dimension of food production and chain is an important issue due to the local nature of the Swedish food industry and retail. The municipalities in Sweden cannot be compared easily with each other and markets also vary with regions due to weather conditions, population density and the large distances among municipalities. These geographical characteristics make it difficult for producers, processors or retailers to have the same opportunities all over. It is generally understood that only big retailers have the ability or the interest to run their stores in low population settlements. This is one reason why it is rare to find more than one retail store in some of such towns and villages. These make big retail enterprises even more powerful on the national level, because they dominate the smaller localities.

**Research Directions:** Greater investigation is needed to better identify the effects of rural monopoly on other chain actors like the producers and processors at the local level owing to the geographical characteristics. Moreover, it is not clear in which ways this affects consumer behavior by limiting the choice of products and thereby affecting the agro-industries and suppliers.

## 11: E-Commerce development in the food market

E-commerce has expanded rapidly as retailers and other marketers of consumer packaged goods offer consumers the ability to shop online (Fig. 8). This allows flexibility and wide choice by saving time. At present e-commerce in food retail has a low share and as of 2012 represented only 1.2% of total edible grocery sales. However, on an average<sup>84</sup>, one in every five Swede bought groceries online in the past year<sup>85</sup>. The Svensk Digital Handel released its Digital Mathandel 2014 report and it shows that last year the online food industry in Sweden was worth 2.2 billion SEK (243 million euros)<sup>86</sup>. This represents a growth of 38% compared to the previous year. According to a recent survey in the Postnord, the first quarter in 2015 showed an increase of 46% of the food products<sup>87</sup>. So the pace of growth has hastened and will continue to accelerate, which might, in turn, change consumers' shopping behavior and change the scope for competition in retail markets, influencing choice, innovation, and prices.

**Research Directions:** Competition policy should remain adjusted to these specific developments in retail markets<sup>89</sup>. It is vital to understand consumer perception of e-commerce for food products; the consequences of the introduction of the e-commerce on the food chain actors like retailers and traditional producers; and, the design

<sup>84</sup> Chauve & Renckens (2015).

<sup>85</sup> Ecommerce (2014).

<sup>86</sup> Ecommerce (2014).

<sup>87</sup> Postnord (2015).

<sup>88</sup> Svensk Digital Handel (2014).

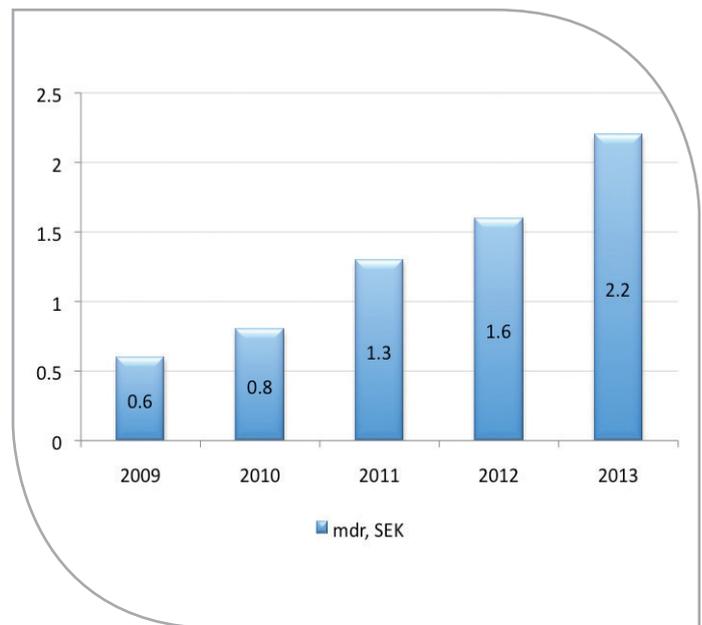


Fig. 8: Turnover of online food in Sweden<sup>88</sup>

and efficiency of new types of contracts and agreements required to govern the relations between e-retailers and agro-industries.

## 12: Alternative models of food retailing

Increased competition with focus on low price has motivated several small scale local food enterprises to find ways to sell their products directly to the end consumers. By creating a parallel market where the retail stage is skipped, more of the price ends up at the producers, without increasing the consumer price more than necessary. However, this type of low scale distribution system is not sufficient for Swedish circumstances, especially for the Swedish countryside where transport distances become large<sup>90</sup>. The reason why they still exist is because the Swedish distribution system is focused on large volumes of standardized products delivered through distribution centers, which excludes many small scale producers. In order to reach the end-consumers directly, e-commerce plays an important role. This channel can also be used to communicate specific values of the products which increase the willingness to pay for the added value provided by the local producers. These values can be a specific type of meat, traditional production methods or just a local context. On the other hand, parallel market is often developed as a reaction to the established ways of distribution and this might be a reason why these markets normally don't grow large enough to have an actual influence of the sustainability of the food supply chain<sup>91</sup>. Another aspect is that the consumption of organic food increases more rapidly when the distribution is dominated by few and large organizations<sup>92</sup> and that the high risk of food waste connected to the selling of perishable products with low turnover<sup>93</sup>.

<sup>89</sup> Chauve & Renckens (2015).

<sup>90</sup> Tillväxtanalys (2014).

<sup>91</sup> Tillväxtanalys (2014).

<sup>92</sup> Lindmark & Bergquist (2014).

<sup>93</sup> Eriksson et al. (2014).

**Research Directions:** In order to investigate the parallel market further with the attempt to improve the efficiency, a starting point would be where cooperation, optimization and integration in the supply chain are pointed out as important aspects of how to improve sustainability factors in a local food distribution system<sup>94</sup>. It would also be interesting to understand the motives of farmers to participate in such chains; the attitudes of consumers towards them; their costs and benefits in comparison to conventional food chains; and how they impact the rural economies.

### 13: Role of clusters in food innovation

Innovation is one of the major pillars for growth and competitiveness. Michael Porter once famously said 'if fortune smiles and conditions are right, a climate for innovations is created'. Past research has shown that cluster development builds networks that foster innovation and strengthening the competitiveness of firms<sup>95</sup>. An example is the Föreningen för fryst och kyld mat (Djupfrysingsbyrån)<sup>96</sup> or Packbridge in southern Sweden which became highly successful through a network of individuals and organizations assembled around it backed by the government and working to create and communicate

information across other actors in the supply chain<sup>97</sup>. Even at a macro level, the strong dynamics within clusters and networks increase the competitiveness of a region and a country which is especially relevant in the context of increased globalization on one hand and integration within the EU on the other. Clustering gives the opportunity to reduce production costs through common geographical location (thereby splitting logistic costs) and information-sharing. This may allow a higher surplus for re-investment in innovation related activities. One of the most important objectives of cluster initiative as illustrated by Fig. 9 below is on innovation.

**Research Directions:** Due to the low share that Sweden has in EU food sector and because of its experience with clusters, development of more food production clusters could aid innovativeness and competitiveness. However, a more systematic analysis is needed to understand how much value can clusters add to food production and innovation as compared to decentralized structures; and if such clusters can help improve the profitability and bargaining power of smaller actors in the food innovation chain through access to better information and infrastructure.

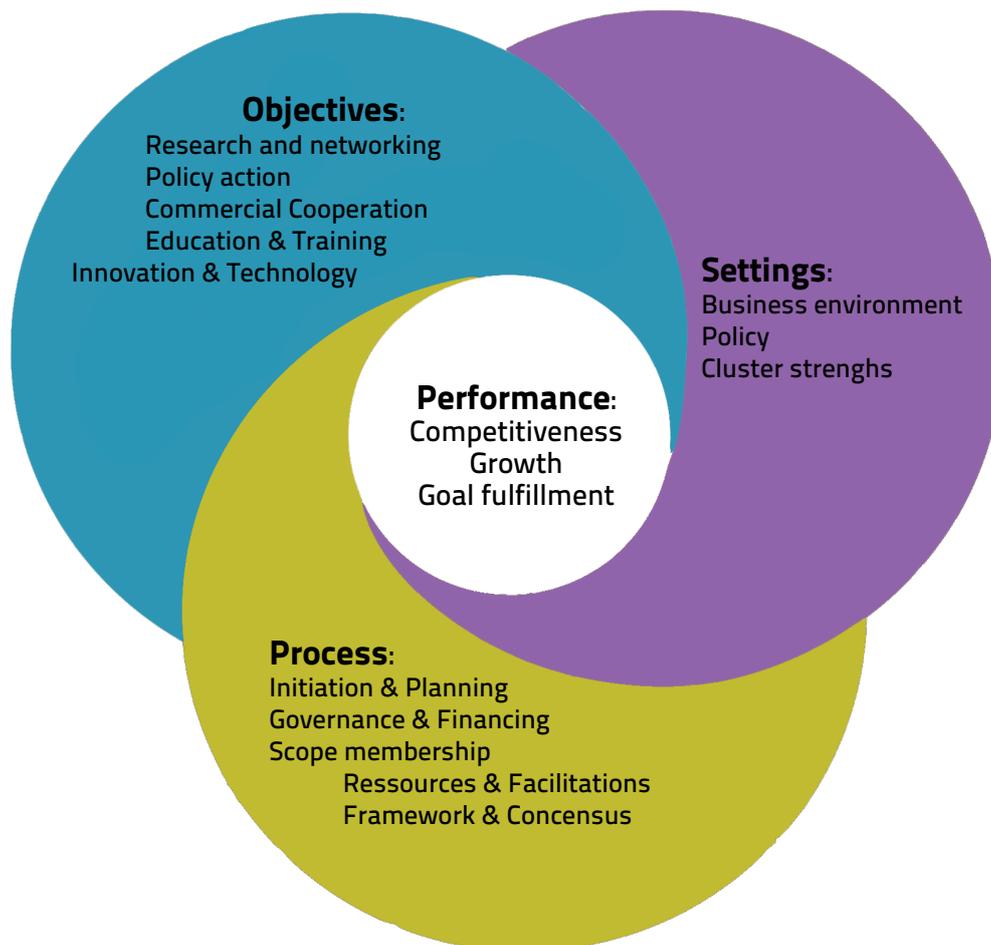


Fig. 9: Cluster initiative performance model<sup>98</sup>

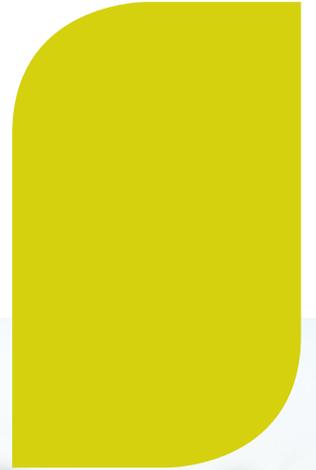
<sup>94</sup> Nordmark (2015).

<sup>95</sup> Cappellin (2004).

<sup>96</sup> Frozen Food Institute.

<sup>97</sup> Frozen Food Institute.

<sup>98</sup> Frozen Food Institute.



# Conclusions and Way Forward

This report gives an overview of challenges in the European food supply chain, with special focus on Sweden. It is evident that even though Swedish food supply chain is highly advanced there is sub-optimality which needs to be reduced in order to make the chain efficient from an overall perspective. Food related research needs to move focus from pure product innovation to greater emphasis on organizational innovation so that value creation is maximized without the need of additional resources. There can be sustainability gains through minimizing loss of value in all stages of the food supply chain, by curtailing inefficient trading practices and increasing transparency.

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“Food related research needs to shift focus from pure product innovation to organizational innovation”

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Highlighting some of the gaps in research concerning stakeholder incentives and industrial structures, we also present a few concrete research topics or problem areas where further investigation is considered important in order to support the development of a sustainable food supply chain in a Swedish perspective. These are only indicative with the objective to emphasize the need for scientific investigation.



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# Notes

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