



**School of
Management and Law**

**Food Sector Study
Figures, Structure, Forces of Change,
and Development Potential of the Swiss
Food Industry**

A Study by the International Management Institute

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EDITORIAL DETAILS

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Management Summary

The food industry is not only important to Switzerland in terms of keeping the country fed; it is of great importance to the Swiss economy as a whole. Up until now, however, there have been very few studies about the food industry in Switzerland. Important figures either do not exist at all or have not been prepared specifically for the food industry. Available statistics, however, vary significantly at times.

This study provides a comprehensive definition and analysis of the most important industry data and the forces which drive it. It has two objectives: Firstly, the food industry is described in terms of its sales development, propensity to export, and commitment to the domestic market. Secondly, global trends, drivers of growth, and development perspectives for the industry are identified.

By analyzing the data, the following findings (among others) were established:

- The food industry is important for Switzerland: In 2012, it generated around CHF 30 billion or 2% of GDP - the third largest single sector contributor to the economy.
- The average growth rate of turnover among food processing enterprises over the period 2001-2012 was 4.3% and thus higher than the national average for all industries.
- With 72,000 employees, it has the second highest industry employment figures. This number does not take account of those employed in adjacent value creation stages.
- The main sub-sectors in terms of sales are:
 - Production of miscellaneous foods, such as chocolate and coffee (35%)
 - Meat and meat processing (16%)
 - Dairy products (19%)
 - Manufacture of bakery goods and pasta (15%)
 - Beverage production (9%)
- The Swiss food market is saturated and marked by fierce competition: The proportion of personal income spent on food has been decreasing for years. Price levels for food and drink have remained largely unchanged while they have fallen at the producer level. In the meantime, 'shopping tourism' now accounts for a not inconsiderable amount (CHF 3.4 billion).
- During the period 2001-2014, exports rose at a rate of almost 12% per year. In 2013, the food industry exhibited the strongest export growth in comparison with other industries. The food industry in Switzerland is strongly divided between internationally competitive sub-sectors that are the drivers of the strong industrial growth, such as coffee, chocolate, or beverages, and other sub-sectors, which operate predominantly domestically, such as meat and milk production.
- The strongest drivers of growth in the food industry are population growth and income growth. The rapid population growth and strong economic development of a number of developing countries will cause a major change in the current global balance over the next 30 years. Compared to the current situation, 70% more food and 30% more water need to be provided. Asia will be home to approximately 70% of the middle classes and is therefore increasingly the focus of the food industry.
- Important, present trends can be distinguished according to supply and demand side trends, and these are different for developing and industrialized countries. Supply-side trends are often driven by technology such as 3D printers, Food 2.0, Nanotechnology, Industry 4.0, and Big Data, but can also be attributed to social issues such as sustainability and corporate responsibility. Demand side trends are strongly influenced by socio-demographic and economic factors. Trends in industrialized countries include functional food, convenience food, organic food, and vegan food, while developing countries are experiencing the catch-up effect with, e.g., the expansion of the product portfolios and food safety.

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1. Introduction

1.1. OBJECTIVES

The food industry is of great importance for securing food supply in Switzerland and for the economy as a whole. Some Swiss food corporations have a worldwide presence and occupy an important position in the global food industry. The purpose of this study is to analyze the food industry in Switzerland in terms of sales development, propensity to export, and commitment to the home market as well as to identify global trends, drivers of growth, and development prospects for the industry.

The content is presented in two parts. The first section focuses on operations in Switzerland while the second section depicts current industry trends and drivers of growth with a global (and where appropriate regional) focus and demonstrates the consequences for the Swiss food industry.

A detailed overview of the key figures for individual sub-sectors is available separately on request. To provide a complete picture of the food industry, adjacent stages of the value creation are considered, and an overview of the structures across the food supply chain is provided.

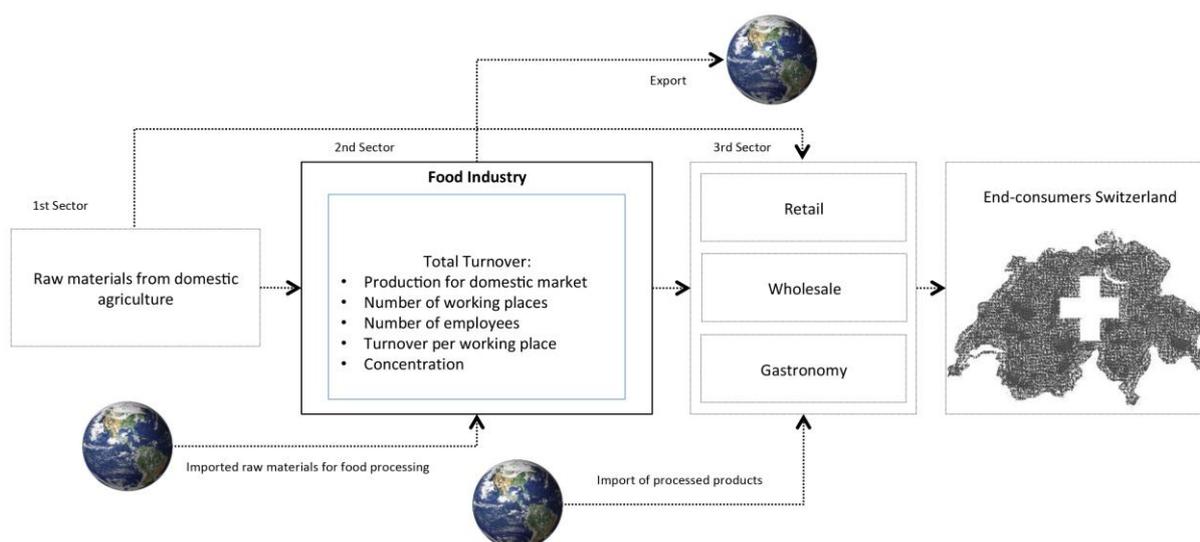


Figure 1: Sectors in the supply chain of foodstuffs (authors' own diagram)

1.2. DEFINITION OF THE FOOD INDUSTRY

How is the term 'food industry' used in this study? The food industry is classified as second sector, in other words, manufacturing or industrial sector. Companies in this sector are distinguished by the fact that they process agricultural raw materials and in one or two stages turn these into end-products which are then resold on the wholesale and retail markets. From there, they are either sold directly or resold via the food service industry to the end-consumer. The food industry is accordingly situated down the line from agriculture (1st sector) and up the line from trade and retail (3rd sector). Figure 1 illustrates the food industry supply chain with the three sectors. Exports and imports take place on both the industrial and trade level: For some products, the food industry has to rely on raw material imports and in return exports finished products. Imported finished products extend the product portfolio available to end-consumers in Switzerland.

For an exact definition of the food industry and its sub-sectors, we draw on the NOGA codes of the Swiss Federal Statistical Office.¹ According to this classification system, the food industry comprises all companies in Category 10, 'manufacture of food products'. Category 10 is further divided into sub-sections: Meat processing, fish processing, processing of fruit and vegetables, manufacture of vegetable and animal fats and oils, manufacture of dairy products, grain mill products, manufacture of bakery and farinaceous products, manufacture of other food products, and manufacture of prepared animal feeds. However, since only those sub-sections of the industry deal with food production for human consumption and the production of non-alcoholic beverages, the subcategory 'manufacture of prepared animal feeds' (NOGA code 109) is excluded and the sub-section 'manufacture of soft drinks'; 'production of mineral waters and other bottled waters' (NOGA code 1107 from Category 11 'manufacture of beverages') is included (see Figure 2).

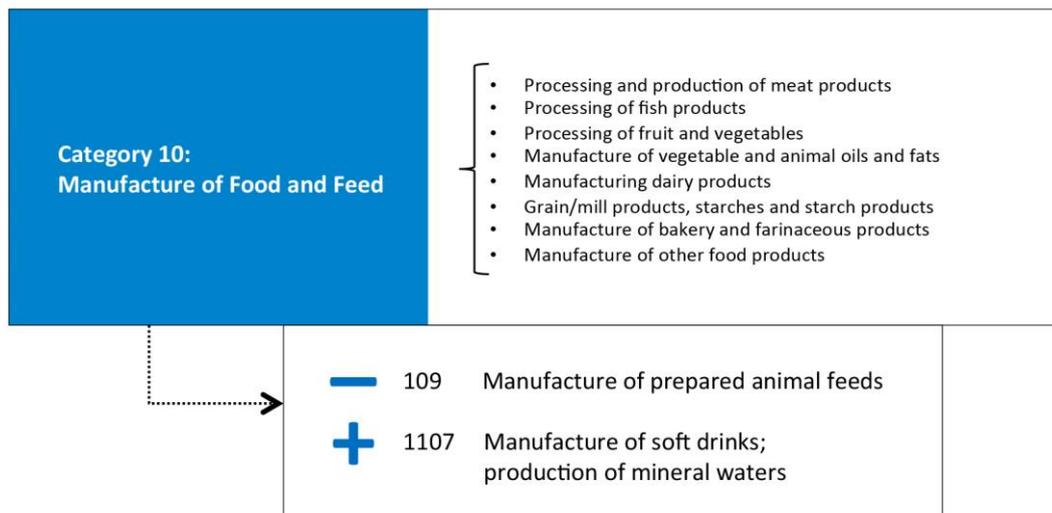


Figure 2: Scope of the food industry according to NOGA codes (authors' own diagram)

In Appendix II, Table 8 and Table 9, there is an overview of the subsections associated with the food industry with explanations of the foreign trade figures used and data for end-consumption in Switzerland.

¹ NOGA stands for 'Nomenclature générale des activités économiques' and provides a classification scheme for the economic activities of a company. Important data such as VAT statistics are recorded under this system. They are compatible with the statistical classification of economic activities in the European Community (NACE Rev. 2), thus permitting international comparisons of sectors and industries to be made.

2. The Food Value Chain

In Section 2, the food industry is presented as part of the value chain for food. In addition, two important points of interaction are examined: Firstly, agriculture contributes to the competitiveness of the industry through the production of essential raw materials and, secondly, end-consumers in Switzerland whose demand for food creates turnover within the industry.

Figure 3 shows the value chain and an overview of the relevant questions discussed in this study.

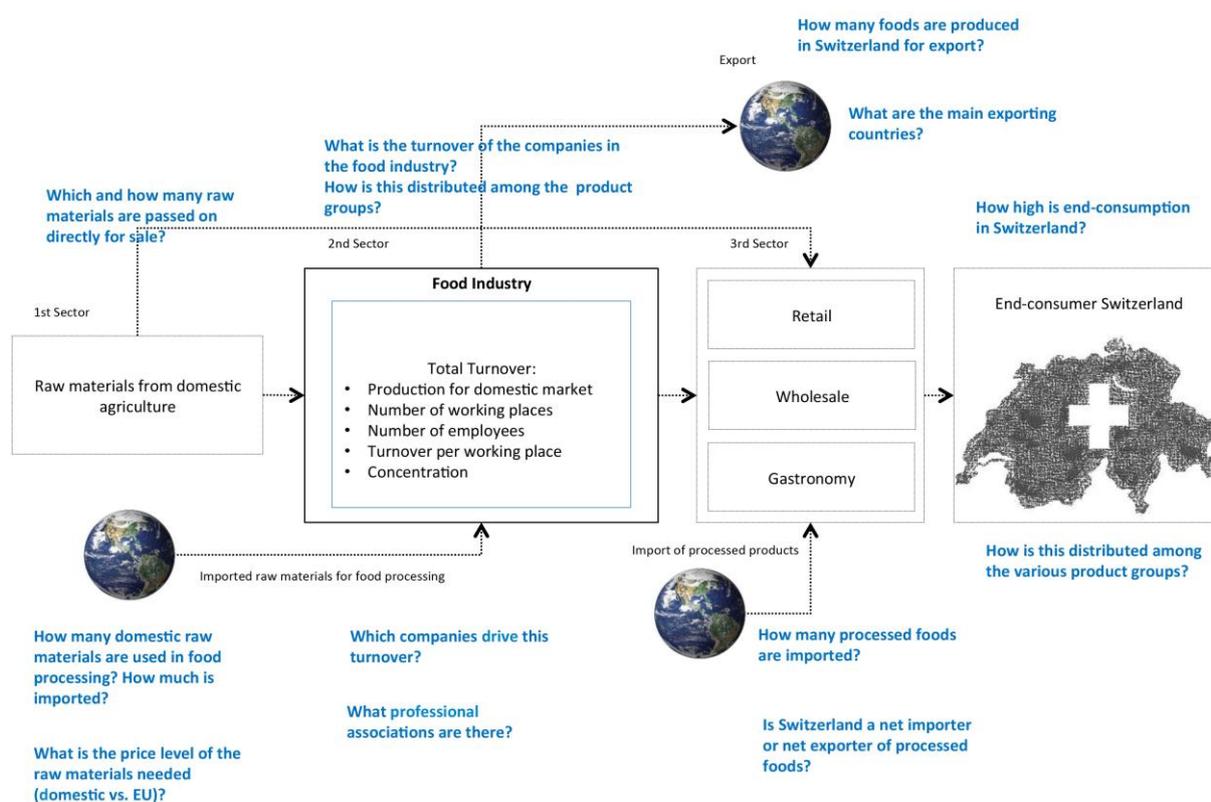


Figure 3: Overview of the relevant issues along the food value chain of food (authors' own diagram)

In Appendix III Table 10 and Table 11 show the turnover of key food manufacturers worldwide and in Switzerland.

2.1. THE END-CONSUMPTION OF FOOD IN SWITZERLAND

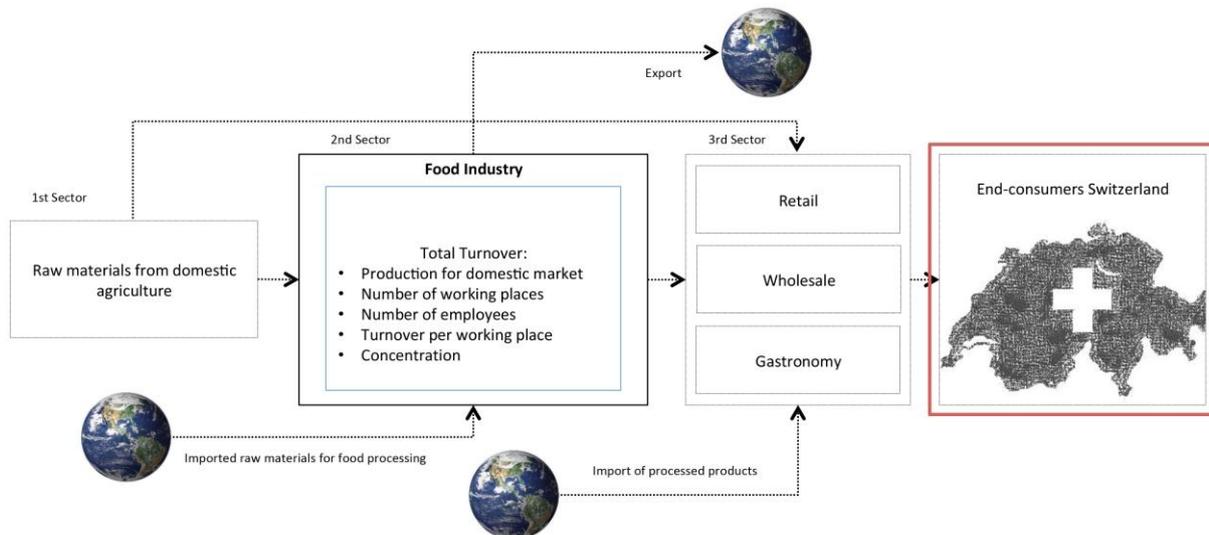


Figure 4: The focus of Section 2.1 on the end-consumer (authors' own illustration)

This section focuses on the end-consumer (cf. Figure 4) and addresses the following questions:

- How much is end-consumption in Switzerland?
- How is this distributed among the various products?
- What shifts in consumption have been observed in recent years?
- How have the expenditure share and price evolved? How is the bargaining power of market participants shaped along the value chain?

2.1.1. Market Volume

2.1.1.1. Total Market²

In Switzerland, the home consumption of food and non-alcoholic beverages is an average of CHF 638 per household per month which represents approximately 6.8% of the gross income of the household. For food and non-alcoholic beverages in restaurants, the average is CHF 409. Extrapolated, this amounts to a home consumption of around CHF 26.3 billion (62%) and CHF 16.9 billion outside the home (38%).³ The total estimated amount corresponds to around CHF 43 billion. The market volume for domestic consumption remained almost constant over time, indicating that Switzerland's food market is saturated.

2.1.1.2. Market Volume & Expenditure Share by Sub-Sectors

From the Household Budget Survey 2013, it is possible to derive the market volume of individual product categories. Accordingly, the highest expenditure was on meat: Around 22% of the total expenditure on food and non-alcoholic beverages was attributed to this product category which grossed a market share of CHF 5.8 billion. This was followed by spending on bread and cereal products (15% or CHF 4.0 billion), closely followed by expenditure on milk, cheese, and eggs (also around 15% or CHF 4.0 billion). Fresh products such as vegetables and fruit came next, with an output share of 13% and 7% (CHF 3.0 billion and CHF 2.2 billion) respectively. All other products followed at a greater distance (see Table 1).

² To get an indication of the need for food in Switzerland and thereby what needs to be distributed among the companies in this sector, market volume has been approximated on the basis of the spending behavior of Swiss households. For simplification purposes, it is assumed that the total value of foods consumed in Switzerland is composed of two building blocks: Firstly, non-alcoholic beverages and food consumed at home and, secondly, the same products consumed in restaurants. The total figure is an underestimate because no business-to-business (B2B) consumption in the context of professional events has been included. However, consumption in canteens or workplace restaurants is included since it is part of the private household budget.

³ The total number of households was taken as 3.4 million in 2012. Source: Swiss Federal Statistical Office. The estimated turnover from the gastronomy sector coincides with the information from VAT statistics. Here there was a reported revenue of around CHF16 billion in 2012.

In accordance with decreasing total expenditure, shares for individual product categories dropped slightly since 2006 - the only exceptions being coffee, tea, and cocoa. Here expenditure rose and market volume increased slightly over time, probably as a result of innovations in coffee preparation (e.g., coffee capsules) and a corresponding boost in consumption. Other shifts in consumer behavior took place in the case of meat, with noticeably less beef and pork being consumed; this was compensated for by sales of poultry and fish. Less noticeable in official statistics on the other hand are other nutritional trends such as vegetarianism or gluten- or lactose-free diets.

To determine the total volume for each product category, it is necessary to know the turnover of the gastronomy industry in addition to that for home consumption. Since restaurant sales are not broken down into individual product categories as they are for home consumption, these need to be specially calculated. For this purpose, the already known output ratio of home consumption is applied to restaurants. This means that the outputs for home consumption in each product category are multiplied by a factor of 1.67 to achieve a figure for the total volume of each product category.⁴

Table 1: Estimated total expenditure for food in Switzerland (authors' estimate)

Food Category	Home Consumption Expenditure in Switzerland (CHF million)⁵	Share	Estimated Total Volume (CHF million)
Meat	5814	22%	9690
Bread and cereal products	4023	15%	6705
Milk, cheese, and eggs	3975	15%	6625
Vegetables	3015	12%	5025
Fruit	2215	9%	3692
Sauces, salt, spices, and soups	1742	7%	2903
Sugar, preserves, honey, chocolate, and confectionery	1652	6%	2753
Mineral water, soft drinks, and juices	1355	5%	2258
Coffee, tea, and cocoa	1054	4%	1757
Fish	862	3%	1437
Cooking fats and oils	599	2%	998
TOTAL	CHF 26.3 billion	100%	CHF 43.2 billion

⁴ This factor arises from the consideration that restaurants account for approx. 40% of food and drink spending and domestic consumption for around 60%. Accordingly, this output ratio is assumed when calculating the amount of the restaurant consumption for each product category. It is therefore assumed that the consumption profile for non-domestic consumption is not systematically different from domestic consumption.

⁵ Total expenditure arises from monthly spending per household extrapolated to one year multiplied by the number of households in Switzerland.

2.1.2. Development of Expenditure Shares & Prices

While the total volume consumed remained virtually constant, expenditure on food as a share of individual income has continued to fall since 1990 (Figure 5).

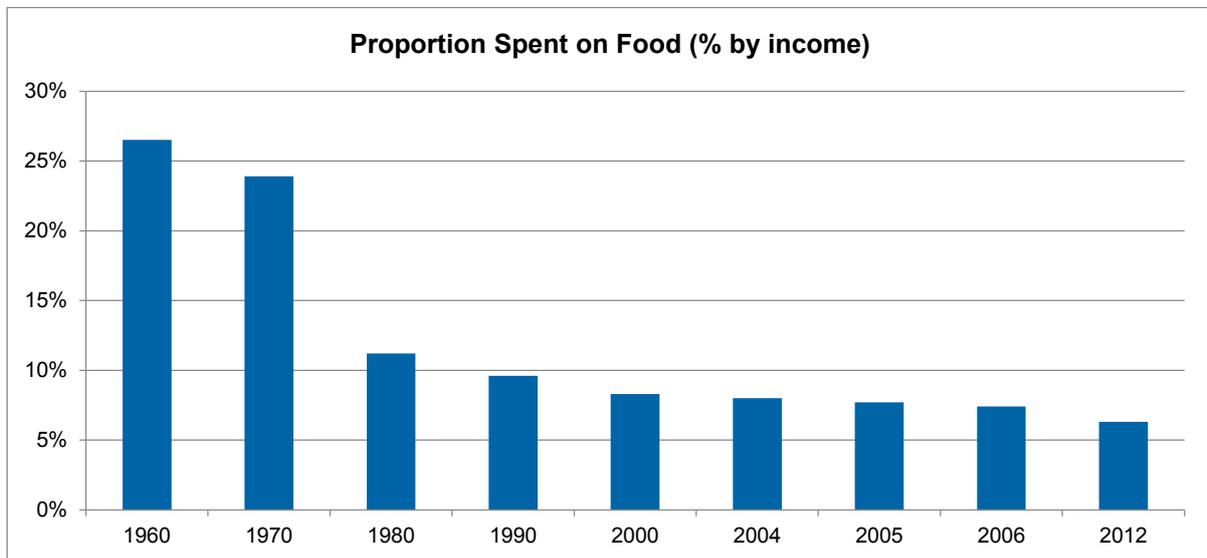


Figure 5: Expenditure on food (data source: Household Budget Survey 2013, Swiss Federal Statistical Office)

The decline in the share of expenditure indicates that food prices have increased less relative to income or may even have fallen. If you compare the price index for foodstuffs to household income (base year 2010), it is clear that food prices have hardly changed since 2006, while household income has increased at an almost constant rate (see Figure 6).

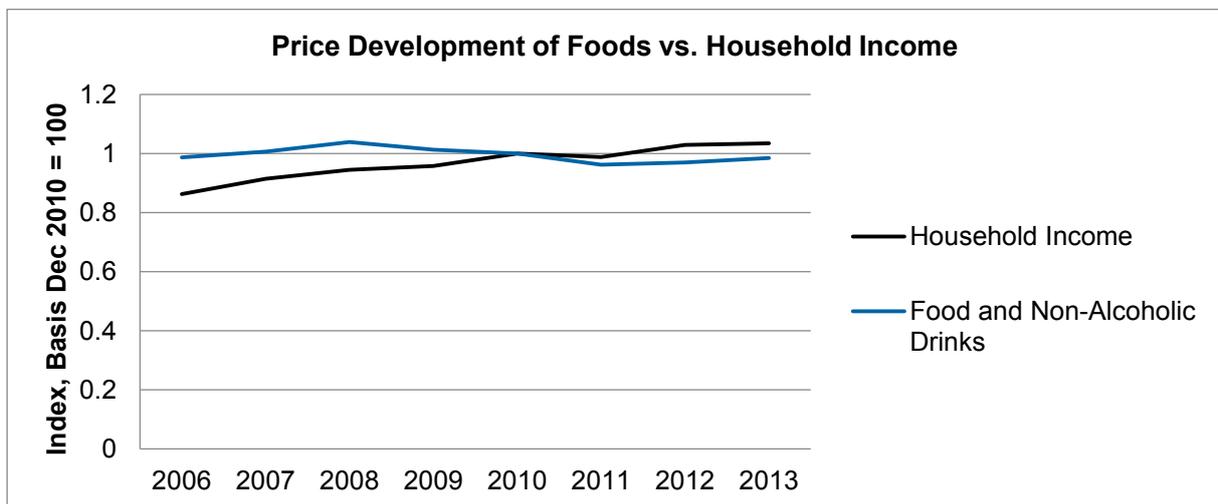


Figure 6: Price development vs. household income (data source: Household Budget Survey 2013, Swiss Federal Statistical Office)

The data shown in Figure 7 support the argument of stagnant food prices. The figure illustrates that apart from an interim period between 2006 and 2009, when an unprecedented rise in commodity prices influenced end-consumer prices in Switzerland, there was no upward trend in food prices over the period. Since 2011, prices on average have been even lower than those at the beginning of the Millennium.

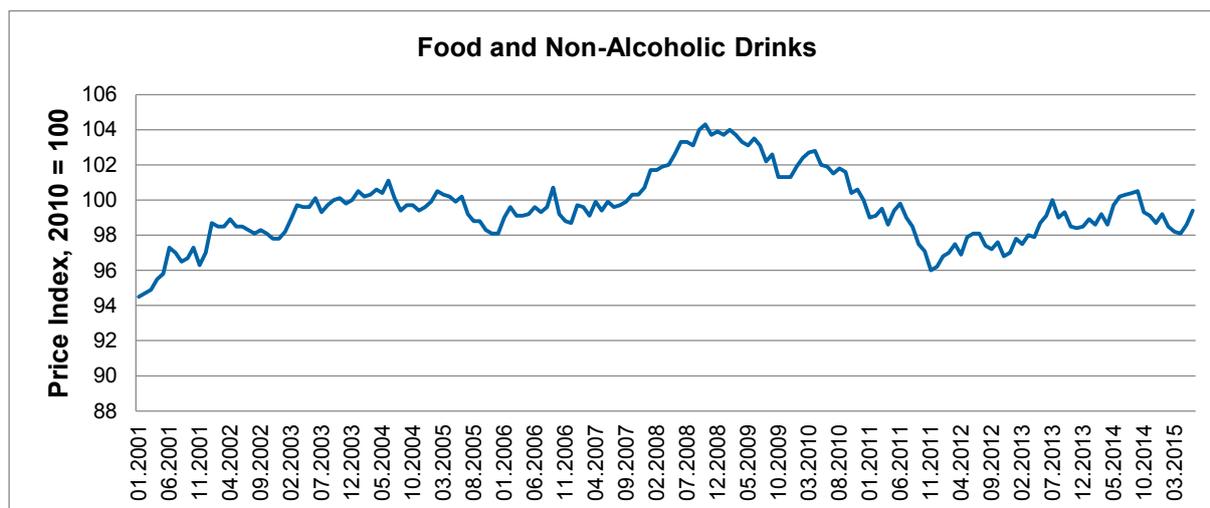


Figure 7: Price development of food and non-alcoholic beverages (data source: Country Index of Consumer Prices 2015, Swiss Federal Statistical Office)

In summary, it can be stated that the total volume of the Swiss market has changed very little and that food prices remained stable or showed a slight tendency to fall. One explanation for these observations is an increase in competition in an already saturated market, where the margins of producers have been cut, and only in the case of niche or innovative products is there any scope for price-setting.

Price competitiveness is also likely to have been further strengthened by so-called 'shopping tourism'. Surveys conducted by the Society for Consumer Research (GfK 2014) show that despite declining price differences between Switzerland and EU countries, cross-border purchases increased by 7% in 2013 and now account for around 10% of all transactions. In the food sector, this amounts to around CHF 3.4 billion.

2.1.3. Market Structure and Power along the Value Chain

Following on from the above comments, the question of how the fall in food prices ended up benefiting the consumer has to be examined more closely. To this end, it is necessary to consider the development of prices at the various stages of the value chain, the proportion of household expenditure each stage receives, and lastly the distribution of market power along the value chain.

Figure 8 shows the development of prices at different value chain levels, i.e., the prices of agricultural means of production, producer prices, and an index of prices for food and drink. From this, it is evident that the producer price – in other words, the price charged by the agricultural producers to the next level - has fallen significantly in recent years, while the means of production has risen slightly in price. This allows an initial conclusion to be drawn that the end-consumer price has been made possible in particular by a reduction in the prices of agricultural products.

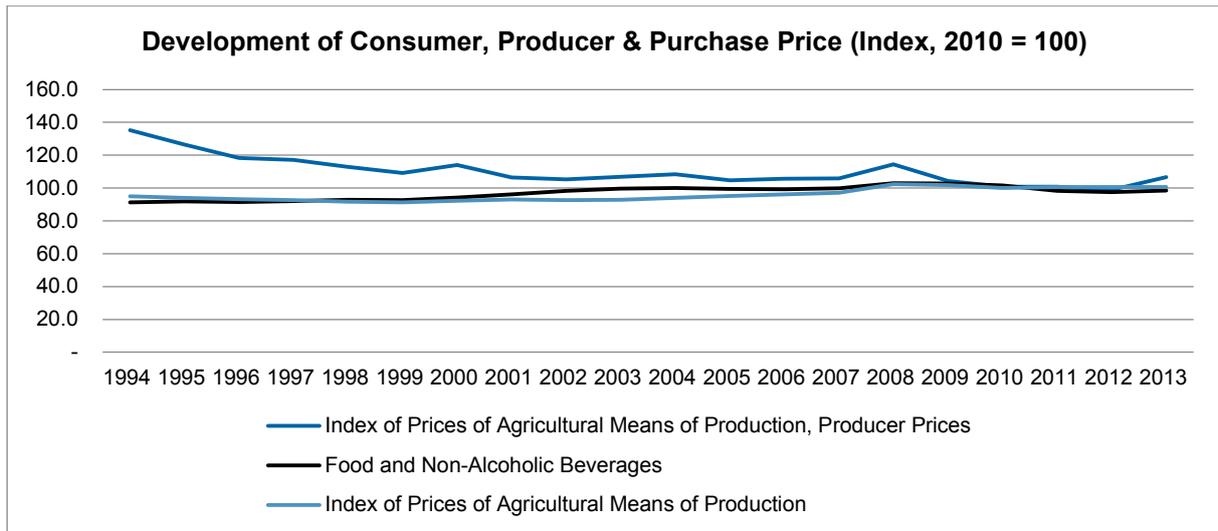


Figure 8: Development of prices (data sources: Country Index of Consumer Prices 2014, Production Price Index 2014, Swiss Federal Statistical Office)

Lastly, it seems appropriate in this context to mention the market structure along the value chain in order to make statements concerning the distribution of market power. In the Swiss food market, there are around 57,000 farms compared to only approximately 3,100 companies in the food industry. An intensification of concentration can be observed in the move to the third sector, namely, trade since only a small number of companies operate in the market and few players dominate it. Here it is worth naming Coop and Migros, which between them share almost 90% of the market.

The market power of trade was analyzed by Breitenstein (2014). Based on a survey of fifty manufacturers of branded products, it could be demonstrated that a sales-related and investment-related dependency exists in almost all cases. A sales-related dependency exists when more than 30% of the turnover of a supplier comes from the customer, while an investment-related dependency exists when the lead times of delivery yields are too short to be able to pay off investments. In addition to this, 76% of respondents described their negotiating position with retailers as a "weak" or "very weak". In Europe, there exists a "unique concentration" (Breitenstein, 2014, p.3). Accordingly, market power towards the third sector is expected to be reinforced and margin pressure reduced in this direction.

2.2. THE FOOD PROCESSING INDUSTRY

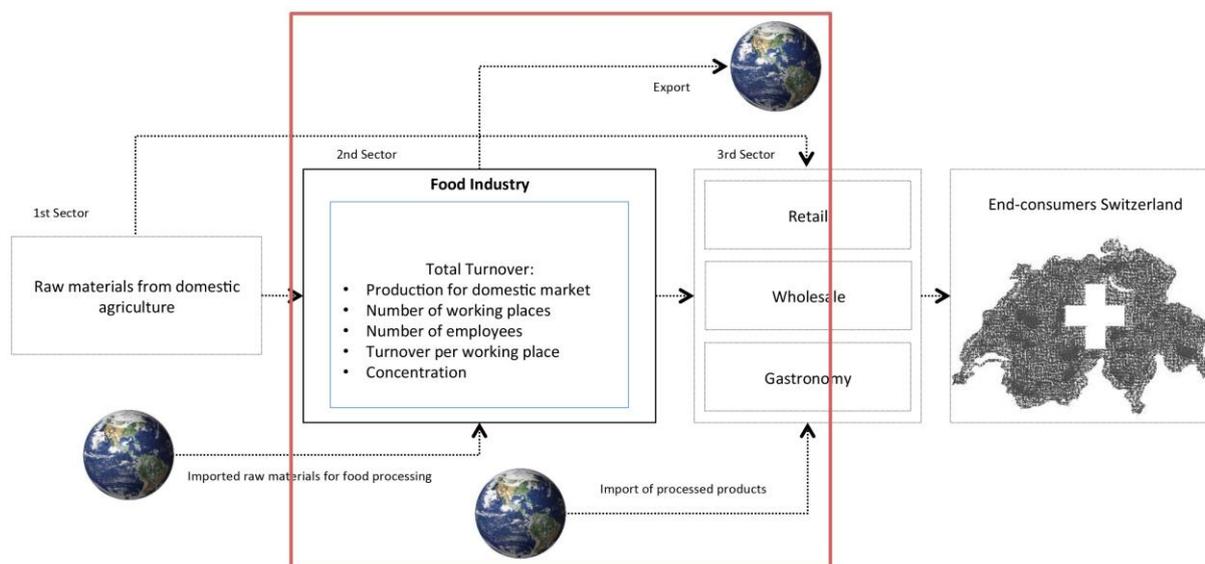


Figure 9: Focus of Section 2.2 on the food processing industry (authors' own diagram)

Swiss foodstuffs such as chocolate and cheese dominate the worldwide associations connected with Switzerland. But do these items really contribute to industry turnover at the levels expected? What other, perhaps less well-known products and players are also important for the industry?

This section focuses on the food processing industry (see Figure 9) and addresses the following questions:

- What is the turnover of the industry? How is it distributed among the sub-sectors?
- Which companies lie behind the turnover?
- How many places of work and employees does the industry support?
- What is the concentration in the market as a whole and in the individual sub-sectors?
- How high are exports? Where do the exported goods go? What is the position of the Swiss food industry in the world market?
- How high are the imports of finished products? Which products are mainly imported? How well does the Swiss food industry meet the needs of households in Switzerland?

2.2.1. Total Revenue and Profit Margins

Turnover in the food industry can be shown using two statistics. On the one hand, it is possible to base this on the total turnover reported by companies in the food industry. However, this includes not only all domestic consumption and export sales but also sales between two different foreign operations and turnover generated by financial transactions. This means that total turnover exceeds the turnover resulting solely from food production. The figures are nevertheless interesting because they shed light on the financial strength of enterprises established in the industry. These are presented correspondingly under the heading 'financial strength'.

The second approach – hereafter referred to simply as 'turnover' – is the turnover resulting from domestic consumption plus exports from Switzerland.

2.2.1.1. Financial Strength

Figure 10 shows that according to the VAT statistics reported by the companies in the food industry, total revenues have grown significantly but that they were very volatile. The average growth rate in the period 2001-2012 was accordingly 4.3%, showing the industry grew faster than the average for all industries in Switzerland.

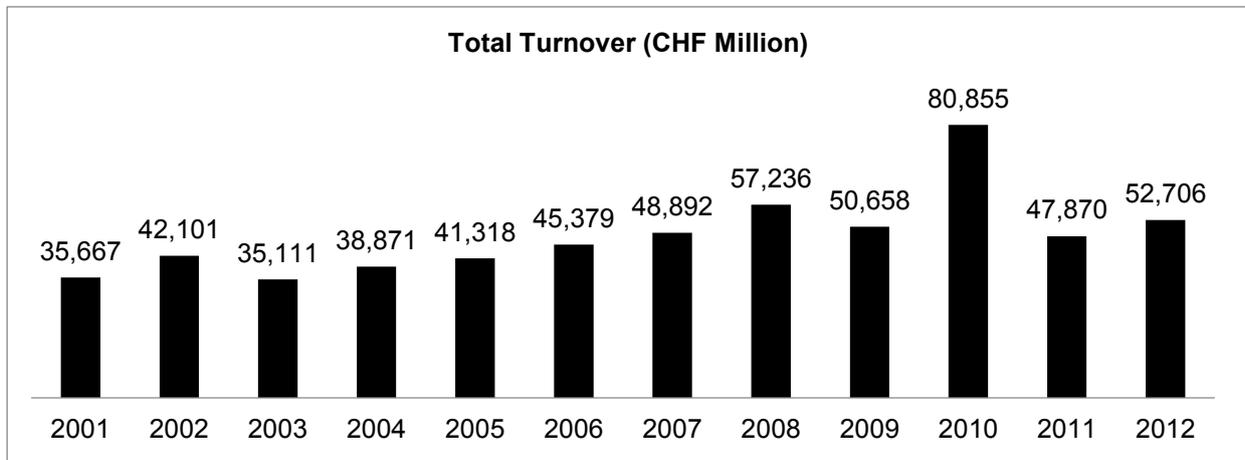


Figure 10: Total turnover in the food processing industry (data source: VAT Statistics 2012, Swiss Federal Statistical Office)

Of particular note is the year 2010 when there was an increase of 60% in total revenues compared to 2009. In the root cause analysis, it is noticeable that gains are made in the sub-section 'manufacture of other food products n.e.c. (1081; 1089)' where most of the large food concerns in Switzerland find themselves. It is assigned to the category exempted turnover⁶. Accordingly, it may be assumed that this strong growth cannot be attributed to growth in consumption or higher sales of food at home or abroad.

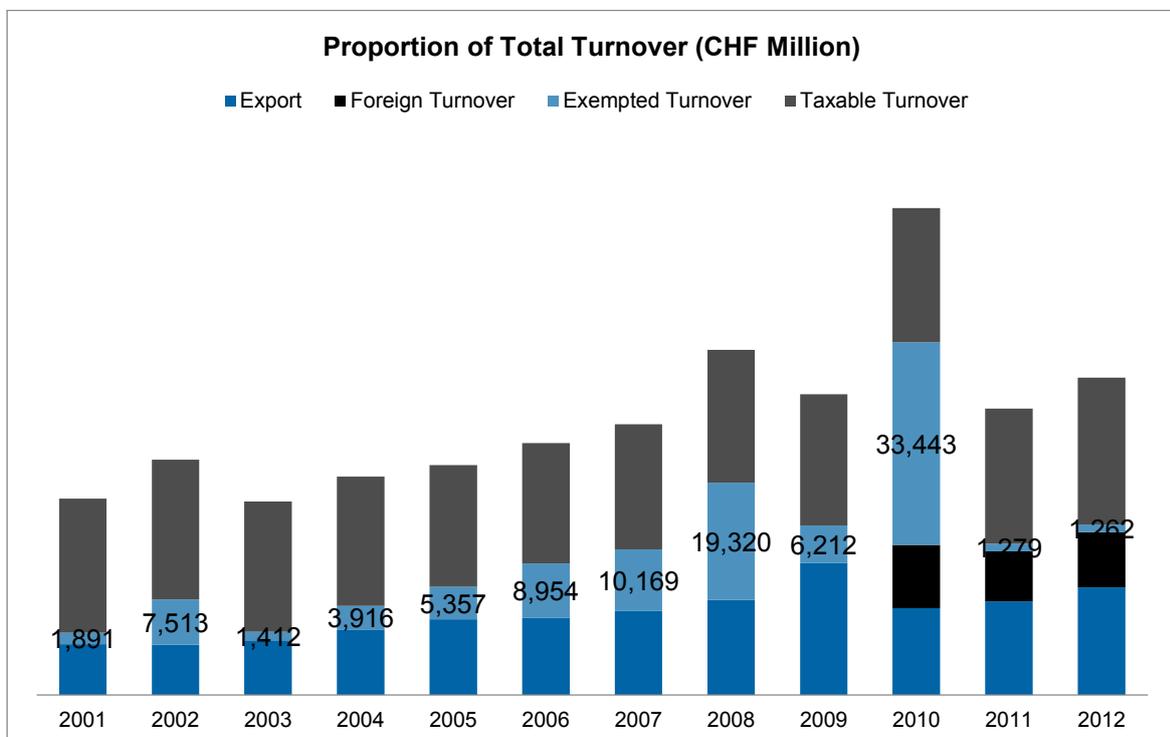


Figure 11: Summary of total sales reported in VAT statistics (data sources: VAT Statistics 2012, Foreign Trade Statistics 2012, Swiss Federal Statistics Office, retrieved from Swiss-IMPEX, July 2015)

⁶ Exempted turnover is turnover that is exempt from taxation, e.g., turnover related to money and capital transfer, insurance, reinsurance, social, and medical activities.

As Figure 11 shows, exempted turnover varies greatly depending on the year. To avoid the problems associated with food production and consumption data being heavily distorted by other effects, the ongoing use of total sales reported in VAT statistics was abandoned. Instead, a proxy was used as the sum of the results from taxable (= domestic) sales plus exports according to foreign trade statistics ("Impex").

2.2.1.2. Turnover According to a Narrower Definition

From now on, turnover will be discussed on the basis of the consumption of processed foods in Switzerland (taxable turnover) or exports of processed foods from Switzerland to the world (Impex).

If we define turnover as taxable transactions plus exports, then the Swiss food industry generated a turnover of some CHF 30 billion in 2012. Around CHF 8 billion was due to exports and CHF 24 billion to domestically distributed products. The profit margin for the food industry in 2012 was almost 5%, which is at the lower end of the scale in comparison to other Swiss sectors. Only 'metal production and metal products' and the 'lodgings' sector recorded lower margins. The leader by far is the pharmaceutical industry with about 22% (Credit Suisse, 2015). Accordingly, the combined profit for the food industry in 2012 was CHF 1.5 billion.

Figure 12 shows that domestic turnover has been relatively flat in recent years, which is consistent with unchanged expenditure on food and beverages.

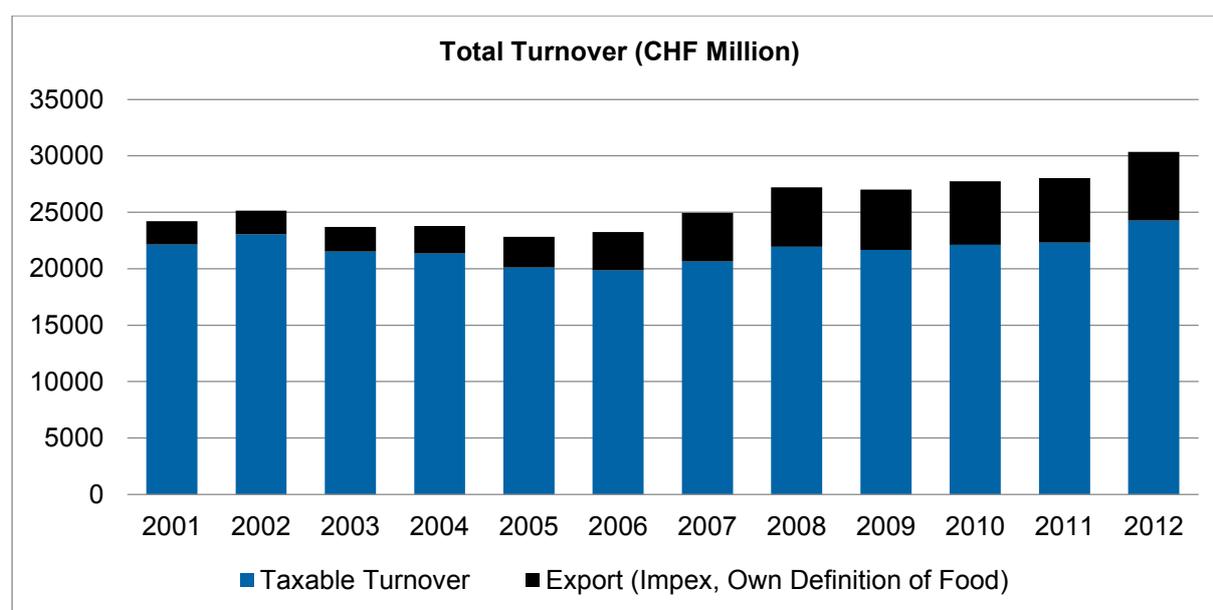


Figure 12: Domestic turnover (data source: VAT Statistics 2012, Swiss Federal Statistical Office)

Zero growth in the domestic market was offset by strong growth in exports, which has made Switzerland a small net exporter since 2013. Around CHF 8 billion were exported as well as imported, with a small positive balance on the export side. In this respect, one in every five Swiss francs generated in Switzerland by the food industry is earned abroad through exports. In return, one in every five Swiss francs spent on processed food goes on products made abroad. Overall, this resulted in an average sales growth of 2.1% per year.

2.2.2. Significance of the Food Industry in Switzerland

Despite relatively good growth, the food industry has lost significance within the processing industries in general. The level fell in recent years from almost 12% in 2001 to 9.6% in 2011, and in some cases is significantly lower than the level of most European neighbors (see Table 2) (OECD, 2015).

Table 2: Food industry share of turnover in the second sector (data source: OECD 2015)

Turnover Share in the Industrial Sector in %	2001	2011	Growth (%)
Switzerland	11.8	9.6	-2.0
Austria	11.0	11.1	0.2
Germany	9.6	9.2	-0.4
Spain	17.5	21.6	2.1
France	14.8	18.8	2.4
Italy	11.7	13.5	1.4
The Netherlands	18.9	20.3	0.7
UK	14.3	17.9	2.3

2.2.3. Food Industry Exports

Exports rose by almost CHF 3 billion in 2001 to nearly CHF 8 billion in 2014 (Figure 13). This figure corresponds to an average growth rate of almost 8% per year. In 2013, the food industry recorded the highest export growth of any industrial sector (Credit Suisse, 2014).

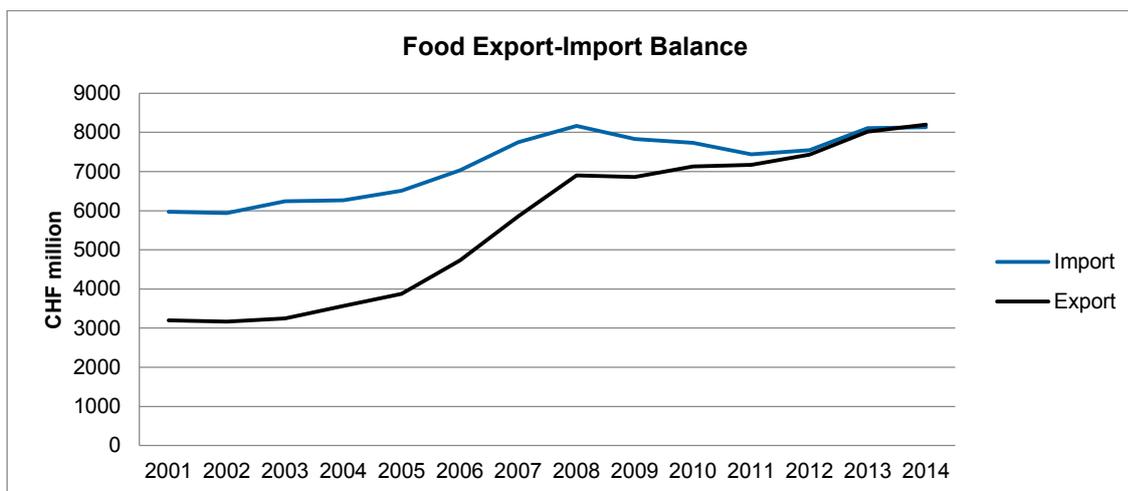


Figure 13: Development of export-import balance (data source: Foreign Trade Statistics 2012, Swiss Federal Statistical Office, retrieved from Swiss-Impex, July 2015)

Figure 13 shows a particularly strong increase in exports for the period 2004-2007. This is attributable to three causes: firstly, the onset of the coffee capsule boom (Nespresso produces all its capsules in Switzerland); secondly, the locating of the Red Bull filling plant to the Swiss town of Widnau, where around half of the world consumption of Red Bull originates; and thirdly, the introduction of bilateral agreements in the area of agricultural processing products in 2005. The proportion of exported foods from trade as a whole also grew correspondingly strongly; it has doubled since 1997 from 2% to just under 4%.

In the international food market, Switzerland was able to increase its market share thanks to strong exports. The export of processed food and beverages from Switzerland rose by 15% in the years from 2001-2011 compared to a world increase of only 13%. Imports to Switzerland, on the other hand, increased less than the global imports, which is why the market share fell in this case. Globally speaking, Switzerland is still only a small player, accounting for only about 1% of all world imports and exports. Among the EU countries, UK is the largest

importer, and the Netherlands is the largest exporter. Table 3 shows the share of the world import/export market by key EU country.

Table 3: Shares in the world market (Source: OECD, 2015)

	Export in 2012 (USD million)	Growth 2000-2011 (%)	Market Share in 2000 (%)	Market Share in 2011 (%)	Import in 2012 (USD million)	Growth (%)	Market Share in 2000 (%)	Market Share in 2011 (%)
Austria	10,069	13.9	0.9	1.1	9,248	12.1	0.9	1.1
Germany	64,446	12.5	6.4	7.1	59,075	10.2	7.4	7.1
Spain	29,024	11.1	3.1	3.0	23,520	9.7	3.2	2.9
France	53,620	7.8	8.5	6.0	43,276	9.1	5.9	5.0
Italy	32,574	10.2	4.0	3.6	32,122	9	4.7	3.9
Netherlands	59,633	11.3	6.8	6.7	41,461	12.9	3.7	4.6
UK	26,212	7.7	4.2	2.9	47,147	8.2	6.9	5.3

2.2.4. Export Destinations

In addition to the development of exports figures, the development of export destinations is also of importance (Figure 14). The following conclusions can be drawn from the export statistics by destination:

- The main export destination by a large margin is Europe. Over CHF 5 billion - nearly two-thirds of all exports - are sent here. The second most important export destination is Asia, followed by North America (both worth around CHF 1.3 billion). Exports to both continents also grew strongly (nominally almost 600% since 2001), but started from a lower level.
- Exports to Africa, Oceania, and Latin America were unremarkable in terms of the absolute amount and their change over time.

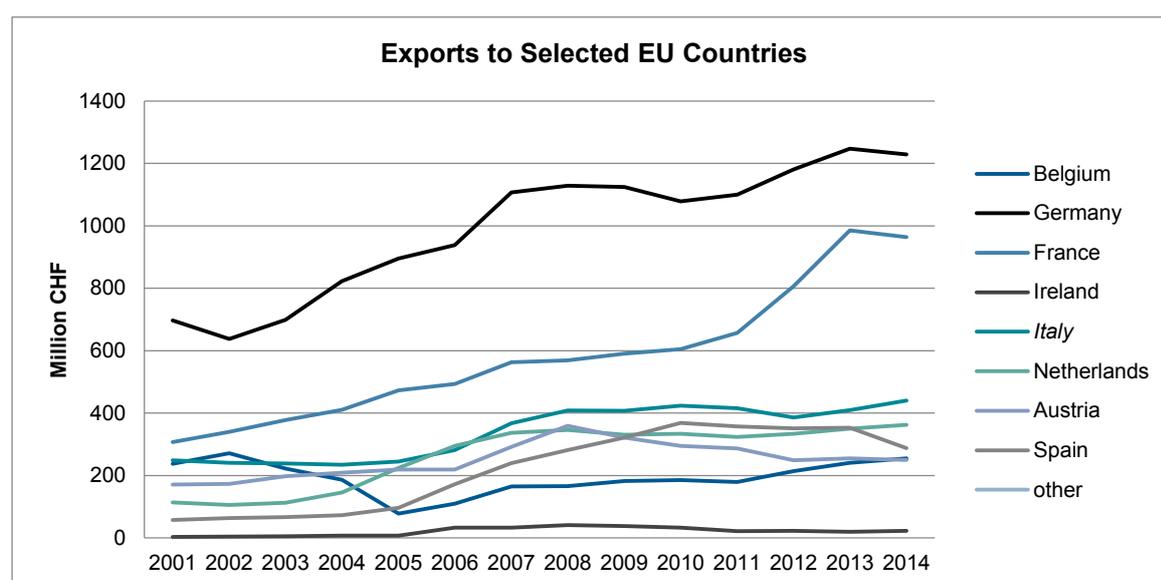


Figure 14: Exports in selected EU countries (data source: Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-Impex, July 2015)

Among EU countries, Germany is by far the most important export destination: Around CHF 1.2 billion worth of exports are sent here, closely followed by France with 20%, Italy with 9%, and the Netherlands with 8%. In particular, France gained significance as an export destination after 2011. Exports to all other countries have increased roughly in proportion to the general increase in exports after 2005.

2.2.5. Employment

The food industry is relatively labor-intensive: In 2013 around 68,000 people were employed in the industry in Switzerland. If we take into account the agricultural sector with a 170,000 workforce together with the food retail sector, which employs 126,000 people (Credit Suisse, 2015), about one in every eight workers in Switzerland and around a quarter of all places of work are connected directly or indirectly with food.⁷ Over half of those are employed in small or medium-sized companies. At around € 48,200, labor productivity is above the EU average and has also grown faster in recent years than in other similar countries: With a rate of around 6.1% between 2001 and 2011, Switzerland reached the second highest level in Europe (after The Netherlands) (Wyss-Aerni, 2015).

How has employment in the industry developed? The development of full-time equivalents for the food industry (Figure 15) shows that the introduction of the bilateral agreements in the field of processed agricultural products in 2005 coupled with the almost simultaneous arrival of Red Bull and the onset of the coffee capsule boom had a significant effect on employment. Employment grew on average by 2,000 FTEs from an average 64,000 employees to an average 66,000 employees after 2005.

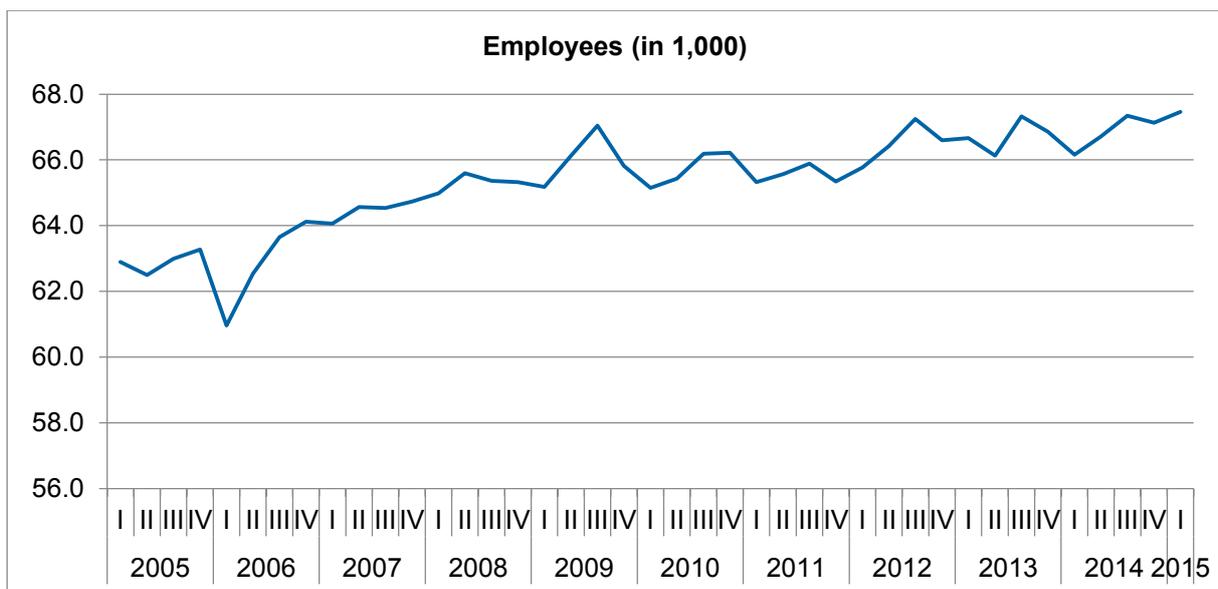


Figure 15: Employment development in the food industry (data source: Employment Statistics, BESTA 2013, Swiss Federal Statistical Office)

Figure 16 shows the breakdown of employees by sub-sectors. Almost 50% of those employed can be found in the bakery and pasta industry, and in meat processing. These sub-sectors are dominated by micro- and small enterprises.

⁷This calculation does not include those companies which manufacture equipment or machinery for the food industry or its affiliated value chain, or companies supplying packaging materials.

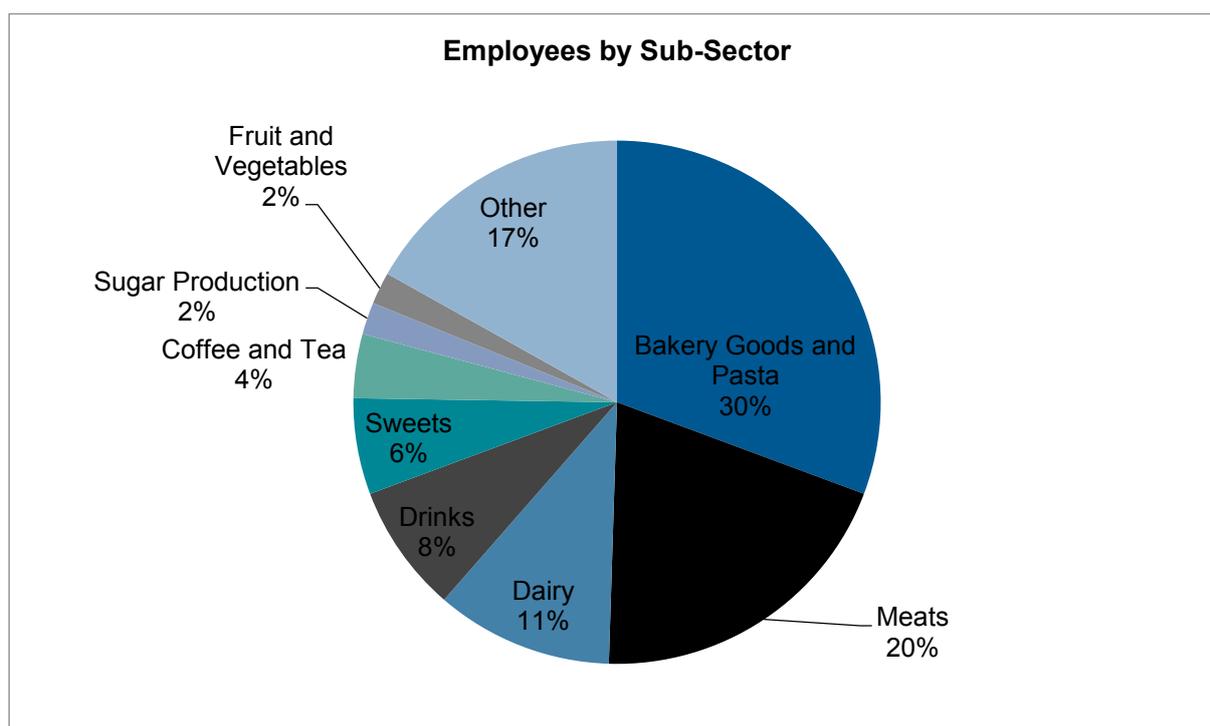


Figure 16: Employees by sub-sector (authors' own diagram based on Credit Suisse, 2015)

2.2.6. Turnover by Sub-Sector

The food industry is divided into nine sub-sectors.⁸ Within the sub-sector 'manufacture of other food products', seven sub-sectors can be identified.⁹

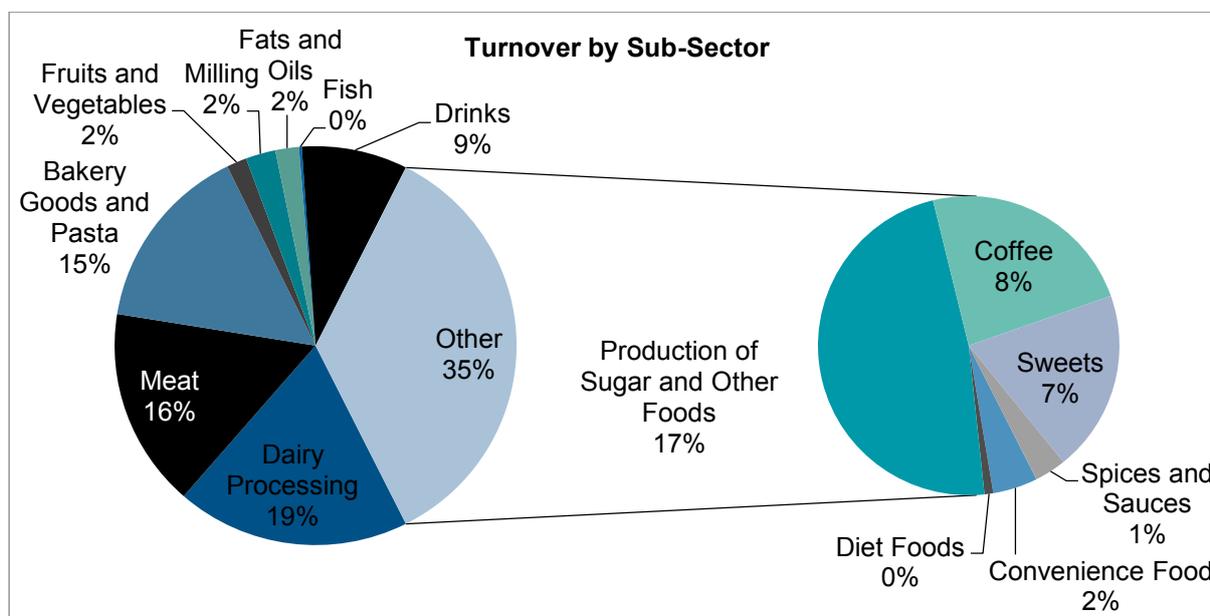


Figure 17: Turnover by sub-sector (turnover = taxable transaction plus exports) (data sources: VAT Statistics 2012, Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-Impex, July 2015)

⁸These are meat processing, fish processing, fruit and vegetable processing, manufacture of vegetable oils and fats, dairy products, grain/mill products, manufacture of bakery and pasta, manufacture of other food products, extraction of natural mineral water, and production of non-alcoholic beverages. For a detailed presentation, refer to "Introduction".

⁹These are the manufacture of sugar, production of confectionery, processing of coffee and tea, manufacture of condiments and seasonings, manufacture of ready meals, manufacture of homogenized and dietetic food, manufacture of other food not elsewhere classified (shown in the graph as "other"). For a detailed presentation, refer to "Introduction".

Figure 17 shows that over 80% of turnover is generated in four sub-sectors, with the category 'manufacture of other food products' by far the largest. It is a collective category of various sub-sectors whose sales distribution is shown in a smaller circle.¹⁰ Within the category 'manufacture of other food products' is the collective category 'manufacture of sugar; other food products n.e.c.'¹¹ which has the largest share at around 17% of turnover. On closer inspection, it can be seen that many of the food conglomerates fall into this category, even if their products could also be assigned to other categories.

It is estimated that a large proportion of the turnover arising from coffee capsules fits into this category. If the revenue earned from the production of coffee capsules (CHF 3.5 billion in 2012) were placed into the general coffee category, it would have a share of around 20%. The second largest sub-section in the 'manufacture of other food products' category is 'manufacture of sugar confectionery', which includes all turnover generated by the chocolate industry; this accounts for approximately 7% of revenue. However, it can be assumed here that the sales of confectionery are underestimated (for example, sales of Mars chocolate bars fall into the category 'production other food products n.e.c.').

In addition to the category 'manufacture of other food products', which is driven mainly by coffee and chocolate, those branches with the next largest share of turnover produce the traditional products which form the basis of everyday nutrition: Milk processing with 19%, meat processing with 16%, and the production of bread and farinaceous goods with 15% all maintain roughly equal proportions and are clearly ahead of the other categories. Lastly, the production of mineral water and soft drinks is also worth mentioning. This area accounts for approximately 9% of turnover, although in this case sales of Red Bull are not listed.¹²

Accordingly, it can be concluded that - in addition to the production of classical, staple foodstuffs - the food industry in Switzerland is characterized by the manufacture of three specific products: coffee, chocolate, and soft drinks.

In comparison with statistics covering the distribution of food industry revenue in the EU, it can be seen that the production of meat, fats and oils, and fruit and vegetable processing generates lower sales figures pro rata in Switzerland than in the EU. Conversely, the proportion generated by milk processing, the processing of coffee, the production of sugar confectionery (including chocolate), and the production of bread and farinaceous goods is much higher in Switzerland.

2.2.7. Export Orientation of the Sub-Sectors

In addition to revenue distribution among the sub-sectors, their respective export orientations are of interest. Figure 18 shows the turnover of the sub-sectors divided into turnover by domestic sales and exports. The percentage of export turnover is illustrated using the axis on the right side.

¹⁰It should be noted that the quantity of such relates to sales; the shares of small groups add up to the proportion of the superordinate category, 35%.

¹¹n.e.c. stands for "not elsewhere classified".

¹²This shows once again the difficulty in obtaining reliable data on the total sales of the industry: While exports of Red Bull are listed in the 'drinks' category and therefore traceable, within Switzerland the company is registered as a wholesaler. Turnover is therefore allocated to the category 'wholesale non-specialized' and not to the food industry at all. In 2012, the category 'wholesale non-specialized' accounted for taxable transactions amounting to around CHF 10 billion. Worldwide sales of Red Bull in the same year amounted to around CHF 4.93 billion (Source: Statista). About half of all the Red Bull consumed worldwide is canned in Switzerland.

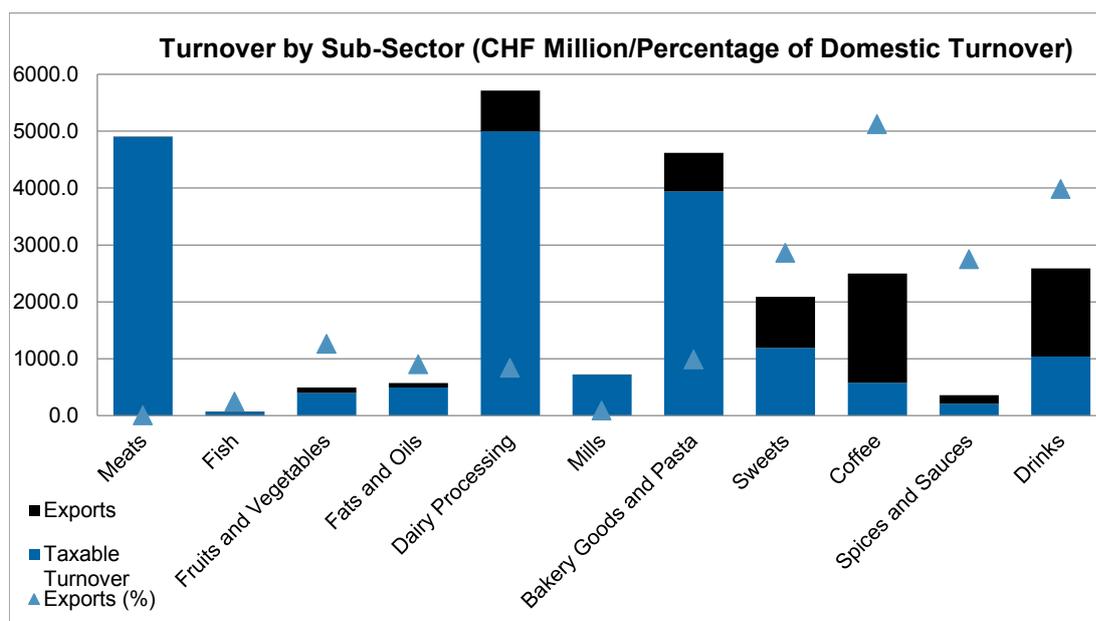


Figure 18: Export orientation of the sub-sectors (data sources: VAT Statistics 2012, Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-Impex, July 2015)

From Figure 19 it can be seen that the propensity to export varies widely between sectors.¹³ The most export-oriented sub-sectors are the processing of coffee and the production of beverages. The products for which Switzerland is known worldwide - the production of confectionery items and milk products (e.g., cheese) - follow at a greater distance.

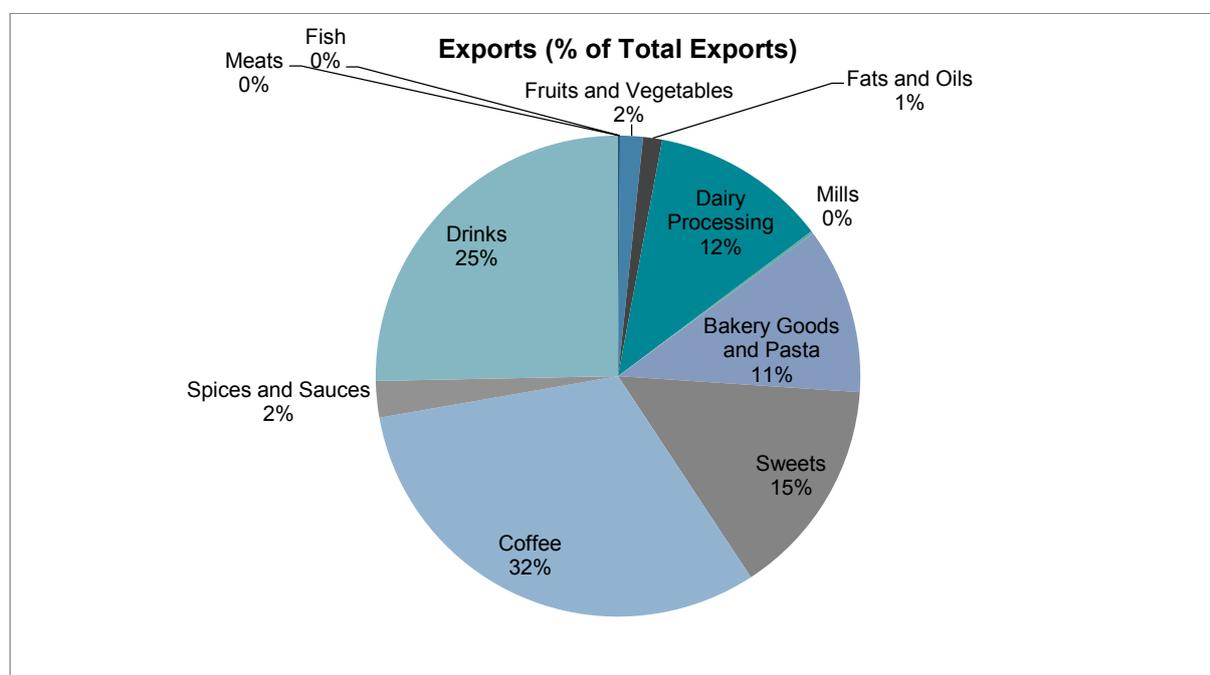


Figure 19: Exports by sub-sectors (data source: Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-Impex, July 2015)

¹³ It should be noted that the category 'manufacture of other food products n.e.c.' is not shown here, since its propensity to export could not be determined. However, because most global companies are included under this category it can be assumed that their propensity to export is high.

It is clear, therefore, that Switzerland is not strong on exports in the traditional industries, but rather in industries that are broadly detached from agriculture. The OECD (OECD, 2015) suggests there may even be a causal relationship. They argue that the Swiss food industry occupies an international, leading position in those markets where it does not depend on the raw materials from domestic agriculture. The uncompetitive and highly insular agricultural sector, argues the study, hinders those sectors that rely on Swiss raw materials from being more internationally competitive. The Swiss food industry, therefore, depends heavily on two, partly imported, raw materials - cocoa and water. Wyss-Aerni (2015) speaks in this context of "the curse of domestic raw materials".

What dynamics do the exports display by sub-sector? Figure 20 shows the historical development of exports in absolute terms. Figure 21 shows relative development compared to a 2001 baseline.

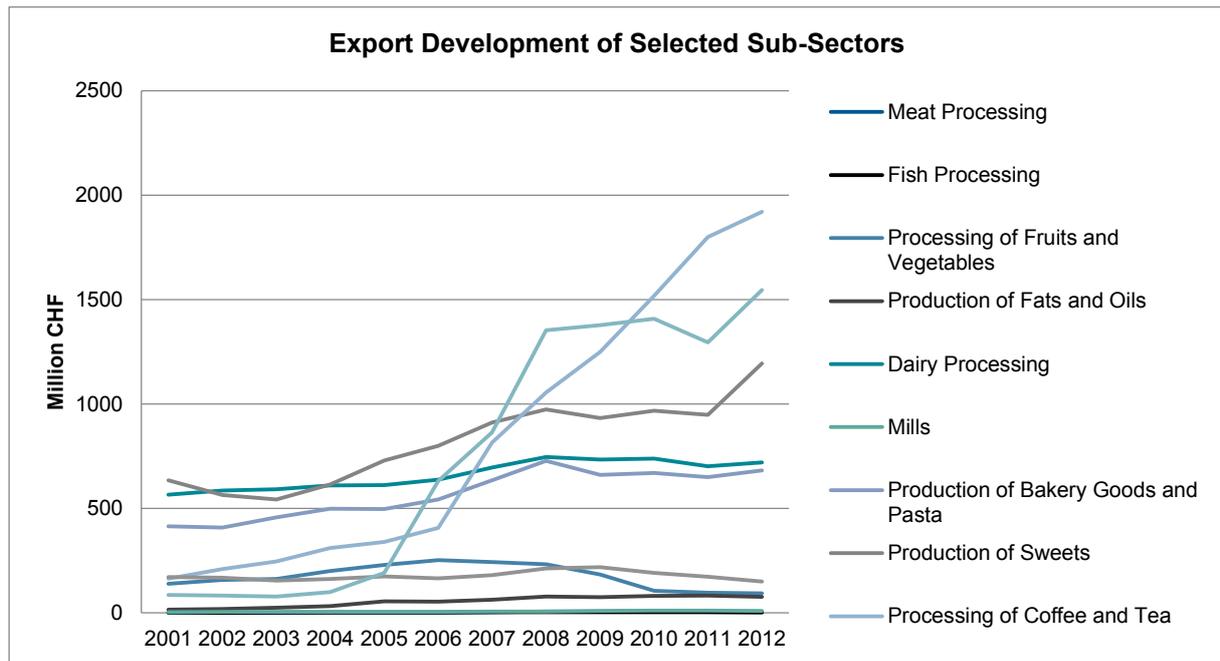


Figure 20: Export development of selected sub-sectors (data source: Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-Impex, July 2015)

From both diagrams, a conclusion can be drawn that the high growth in turnover was the result of a strong rise in the exports of beverages and processed coffee. This means that today's strongest export sectors were also behind the strong development of the industry as a whole. Exports from coffee processing increased from CHF 200 million to just under CHF 2 billion in the period 2001-2012. A similar development took place in the beverage industry, where sales of below CHF 100 million grew to CHF 1.5 billion.

From a total CHF 8 billion worth of exported products in 2012, the coffee processing recently achieved a share of around 28% and the beverage industry a share of 22.5%. It is interesting to note that the international strength of the food industry in these two categories grew over a relatively short period: Today's food industry profile is the result of a development that began back in 2005, illustrating just how dynamically an industry can evolve in the presence of the right set of conditions. Although other sub-sectors do not show similarly high growth rates, they are nevertheless significant on account of their absolute size. They include the manufacture of sugar confectionery as a category with the third-highest turnover, whose exports rose by CHF 630 million to CHF 1 billion; this constitutes around 13% of all exports. In fourth and fifth place are milk processing and the production of bread and farinaceous products, each of which had exports totaling CHF 700 million - a slight increase.

In relation to the level of exports in 2001, one sub-sector stands out: The manufacture of oils and fats. Exports increased five-fold over the last 15 years, from CHF 15 million in 2001 to CHF 78 million in 2012, which in relative terms is the third largest development.¹⁴

In addition, the fairly solid development of meat processing is striking; from an initially very low level, turnover here has also increased five-fold. Behind this development probably lies Bell AG, which has greatly expanded its international business in recent years and is now considered one of the largest meat processors in Europe. This illustrates that despite a highly regulated and uncompetitive international agricultural sector, export growth can still be generated.

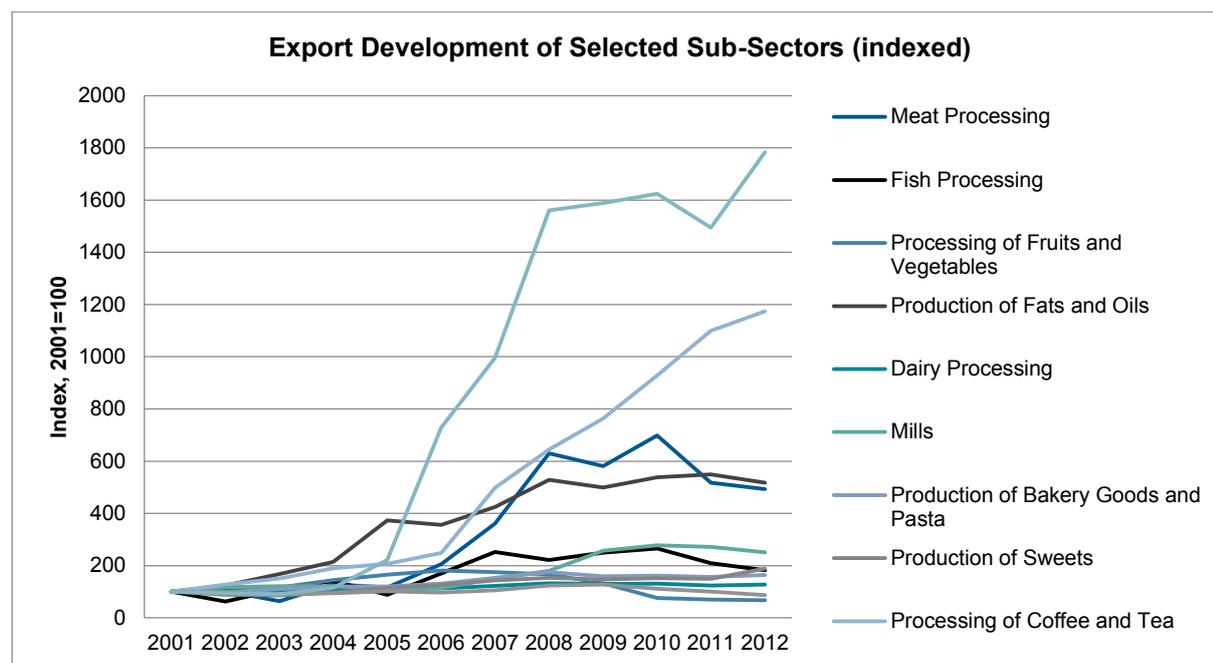


Figure 21: Relative development of export turnover (compared with 2001) (data source: Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-Impex, July 2015)

In summary, it can be said that the sub-sectors of the food industry are very different in terms of international competitiveness: While coffee processing and beverage exports increased strongly, traditional industries have been more oriented towards the domestic market. However, this situation is not static. Newcomers such as the manufacture of fats and oils as well as established industries that have gained momentum are likely to help shape the international profile of the Swiss food industry more in the future.

2.2.8. Development of Turnover per Place of work

Figure 22 shows the development of average turnover per place of work¹⁵ for selected sub-sectors. Accordingly, beverage production achieved by far the highest turnover per workplace, followed by vegetable and fruit processing and the production of sugar confectionery. With respect to development over time, three categories can be defined: Industries with increasing indicators, industries with falling indicators, and those showing no change. (Notes about the individual sub-sectors are recorded as bullet points.)

¹⁴ It would be interesting in a further project to analyze the reasons behind the development of oils and fats.

¹⁵ While the turnover and export performance figures provide information about the macro-economic development of the (sub-) sections, the historical analysis of turnover per place of work serves as an indicator of micro-economic developments within a sector.¹⁵ The absolute level of the "turnover per place of work" figure provides information on the average size of an operation. Development over time shows whether the market has developed attractively for a company. An increase in the figure may indicate either an increase in the turnover of the sector or a decrease in number of their respective companies. The latter case is attractive for companies since an increase in the figure implies less competition, higher concentration, and greater financial leeway. A decreasing figure, however, indicates that the industry has a tendency to be less attractive for a company. The decrease has to be caused by either a decrease in turnover in the industry or an increase in number of places of work (and therefore an increase in competition in the market). The latter effect can also mean that high margins have attracted more competitors into the market and led to a decline in the indicator.

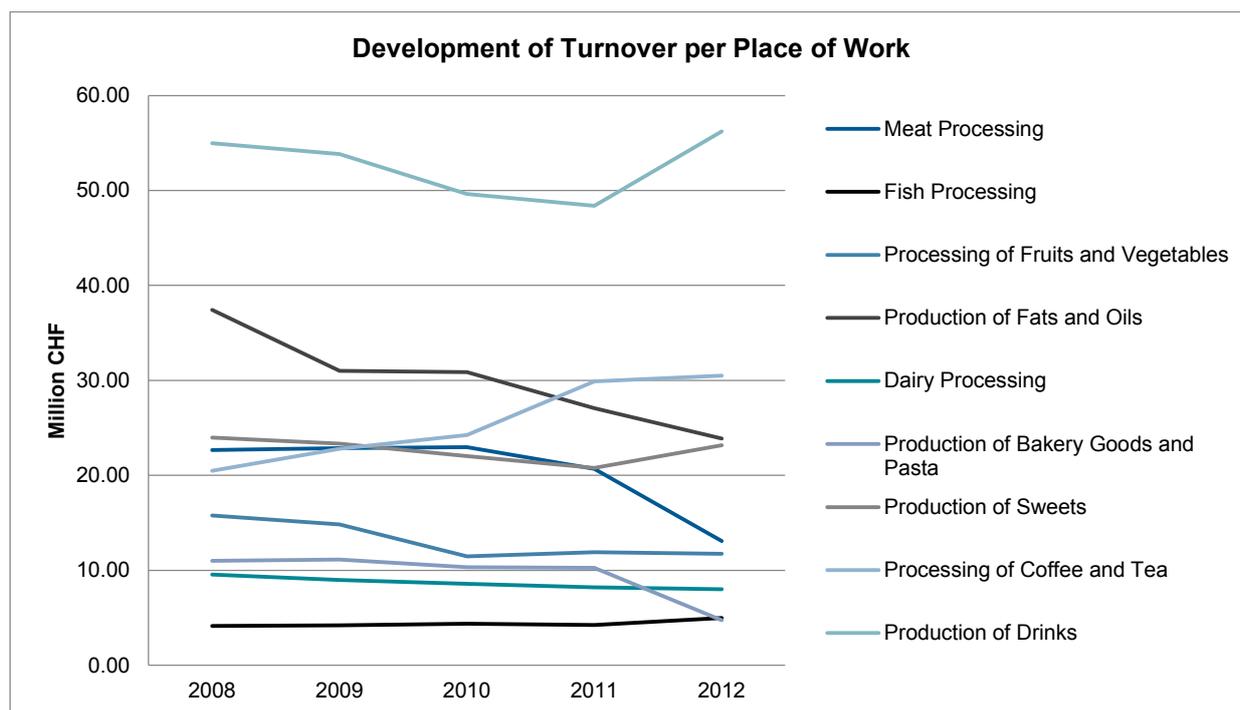


Figure 22: Turnover per place of work (data sources: VAT Statistics 2012 and Statistics of Corporate Structure, STATENT, 2013)¹⁶

Strictly speaking, only the processing of coffee and tea falls into the first category, where sales per industrial operation have risen from CHF 20 million to CHF 30 million since 2008. Beverage production has recently shown a positive development, although it underwent a decline from 2008-2011.

- In the case of coffee and tea processing, both turnover and number of places of work have risen. Since the ratio of turnover over the number of places of work has increased, sales growth was proportionately higher than the increase in the number of companies. Accordingly, more companies are now earning higher revenues in the coffee and tea processing industries than in 2008. This increase can still be seen even though Nespresso turnover is not included here.
- In beverage production, both the number of places of work as well as revenues rose, with a disproportionately large growth in jobs from 2009-2010 compared to turnover - a situation which has been in reverse since 2011.

Declining indicators, however, were observed for a variety of sub-sectors, which potentially illustrates increased competition (and possibly shows that some industries had to struggle harder after the EU agreement in 2005). These include the sub-sectors of manufacturing of oils and fats, meat processing, fruit and vegetable processing, and lastly also the production of bread and farinaceous goods.

An almost constant development was experienced by the confectionery, fish processing, and milk processing sub-sectors.

2.2.9. Meeting Consumer Needs in the Swiss Domestic Market & Imports

This section considers the role of the food industry for consumption within Switzerland. Central to the issue is the question: Can the food industry produce what is being consumed in Switzerland?

This question can be answered by considering its degree of self-sufficiency, its imports, and comparing household expenditure with industry revenue.

¹⁶ Due to the reliability of the data from VAT statistics, only figures from 2008 onwards have been taken into account.

2.2.9.1. Degree of Self-Sufficiency¹⁷

The Agricultural Report issued by the Federal Office for Agriculture (2014) shows that Switzerland has a global self-sufficiency rating for food of approximately 60% (gross), which did not show huge fluctuations over the past 12 years (see Figure 23). This implies that about 40% of the caloric intake stems from imports.¹⁸

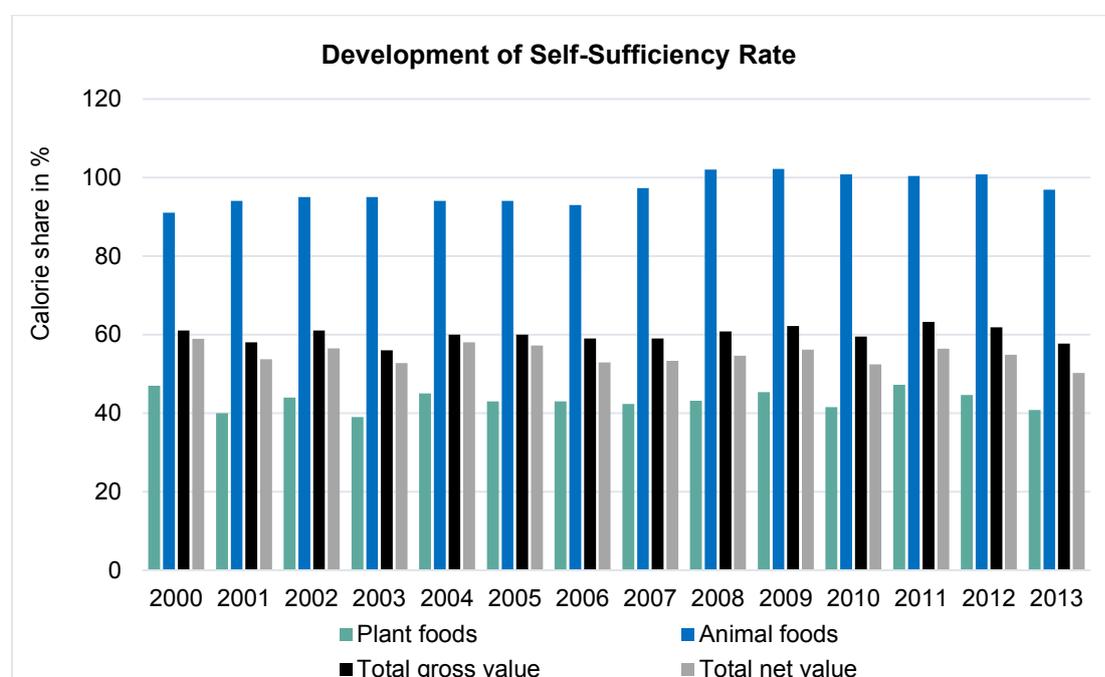


Figure 23: Degree of self-sufficiency (Source: Federal Office for Agriculture, 2014)

The Agricultural Report by the Federal Office for Agriculture (2014) makes a distinction between foods of vegetable origin and foods of animal origin. Here, there is a self-sufficiency rating of over 100% for animal-based foods (i.e., more is produced than consumed) but a below-average level in the case of plant-based foods (40%).

2.2.9.2. Imports

So which product categories need to be covered by imports? In Figure 24, domestic turnover is shown with the respective imports for each sub-sector, and it can also be seen what proportion of the total market is held by Swiss corporations.

¹⁷ The self-sufficiency degree is defined as the ratio of domestic production to overall domestic consumption. With the self-sufficiency degree, a distinction is made between a net self-sufficiency (deduction of domestic production based on amount of imported feed) and a gross self-sufficiency.

¹⁸It should be noted, however, that this is a derived and therefore theoretical measure, since it is based on a comparison of the food produced with the average quantity of goods demanded by the population and their calorie requirements.

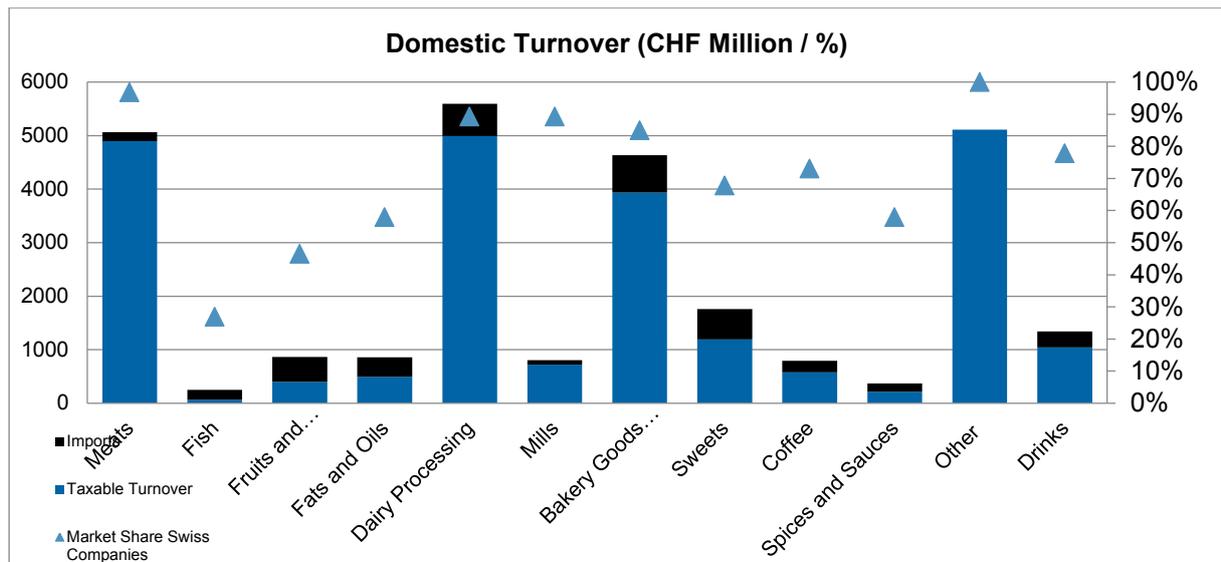


Figure 24: Domestic turnover (turnover = taxable transactions plus imports) (data source: Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-Impex, July 2015)

For those industries in which Switzerland has no naturally-occurring raw materials, the import ratio tends to be higher (i.e., the market share held by Swiss companies is small). As a result, there is a disadvantage for companies in Switzerland that rely on imports compared with those able to source their production materials domestically. Accordingly, the import quotas are higher for processed fish products, processed fruit and vegetable products, oils and fats, and seasonings and sauces. Similarly, high imports can be observed in the sub-sectors of the 'manufacture of seasonings and sauces' and the 'manufacture of sugar confectionery'.

However, in the traditional Swiss consumer industries such as meat, bakery, and dairy products, the market share by Swiss companies is very high. Given the fact that Switzerland is rich in the raw materials needed and the fact that these goods were being consumed and produced before the strong internationalization of food markets, this finding comes as no surprise.

2.2.9.3. Comparison of Household Expenditure and Industry Revenue¹⁹

The largest expenditure groups for households are the meat products, bakery goods/pasta, and dairy products. This order is consistent with the turnover shares of the food industry.

Table 4 shows household expenditure share by category compared to the turnover share of the respective sub-sectors.

In meat processing, the production of bakery and farinaceous goods and, in milk processing, the difference between household expenditure and turnover shares are additionally covered by Switzerland's position as a net exporter/importer. In this way, Swiss households spend around 22% of their food budget on meat while Swiss producers have a turnover share of only 16% in this category. Switzerland should, therefore, be a net importer of meat, which is consistent with statistics recorded by the Swiss Customs Administration. Expenditure on bread and cereals and industry revenues in the production of bread and pasta are both 15%. This is confirmed by Swiss Customs Administration statistics which show that Switzerland imported almost the same amount as it exported. This reveals, however, that the needs of the Swiss are not completely congruent.²⁰ In the case of the dairy

¹⁹In addition to the self-sufficiency rate and imports according to Swiss Customs Administration statistics, an idea about demand fulfillment can be illustrated by means of a comparison of budget expenditure and industry revenue. The following considerations lie behind a comparison of expenditure share and turnover share: On the one hand, we would expect that the product categories generating the largest industry revenue would be those with the highest household expenditure. Larger deviations between consumption and turnover shares indicate that the money spent by the consumer has not landed in the pockets of the food industry and/or has not come from this source. Alternative recipients and senders are foreign sources or the agriculture sector. This comparison assumes implicitly that the profit margins for retail and wholesale trade do not vary greatly between different product categories. This would distort a comparison with expenditure shares.

²⁰This may lie in the fact that very little pasta is produced in Switzerland. In contrast, Switzerland produces quite a lot of extended-life baked goods which are exported abroad.

industry, revenues are around 18% while household spending is only 15%, confirming that Switzerland is a net exporter of dairy products.

Table 4: Household expenditure vs. turnover (data source: OECD 2015)

Budget Expenditure (% of total expenditure)		Turnover by Sub-Sector (% of total)		Position According to Foreign Trade Statistics
Meat	22%	Meat	16%	Net importer
Fruit and vegetables	21%	Vegetables and fruit	2%	Net importer
Bread and cereals	15%	Baked goods and pasta	15%	Approximately balanced
Milk, cheese	15%	Dairy products	18%	Net exporter
Sauces, salts, spices	7%	Seasonings	3%	Net importer
Sugar, confectionery	6%	Confectionery	8%	Net exporter
Mineral water, soft drinks	5%	Mineral water, soft drinks	8%	Net exporter
Coffee, tea	4%	Coffee, tea	8%	Net exporter
Fish	3%	Fish products	0.2%	Net importer
Cooking fats	2%	Fats and oils	2%	Net importer

In the categories of sugar confectionery, coffee, and beverages, the Swiss food industry also makes a higher turnover percentage than that of sales to Swiss households. Accordingly, it can be assumed that revenue also flows into the country from outside. This statement agrees with foreign trade statistics which show that Switzerland is a net exporter in these categories. It demonstrates, however, that in Switzerland not only commodities are consumed that are domestically produced, but that there is a considerable market for imported goods. The market share in sugar confectionery and coffee is between 70-80%. Here it can be seen that the Swiss food industry does not just produce the entire range of products that Swiss households want to consume, but that the diversity of products is increased by imports. This fact is especially true for these three broad categories, whose product-specific characteristics can vary greatly.

For processed fish products, oils and fats, and seasonings (this also includes ready meals), Switzerland is a net importer, which is also reflected in the significantly lower turnover share to expenditure share and the low market share held by Swiss companies (<60%). The lower market share can be explained by the fact that Switzerland has little or no raw materials of its own to make these foodstuffs and consequently no domestic industry has previously existed to produce these goods.

A big difference between revenue and expenditure is evident in the category of fruit and vegetables, which constitutes 21% of household expenditure. Here fruit and vegetable processing accounts for only 2%. The difference stems from the fact that the household expenditure also includes unprepared fruit and vegetables, while only the sale of prepared products counts towards the industry turnover. Table 5 summarizes these findings.

Table 5: Coverage of domestic requirements (data source: OECD 2015)

High coverage of demand through domestic production	Low coverage of demand through domestic production	Production and consumption not consistently congruent ²¹
<ul style="list-style-type: none"> • Meat products • Dairy products • Baked goods and pasta²² 	<ul style="list-style-type: none"> • Oils and fats • Fish • Seasonings and sauces 	<ul style="list-style-type: none"> • Coffee, tea • Beverages • Confectionery

2.2.10. Market Concentration

Market concentration is the last element needed to describe the position of the Swiss food industry in the domestic market.²³ This is calculated on the basis of domestic sales generated per place of work.²⁴ Figure 25 shows both the average domestic turnover achieved per place of work and the resulting, average market share.

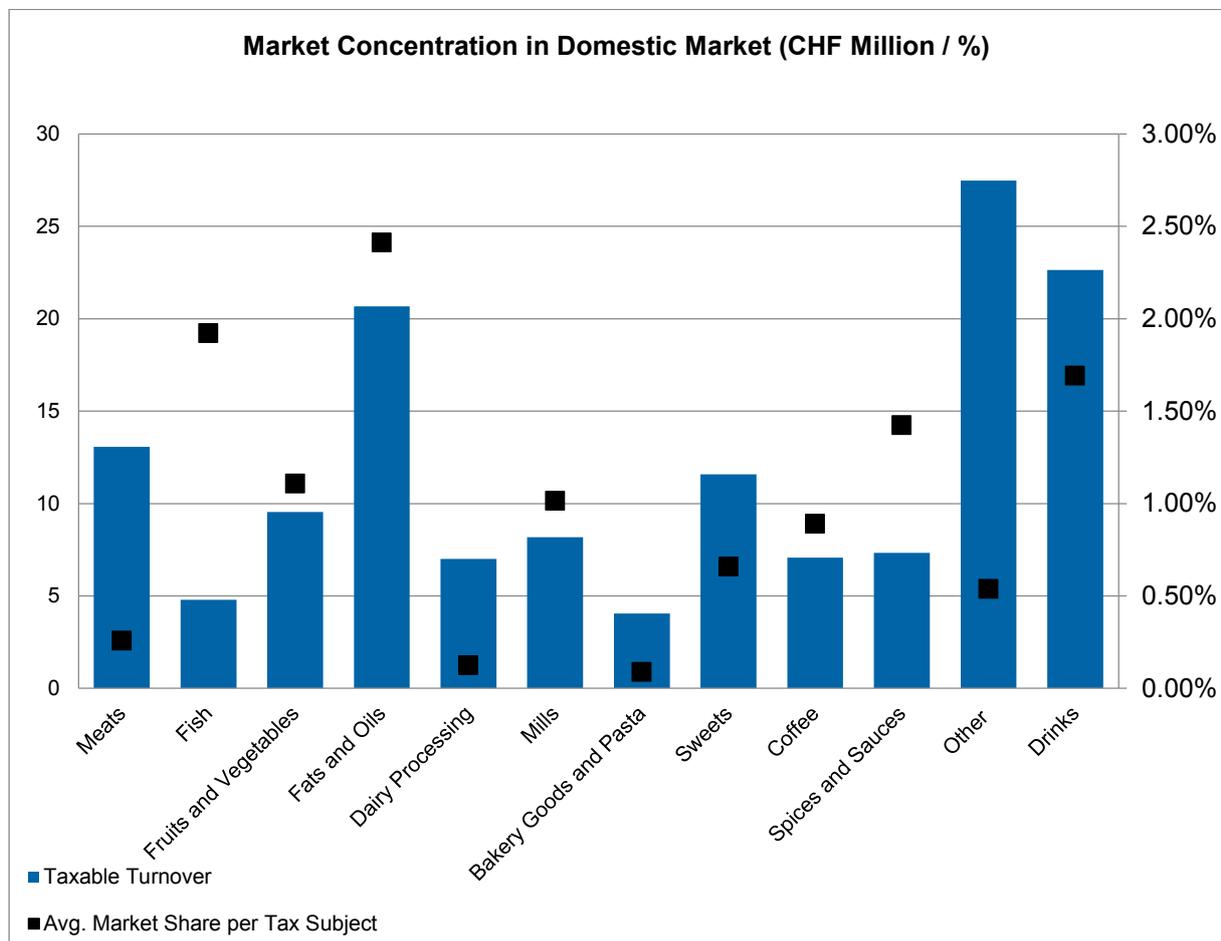


Figure 25: Market concentration (authors' own diagram based on data from the VAT Statistics 2012 and Statistics of Corporate Structures, 2013, Swiss Federal Statistics Office)

Figure 25 shows that in particular specialized sub-sectors have a higher concentration and a correspondingly higher market share. Thus, the sub-sectors 'manufacture of oils and fats', 'fish processing', and the 'production of

²¹ Visible through a higher export and import share.

²² It should be noted that this statement is probably more true for baked goods and less so in the case of pasta. A closer investigation has not been made here.

²³ The assessment of market concentration depends on an understanding of the second moment of distribution. The most accurate measure of the assessment of market concentration is based on a so-called Lorenz curve in accordance with the presentation of revenues. However, this is not possible owing to lack of availability of turnover figures on a micro-level. From the available, aggregated data, only average values can be calculated, resulting in a limited statement with regard to the actual concentration within a sector.

²⁴ This is in contrast to the previously-considered measure of turnover per place of work, where turnover was defined as domestic sales plus exports. Since it is the concentration in Swiss markets which needs to be analyzed here, exports are not considered.

seasonings and sauces', along with the 'production of beverages' have an average market share of 1.5% and more. A lower market share and correspondingly higher competition can be observed in the traditional sectors of the food industry: Meat processing operations, milk processing plants, and bakery and pasta producers account, on average, for less than 0.3% of the market.

2.3. SWISS AGRICULTURE & RAW MATERIAL IMPORTS

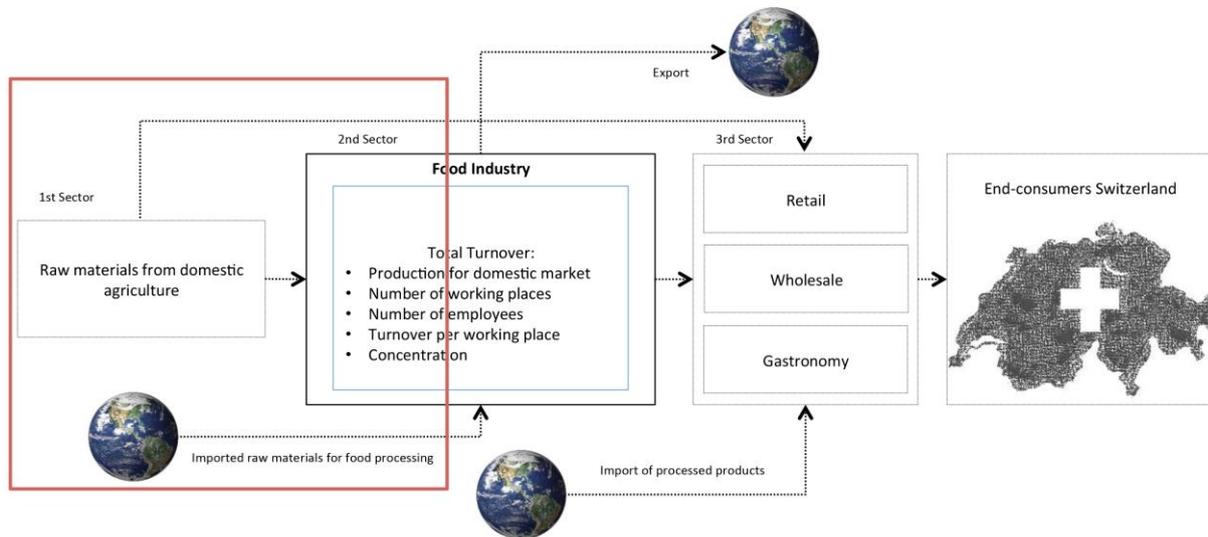


Figure 26: Focus of Section 2.3 on agriculture and raw material imports (authors' own illustration)

The food industry is dependent on a variety of input factors for production, and it is availability, cost, and quality which determine the competitiveness of the industry (see Figure 26). Swiss agriculture makes a major contribution to the competitiveness of the industry as it provides a large proportion of domestically processed raw materials. This section answers the following questions:

- Which raw materials are needed by the food industry?
- Which raw materials are produced by the agricultural sector?
- What is the price level of domestic raw materials compared with other countries?
- How have raw material imports developed?

2.3.1. Required Inputs

For the Swiss food industry, the following raw materials are principally used in the sub-sectors:

- Meat and meat products which are used in meat production especially (NOGA 101), but also in other sub-sectors including 'prepared meals and dishes' (NOGA 1085)
- Fish and shellfish which are used in fish production especially (NOGA 102), but also in other sub-sectors including 'prepared meals and dishes' (NOGA 1085)
- Fruit, vegetables, and potatoes which are used in fruit and vegetable processing (103), but also in other sub-sectors including 'prepared meals and dishes' (1085)
- Vegetable seeds that are used in the manufacture of vegetable and animal oils and fats (104)
- Raw milk that is used in the manufacture of dairy products (105)
- Cereals which occur in meal and grain milling and the manufacture of starches and starch products (106)
- Sugar which is used in the manufacture of sugar confectionery (1082) and the production of beverages (1107)
- Coffee beans which are needed for coffee processing (1083)
- Cocoa beans, cocoa butter, and cocoa paste for the manufacture of sugar confectionery (1082)

A detailed analysis of the dependence of the Swiss food industry on domestic agriculture is difficult, however, since the amount of raw material processed by the food industry is unknown. For this reason, a comparison is made between domestic production quantities and the imported quantities of the key raw materials already mentioned. Figure 27 shows the ratios with import share shown on the right axis.

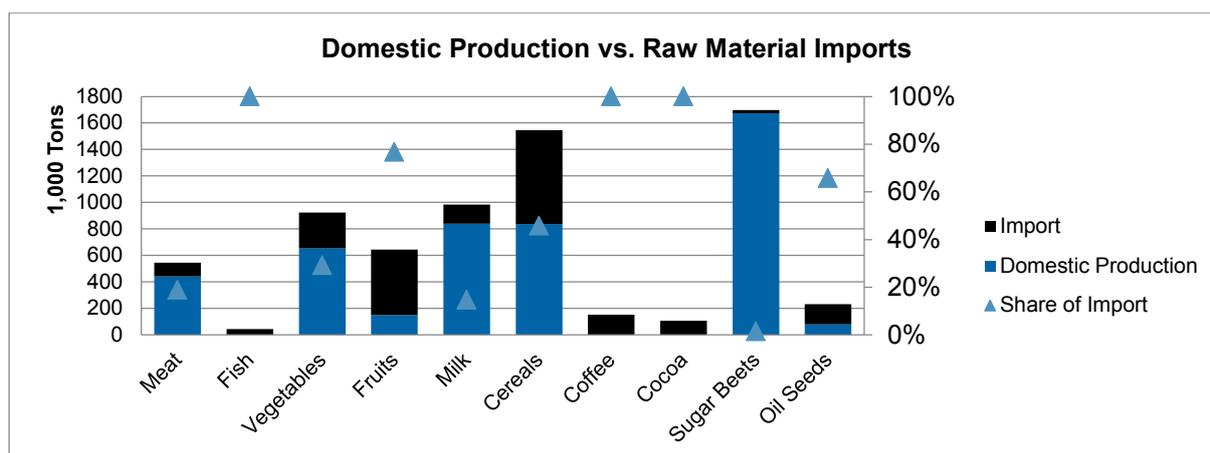


Figure 27: Comparison of domestic production volumes and commodity imports (authors' own diagram based on data from the VAT Statistics 2012 and Statistics of Corporate Structures, 2013, Swiss Federal Statistical Office)

The highest import shares for raw coffee, cocoa, and fish hold few surprises since domestic agriculture has little or no natural facilities to produce these items. Accordingly, there is a high dependence here on imports from foreign countries. In addition, fruit and oil seeds have a high import share (more than 60%). Cereals, vegetables, and meat occupy the central area with import shares between 20% and 60%. This means in return that the food industry, especially in the case of sugar beet (and correspondingly sugar), vegetables, milk, cereals, and meat, relies on the resources of the domestic producers.

2.3.2. Raw Material Prices - International Comparison & Development

Producer prices in Switzerland are generally around 100% higher than those in the EU. The only exceptions are pears, apples, and carrots, where Swiss prices are comparable to those in the EU. While this was the case in 2010, the dynamics of price trends (see Figure 28) show that most commodity prices for raw materials are falling, and therefore one could expect a convergence of price levels and thus an improvement in the competitive situation affecting the food industry. (This also reflects the global trend which has already been illustrated by the producer price index). The development of prices for grain, raw milk, fruit, and potatoes was particularly strong; only in the case of fresh vegetables was a rising price trend observed.

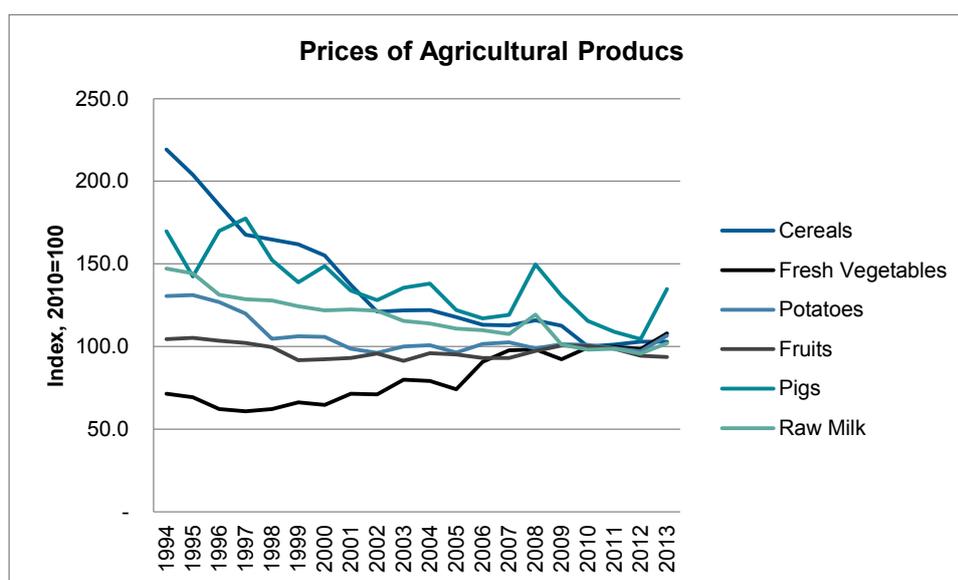


Figure 28: Development of producer prices (author's own illustration based on data from the Index of Prices of Agricultural Products, 2014, Swiss Federal Statistical Office)

The poorer competitive position of Swiss companies on account of higher prices for raw materials compared with other EU countries was cushioned by the conclusion of bilateral agreements which introduced a so-called balance mechanism. When using domestically-produced, agricultural raw materials for subsequent export of the finished product, the price difference of the raw materials between the domestic and foreign market would be refunded. This mechanism was anchored in what became known colloquially as the "chocolate law". However, on 19 December 2015, the WTO agreed to a ban on all forms of export subsidies, affecting Swiss export subsidies for agricultural products processing according to the "chocolate law".

2.3.3. Development of Raw Material Imports

How have raw material imports developed over time? Figure 29 shows that imports relevant to food production have increased by approximately 20% over the past 15 years. The export of raw materials has, however, remained virtually unchanged. Accordingly, the dependence of the Swiss food industry on foreign raw materials has increased, while at the processed products level it has become a small net exporter.

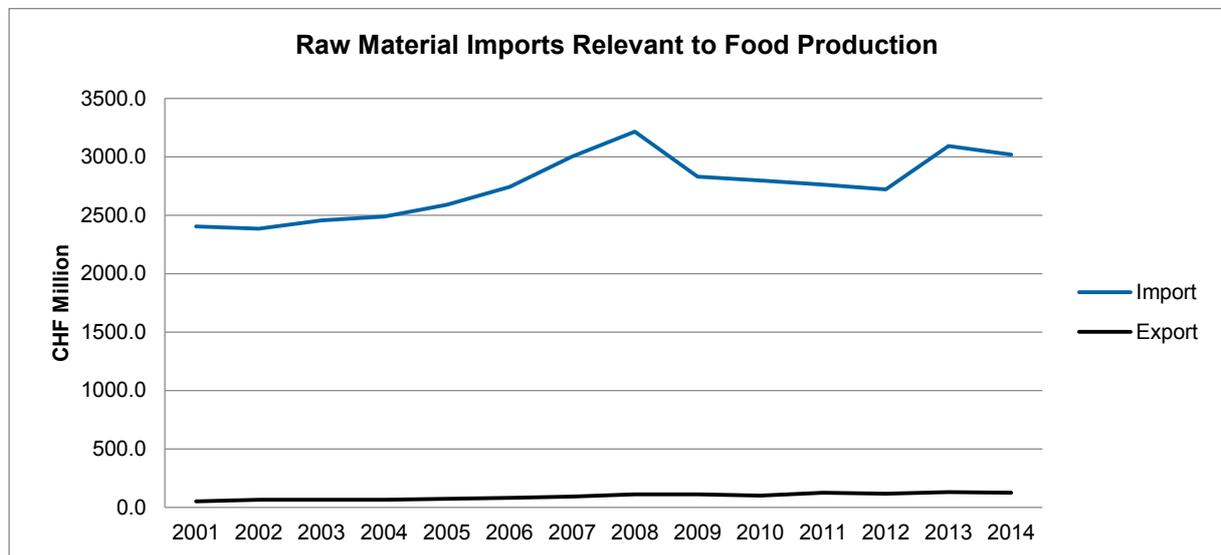


Figure 29: Imports and exports of raw materials for food production (data source: Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-IMPEX, July 2015)

Figure 30 shows the development of raw material imports over time. Coffee imports grew particularly strongly, which is consistent with the development of the industry towards being an exporter of processed coffee products. Furthermore, the import of vegetables and fruit also rose slightly. The import of fish and cereals, however, remained unchanged. The interim increase of prices for key raw materials during the years 2006-2009 can also be seen in the graph.²⁵

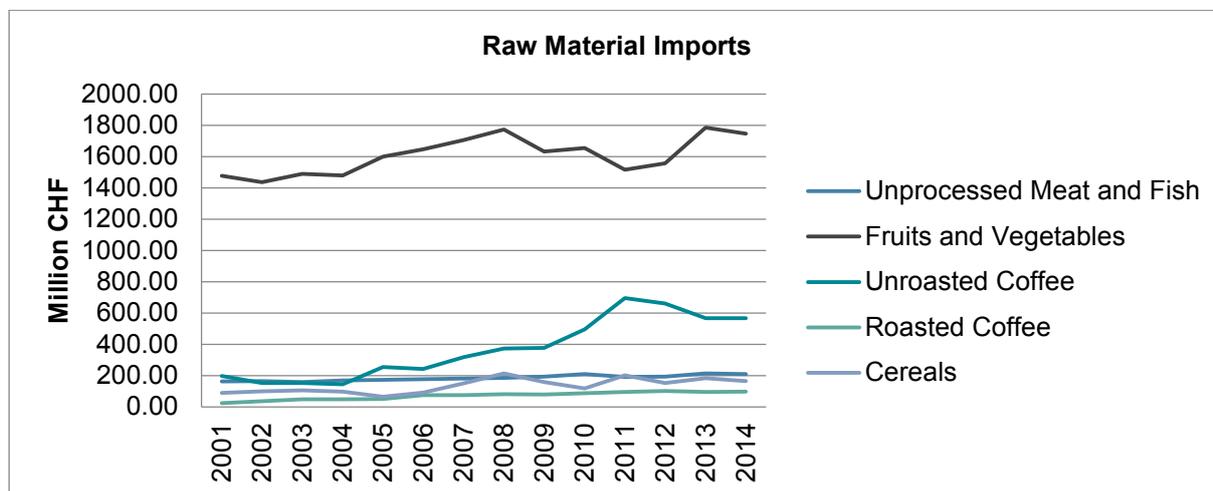


Figure 30: Development of raw material imports (data source: Foreign Trade Statistics, Swiss Federal Statistical Office, retrieved from Swiss-IMPEX, July 2015)

²⁵ For a more detailed description of the causes of the increase in the price of natural raw materials on international markets, see Bretschger et al. (2010).

3. Nutritional Habits, Trends, and Key Technologies

The following section provides an outlook on the development prospects for the food industry. The following questions are addressed:

- How have the nutritional habits of consumers changed?
- What were the driving forces behind these changes?
- How will these develop in the future and thereby affect the market for food? What trends can be identified here?
- What technologies will change the market for food in the medium term?

3.1. NUTRITIONAL HABITS AND THE FORCES DRIVING THEM

Today's eating behavior has changed significantly. In winter, people no longer need to rely on a limited selection of vegetables, fruit or preserved products, but may choose from international products that are available in supermarkets throughout the year (Regmi 2001).

Many factors caused the changes in eating behavior. Among them are the increase in income per capita, trade liberalization, improvements in transportation, greater ethnic diversity, and changes in working practices to include a greater proportion of the women who previously undertook food preparation (cf. Kearny 2010).

Among the many factors that have contributed to these changes in eating habits, the increase in per capita income in recent decades is the most important single factor. The influence of income on eating habits is best seen from a comparison of diets in industrialized nations and in developing countries (Regmi 2001).

Figure 31 shows that in some industrialized nations (such as the U.S.), the proportion of meat consumed is significantly higher than in countries with a lower standard of living (e.g., Kenya and the Philippines). In turn, the consumption of cereals is significantly reduced.

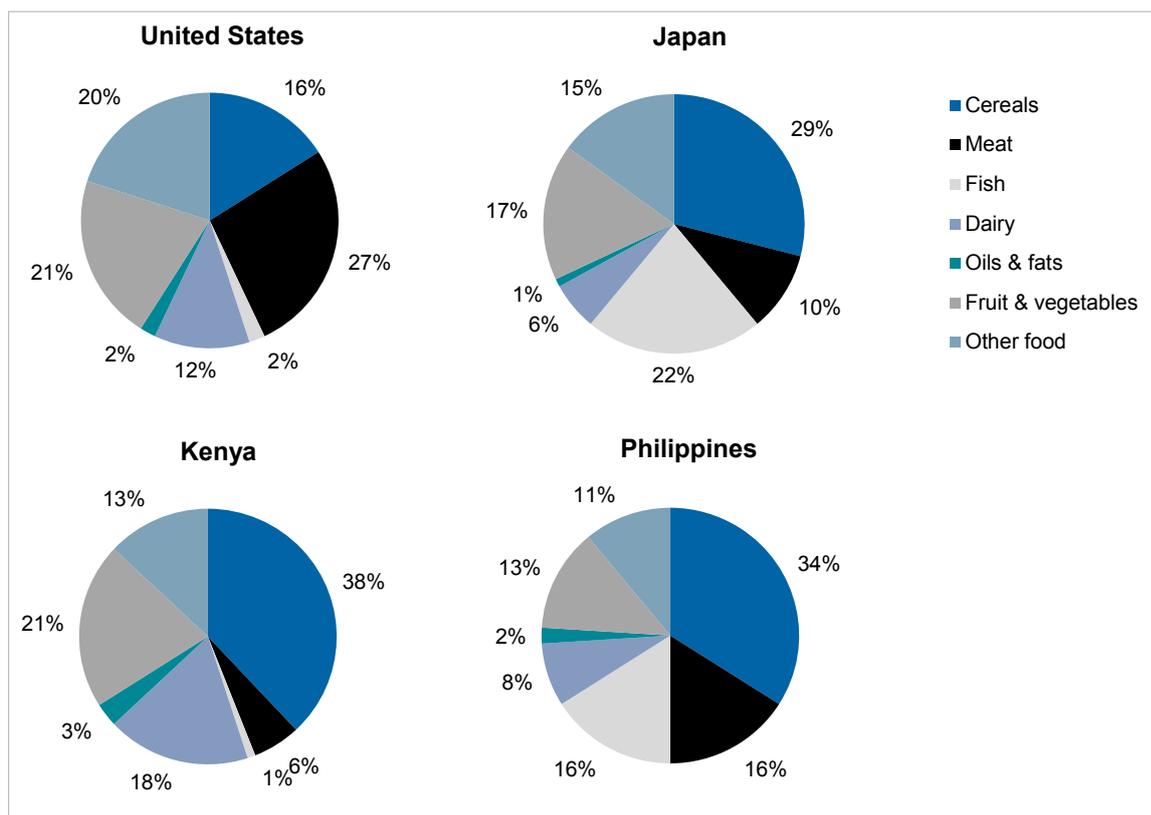


Figure 31: Global consumption patterns (proportion of individual foods in the total food budget) (data source: The World Bank, 1996)

An increase in income together with corresponding changes in nutritional habits also correlates strongly with migration from the countryside to the city (Regmi and Dyck, 2001). The rural population produces and consumes its own food. That means that there is very little trade in food, and any choice is limited to that which can be cultivated locally. As a consequence, the majority of foods consumed in the country are energy-rich and high-carbohydrate products which are self-cultivated, such as rice, cereals, root vegetables, and tubers. Participation in the international food trade begins with urbanization: People buy what the supermarket has to offer. A greater product range results in a more diverse food intake. More fruit and vegetables are consumed. Urbanization as witnessed by industrialized nations in the 20th century and also in many emerging countries has consequently led to a higher demand for fruit, vegetables, and meat in particular - at the expense of grain products (Regmi and Dyck 2001).

Income-related access to international food markets also leads to an increased harmonization of food choices. The more internationally connected you are, the sooner you will find the same brands and products on the shelves of grocery stores. One speaks of so-called 'global urban eating patterns' that prevail in all major cities of the world, in part at the expense of the individual identification of a food culture.

As incomes rise among the middle classes, the typical shopping basket does not alter as significantly as it does when joining the ranks of the middle classes. Instead, the products already consumed are replaced by those of a higher quality. Quality is assessed not only on the basis of ingredients, but also takes account of factors such as health benefits, food safety issues, and the demand for ethically responsible production. These preferences among consumers have resulted in industrialized countries making adjustments of food systems. National legislation and processes in the industry enterprises have continuously adapted to rising consumer expectations.

Lastly, age also plays an important role in the determination of nutritional habits. Older people tend to consume greater quantities of fruit and vegetables and are more likely to eat at home. Younger people, however, prefer readily available, processed foods which are not necessarily healthy and are often eaten out of the home. While

an aging population can be observed in industrialized countries, the average age in developing nations is very low (Regmi 2001).

3.1.1.1. A Look into the Future

How is the world evolving and what effect does this have on the food market and its protagonists?

The world's population is increasing in numerical terms. According to United Nations estimates, the figure will have tripled from three billion in 1960 to nearly nine billion inhabitants by 2050 (Figure 32). A large part of this increase will take place in Asia, whose population is expected to quadruple. By 2050, the supply of food will have to increase by around 70% overall, energy by 50%, and water by 40% compared with the situation in 2009 (Food & Drink Europe, 2014). Already now, people are aware of the difficulties arising from a growing world population with limited available acreage and are searching for innovations to make the agricultural sector, among other things, more efficient (see also the section on Trends).

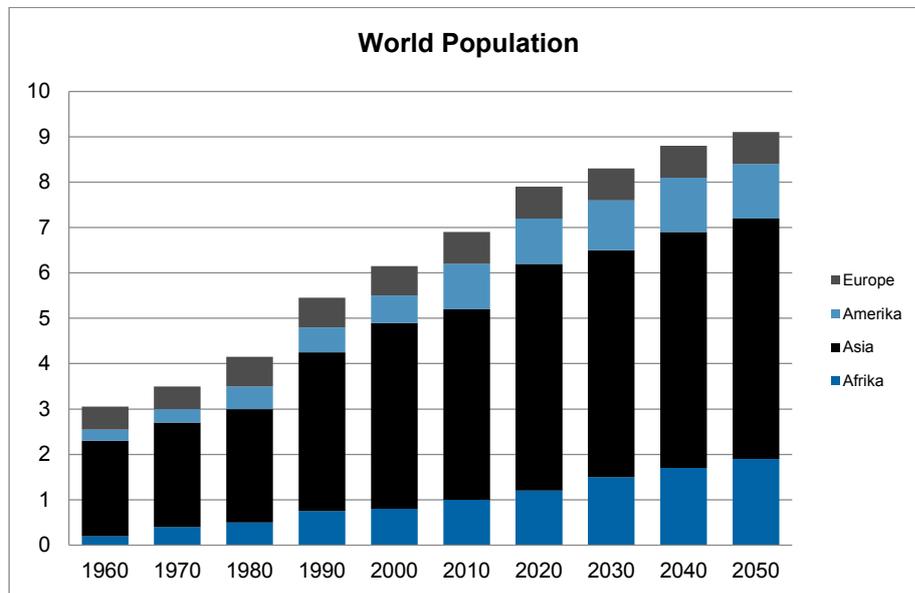


Figure 32: Development of world population (data source: Food Drink Europe, 2014)

With a numerical increase in population, the distribution of income will also change. As Figure 33 shows, in 2030 China will be the largest economy in the world - ahead of the United States and the Eurozone. Correspondingly, the Chinese market share in the international food trade will rise sharply. During the same period, non-OECD countries will have a larger collective GDP than the OECD countries. The proportion of income earned by OECD countries, according to estimates, will be pushed back from just over 60% in 2011 to about 40%.

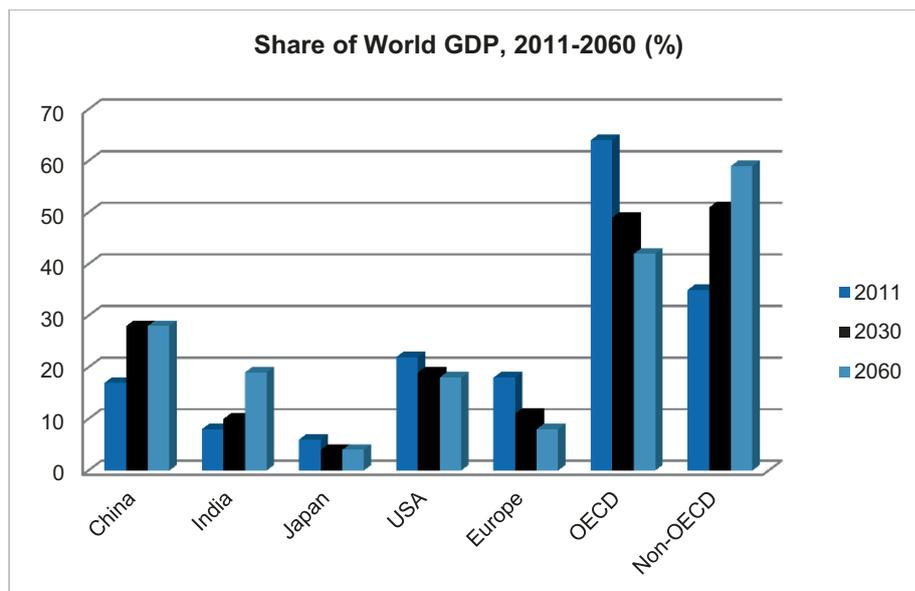


Figure 33: Shifts in GDP (data source: Food Drink Europe, 2014)

As described in the previous section, the shift towards the middle classes has the greatest influence on the composition of the average food basket. Over the next few decades, a strong middle-class growth is to be expected, and this will come mainly from the Asia-Pacific region; their numbers will double from 2.5 billion today to 5 billion by 2030 (see Figure 34). Around 65% of middle-class expenditure will come from Asia while the European middle-class share will fall from almost 40% today to below 20%.

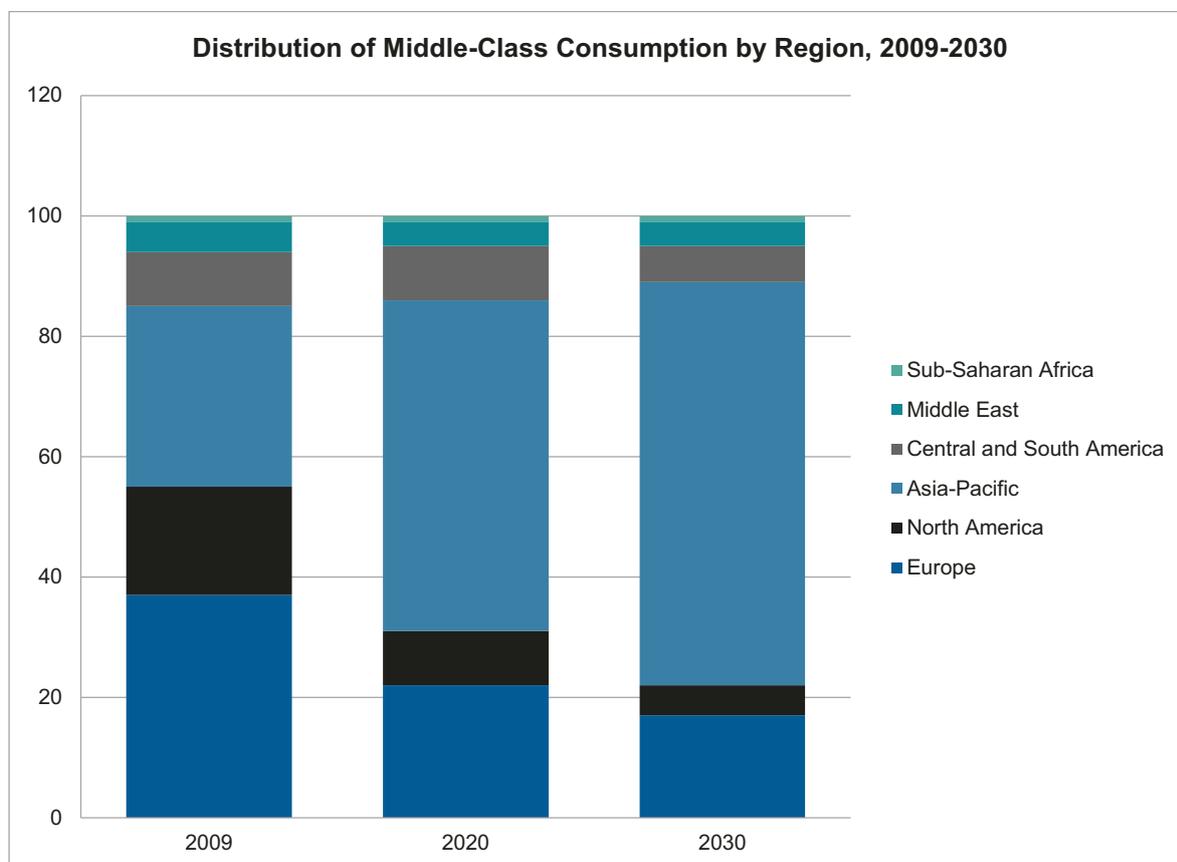


Figure 34: Middle-class consumption (data source: Food Drink Europe, 2014)

Furthermore, life will be primarily urban (Figure 35): While in 2010, worldwide there were already more people living in cities than in rural regions, by 2050 this will have risen to two-thirds of the population. Their number will dramatically increase market demand for food since the urban newcomers will no longer be growing their own. The demand for fruit, vegetables, and meat will also increase substantially, as will the demand for fast food or convenience products (cf. also Kearny 2010).

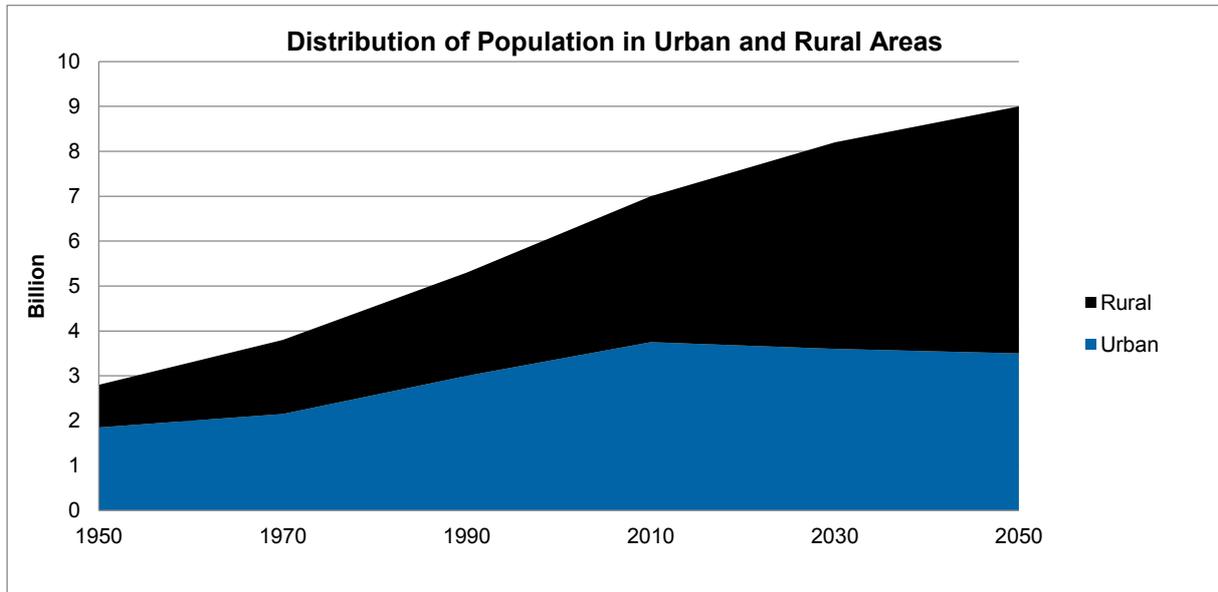


Figure 35: Urban and rural population (data source: Food Drink Europe, 2014)

3.2. TRENDS

Trends in the food industry can be defined as long-term changes in movement and transformation processes within specific food cultures and societies (Rützler, 2015). They have a half-life of about ten years, but can be effective for longer.

Trends can be triggered on the supply side or the demand side. On the demand side, they are caused by changes in the socio-demographic structure of a society or by favorable changes in the economic environment. On the supply side, there are production or process changes that have been made possible by new technologies or other developments, as well as changes to the production potential of a company.

Figure 36 provides a schematic overview of influence factors and trends, which are described briefly in the following sub-sections.

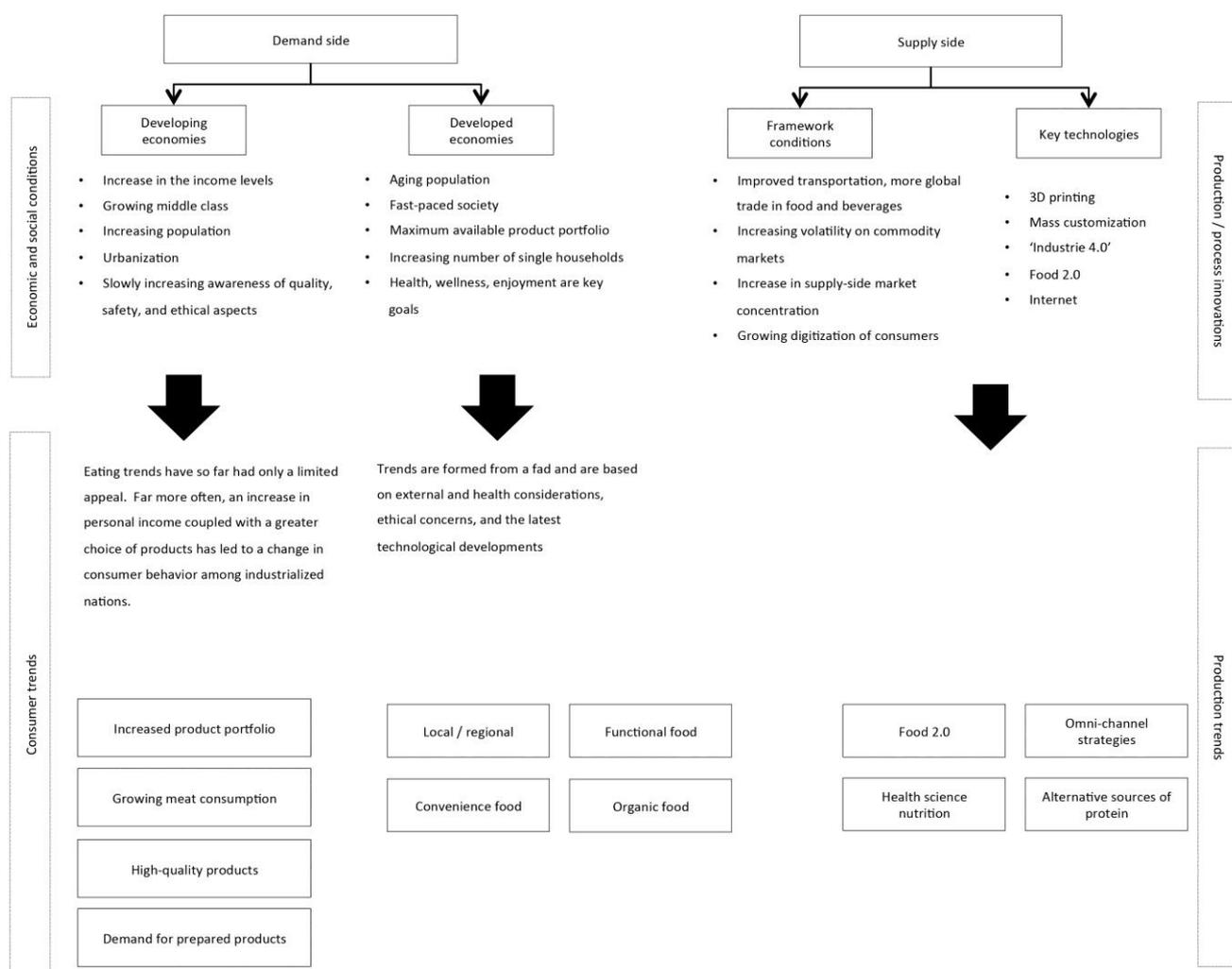


Figure 36: Overview of trends (authors' own diagram based on Chatterjee et al., 2010)

3.2.1. Demand-Side Trends / Consumer Trends

Demand-side trends (consumer trends) are triggered primarily by socio-demographic and economic developments (Chatterjee et al., 2010). Very different basic conditions exist in industrialized countries in comparison with developing nations to account for the differing characteristics of the respective trends.

In industrialized countries, food markets are already saturated. The consumer has a large number of foods to choose from daily with which calorific needs can be easily met on almost any budget. Accordingly, consumer demand can be directed towards goals other than purely financial considerations. As a result, nutritional trends can form in much the same way as fashions in clothing. Food trends are now common in industrialized countries, some of them being driven by health considerations (functional food), ethical concerns (organic or vegan foods), the fast pace of city life (convenience food), and the increasing average age of the population (e.g., fruit and vegetables).

In developing countries, however, food consumption has until now assumed the role of meeting a physical need. With disposable income slowly increasing, the role of food in society is changing as well. The consumer has more freedom of choice about which goods to consume and as the demand for other products increases, so does the availability of what is on offer. Consumer behavior here can be best described by the 'catch-up effect' as it is mainly a case of being able to enjoy the same range of products as industrialized nations. The formation of individual trends has hitherto received little attention. Phenomena already familiar to industrialized nations such as a growing awareness of quality, the desire for a more protein-rich diet, less time spent in food preparation, and, increasingly, ethical considerations are becoming increasingly important to shoppers in these countries.

Table 6 provides an overview of the factors and trends in developing countries and industrialized nations.

Table 6: Influencing factors and trends in the food sector (authors' own representation)

Developing Countries	Industrialized Nations
<ul style="list-style-type: none"> • Increasing population • Young population (median frequently under 20 years) • Urbanization • Rising income levels • Low average calorie intake • Inadequate institutions / poor law enforcement 	<ul style="list-style-type: none"> • Aging society • Increasing health awareness • Growing number of single households • Fast-paced lifestyle, esp. in cities and on weekdays • Caloric intake at full capacity • Return to regional production, rejection of non-transparent supply chains
<ul style="list-style-type: none"> • Growth markets • Increasing quality awareness • Diversification of former eating habits • Increasing awareness of ethical issues, e.g., animal welfare • Increasing importance of food safety • Growing concern about food supply security 	<ul style="list-style-type: none"> • Saturated markets • Coupling of the desire for food intake with other goals, e.g., increased health • Eating for pleasure and as a social event • Strong ethical awareness, sustainable consumption • New products based on the latest technical developments
<ul style="list-style-type: none"> • Meat products • High-quality products • Pre-prepared food / convenience food 	<ul style="list-style-type: none"> • Functional food • Convenience food • Regional vs. international food • Organic / vegan food

3.2.1.1. A Brief Look at Trends in Industrialized Nations

In the industrialized nations, eating habits may be described on the basis of trends such as 'functional food', 'convenience food', 'regional vs. international food', and 'organic/vegan food'. Their evolution has been encouraged by an aging population, increasing urbanization, the growing number of single households, and the increased desire for self-realization (including health, visual appearance, and ethics).

The functional food trend corresponds with the need to combine food intake with other goals such as health or dietary supplementation (Falguera et al 2012). The largest markets for functional foods are currently Japan and the U.S.; in Europe, the trend has not yet fully come into effect (Bigliardi & Galati 2013). For example, it has been suggested that a yogurt not only provides calories, it may also have a positive effect on the intestinal flora. A fish is not only appetizing, but its consumption brings with it some positive health benefits owing to its high Omega-3 fatty acid content (which may help prevent Alzheimer's disease).

Since consumers are willing to pay a higher price for foods which may help them feel, or look, better, it is expected that the food industry will continue to develop these trends. One possible direction is the move towards 'personalized nutrition'; the aim here is to base nutrition on genetic predispositions (similar to personalized medicine). In this area, Nestlé is playing a pioneering role. Consequently, Nestlé is no longer simply a food corporation but also one engaged in healthcare as it conducts research into the development of 'personalized' food.

In contrast to the health-oriented food trends, it can be seen that life - particularly in a professional context - is characterized by a faster pace and, in the private domain, by singles. The number of one-person households has grown rapidly in recent years and the time spent on preparing meals during the week has decreased with each passing year. Accordingly, the trend for 'convenience food' has become more pronounced, with food being made so it is immediately consumable anywhere and at any time.

A vegan diet is understood to exclude all animal products. The development of this food trend may be due to a combination of factors such as increasing ethical concerns about consuming animals or their by-products, health worries, or beauty ideals. It also seems to be a side effect of high, still increasing living standards in industrialized countries, allowing the consumer to use adequate substitutes for nutrients from animal products satisfactorily.

Lastly, it could be the result of a growing tendency to reject products manufactured along an increasingly unclear supply chain. This trend is summarized by the expression 'romance vs. science'. Those who can afford it make their purchases regionally/locally and therefore buy foods which have been grown by farmers rather than in technical production processes by multinational corporations (cf. Hauser et al., 2015). For instance, it is becoming increasingly important for consumers in Switzerland that the food they buy is sourced "close to home" and that it is associated with feelings of "wellbeing, security, and relaxation" (Hauser, 2012, p. 14).

3.2.2. Supply-Side Trends - Key Technologies and Innovations

In addition to the demand-side trends that are influenced by socio-demographic factors and economic conditions, innovative technologies and developments on the supply side are leading to an expansion in production facilities. The largest wave of innovation in the food industry took place in the 1960s and 1970s when the dominant world food conglomerates were founded and the majority of significant products innovations and business model innovations were implemented. Since then, only incremental innovations have been observed in the food market, but this could all soon change.

With the arrival of multiple new enabling technologies, the current innovative standstill could be overcome, and a new revolution in the food industry triggered. In anticipation of this, investment in food-tech startups rose from US\$ 288 million in 2013 to over US\$ 1 billion in 2014 (MIT Technology Review, 2015), signaling a growing interest in innovations within the industry. Food engineering in the context of Food 2.0 trends, genetically modified foods, sustainability, the increasing use of 'big data' along the entire food supply chain, the application possibilities of the 3D printer, and more recently the Internet of Things proclaimed, e.g., by the Industrial Internet, are just some of the trends set to revolutionize the food industry in the near future. These are outlined briefly below.

3.2.2.1. 3D Printer

The 3D printer for food enables the production of foods according to individual wishes, making possible the individualization of mass production and decentralization of production.

The following four areas of application for the 3D printer are conceivable: In industrial production by food manufacturers, in a production-affiliated supermarket, in a commercial kitchen, and by end-consumers themselves. In this regard, the Italian company Barilla has been working on pasta cartridges which enable the production of individualized pasta. Besides Barilla, Google has also announced plans to use a 3D printer for pasta production in its staff restaurants. Some chefs are experimenting with 3D printing, especially for the automated

decoration of plates and creative design (Alimenta 2015a, b). Another example is the production of personalized chocolate products, which shows great potential (cf. KPMG, 2014).

As promising as the technology may sound, the application possibilities and business models are not yet clear. On the one hand, the 3D production process in its present state of development takes more time than the procedures it is designed to replace. For this reason, it will be necessary to find applications that generate additional value through customization and compensate for the higher time requirement. This raises the question of what sensory, tactile, or functional properties these products should have which could not be realized using established methods (Alimenta, 2015a). On the other hand, raw foods present additional difficulties when compared with plastics. The starting materials are non-homogeneous, less defined in their properties, and water-based (Alimenta 2015a).

3.2.2.2. Digitization and Big Data

The latest information technologies with their possibilities for data generation and analysis have an impact on business processes along the entire food value chain. A study by the Gottlieb Duttweiler Institute concludes that the progressive digitization of the entire food sector will change and have an impact on production, purchasing/supply, and out-of-home consumption (Hauser et al., 2015). Digitization allows the latest technologies to measure the buying behavior of customers more closely and coordinate the delivery processes, product development, and production processes accordingly. For example, a Swiss start-up uses mobile data to identify consumer movements in shopping centers and thereby facilitate predictions in terms of sales and profits.

Wal-Mart, one of the largest food retailers in the world, has recognized the potential of such technology and has repositioned itself as the "Internet technology company inside of a retailer" (D'Innocencio, 2013). At innovation labs in the heart of Silicon Valley, research is being conducted into the link between data and business processes.

In addition to the commercial world, big data is increasingly finding uses in the agriculture sector. In every tractor and sprayer supplied by John Deere, built-in wireless communication technologies are used to report the position of the tractor, what it has planted, and much more besides. According to MIT Technology Review (2015), 39% of farmers in America have already indicated that they use sensor-driven technologies which give data feedback on fertilization, irrigation, and stage of plant development.

Together with sensors in the soil and weather forecasts, farmers can now find ways to use water, seeds, and fertilizers more efficiently. Companies such as IBM, Intel, Monsanto, or John Deere hope that more and more farmers will consider data to be as necessary and reliable as the tractor and the seed.

3.2.2.3. Food 2.0

Food 2.0 is the latest gamble by Silicon Valley investors, who have realized that innovative solutions to the food and resource problem come with the promise of high returns (Bradshaw, 2014). Consequently, some startups are currently researching ways to satisfy the growing world hunger for protein using products based on non-animal ingredients. Hampton Creek, a start-up based in Silicon Valley, is often cited as a prime example of the new movement. A generous capital endowment of US\$ 120 million has enabled research into synthetic foodstuffs. In this way, it is now possible to make mayonnaise without eggs and produce steak or liver without ever slaughtering an animal.

Furthermore, projections show that insects are also considerably more efficient concerning the production of greenhouse gases compared with cattle or pigs. As van Huis et al. (2013) showed, the greenhouse gas production of animals traditionally raised for food is a hundred times higher than that of insects typically considered to be edible in the Western world, such as crickets or mealworms.

3.2.2.4. Genetically Modified Foods

A genetically modified food product is a food product made from genetically modified plants, animals, or microorganisms or one which either contains genetically modified food or is produced using a genetically modified food. Genetic modification creates benefits such as pest resistance, nutritional value, or improved shelf-life. On the other hand, it raises significant ethical concerns (cf. Zhu & Xie, 2015). A growing market for GM foods is primarily anticipated in developing countries, in particular, Brazil and China (Kearny, 2010).

3.2.2.5. Industrial Internet

The Industrial Internet concept and the Internet of Things have a shared origin. By changing to Internet Protocol Version 6 (IPv6), it is now possible to generate Internet addresses long enough to ensure that every product, every package, and every relevant object in the production process can be assigned its own Internet address (Alimenta, 2015b).

The Industrial Internet allows for the flexible production and automation of production processes through Internet-based links. The aim is "the intelligent, smart factory which is self-supporting and characterized by versatility, resource efficiency, and ergonomics as well as the involvement of customers and business partners in business and value-added processes" (Alimenta, 2015b). It is expected that this development in the food industry will also lead to greater flexibility in producing efficiency gains.

3.2.2.6. Nanotechnology

Nanotechnology describes the manipulation of materials at the atomic, molecular, and macromolecular level. In the food industry, there are numerous possible applications for this, such as quality control, production technology, functional food, and packaging (Sastry et al., 2013). So it is possible, for example, to enhance flavors or produce lighter and more heat-resistant packaging with the help of nanotechnology (ibid).

3.2.2.7. Sustainability and Corporate Responsibility

Another trend in the food industry is sustainability and corporate responsibility (cf. for the chocolate industry, KPMG, 2014). Corporate responsibility can be defined from a single-operation, strategic point of view as the duty of companies to identify purposefully and systematically those areas of activity in which the assumption of social responsibility supports the goals of the company in making relevant strategic decisions and implementing these on an operational level (Winistörfer et al., 2012; Brand & Winistörfer, forthcoming). Corporate responsibility is increasingly becoming a feature for food manufacturers that is necessary for successful business relationships, e.g., between supplier and customer, and is often used as a selling point when making comparisons with competitors. Many key players in the industry such as Unilever, Nestlé, Mondelez, or Coca-Cola have launched comprehensive sustainability programs and committed themselves to sometimes demanding and specific goals. This concerns both their own production with issues such as energy consumption and greenhouse gas emissions as well as supply chain issues such as sustainable agriculture.

3.3. DRIVERS OF GROWTH

Finally, it is necessary to address briefly those factors which determine the potential of a food market (in an economic context). For this, a formula is used which relies on drivers of turnover for a company.

The starting point when considering these drivers is that market potential is the sum of all the revenue in an industrial sector. The turnover of a company, in turn, is determined by the number of products sold and the price of products. An increase in market potential can take place either through an increase in the amount of food sold or an increase in the price. Figure 37 provides an overview of possible influencing factors on price and quantity.

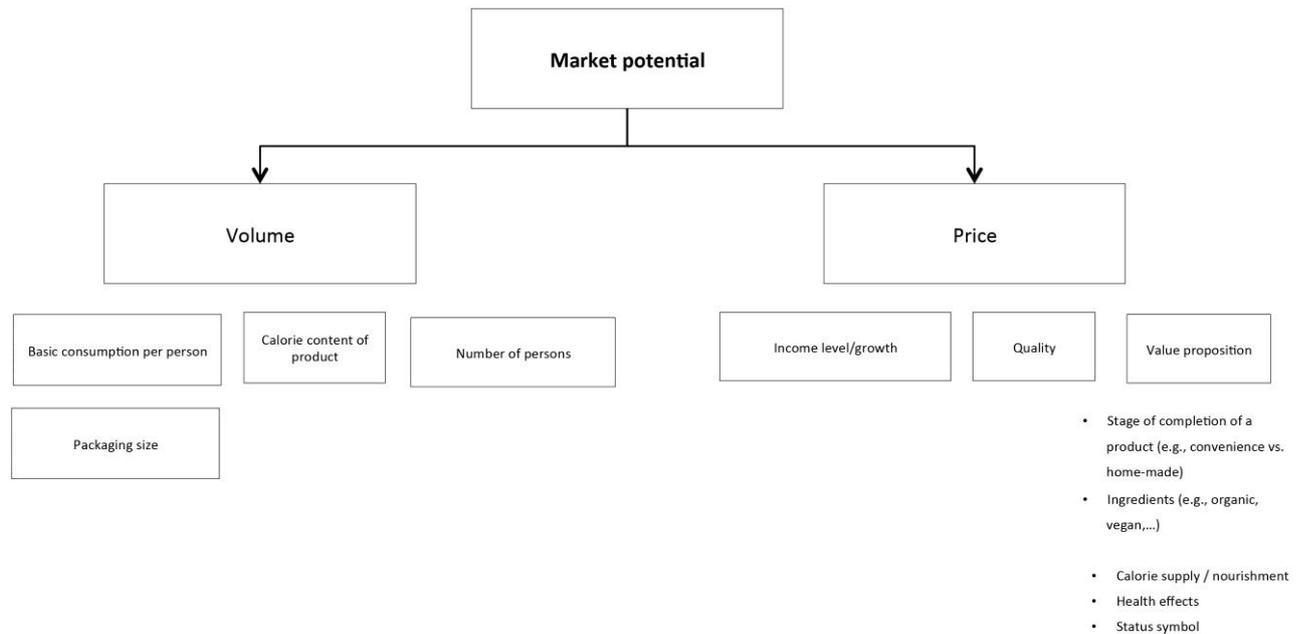


Figure 37: Determinants of market potential (authors' own diagram)

At least three factors influencing the price of food products can be identified. Firstly, the income level of the economy influences the price and therefore a realizable price for a product. The higher the level of personal income, the sooner companies can charge higher prices for their food. In addition, the quality of the product and the value proposition associated with the purchase of the product determine the price achievable. Therefore, products which have a positive impact on health in addition to their primary objective of calorie intake result in a higher willingness to pay among consumers (see 'functional food') and thus influence market potential.

At the same time, the number of foods with sales potential are influenced by at least four factors. On the one hand, the number of people in an economy determines how many products are purchased; if the population increases, more food is sold. On the other hand, the respective basic metabolic rate or the average calorie intake is relevant to the amount of food sold. The higher the average calorie requirement, the more products you can sell.

Figure 38 shows that there is still catch-up potential in developing countries. The average number of calories consumed there is sometimes much lower than in industrialized nations.

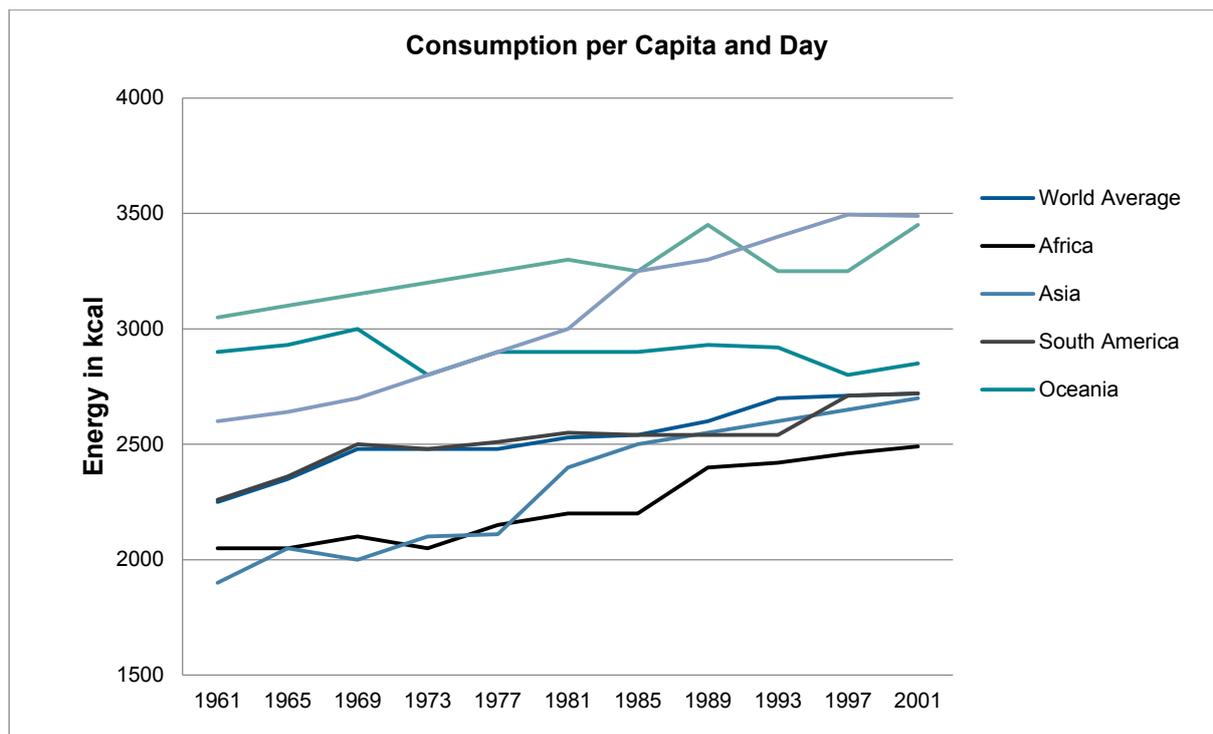


Figure 38: Calorie intake (data source: Jud, 2007)

The third conceivable factor worth noting is the caloric density of the product in question. The fewer calories a product contains, the more products you can sell. 'Light' products are attempts to divide the maximum calorie intake per day into the greatest possible number of products. Lastly, packaging size plays a determining role - the smaller the package size, the higher the number of product units sold.

4. Conclusion

In this study, we have attempted to present and interpret in a condensed form the various sources of data available concerning the Swiss and international food industry. Working with the data has corroborated the importance of the food industry for Switzerland, identified developing trends, and uncovered drivers of change. In subsequent studies, we want to investigate various issues in the food sector in greater detail. The following findings offer scope for further analysis of the food industry:

1. The data available concerning the food industry in Switzerland and the documentation of the corporate landscape are significantly poorer than the European standard. While numerous studies, data, and presentations on the food industry exist in Germany and the EU, in Switzerland there is no source to provide such information in a comparable quality and quantity.
2. The recent export strength of the food industry, which has also brought significant employment in its wake, correlates chronologically with the conclusion of bilateral agreements in the field of processed agricultural products. The effect of the bilateral agreements on industrial growth, and specifically the food industry and its employment, has not yet been quantified.
3. When analyzing the sub-sectors of the food industry, there is a sub-sector which has previously received very little attention, namely the manufacture of plant-based oils and fats. It has demonstrated the third best relative export development - after coffee processing and beverage production - with a five-fold increase in exports since 2001. In addition, the industry has a relatively high market concentration and the second highest turnover per place of work. Despite above-average performance figures, this sub-sector, together with its major players and driving forces has hitherto received too little attention.
4. Although coffee processing in Switzerland has enjoyed very strong added value for a few years, the market for (vocational) education in this sub-sector still appears under-developed. Also, there is no industry association which could be used as a professional exchange platform and for collating information. There is room for improvement in this respect.

Detailed information on the sub-sectors of the food industry is available on request.

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Appendix

I. OVERVIEW OF NOGA NOMENCLATURE

Table 7 gives an overview of the food industry-related sub-sectors examined here. It should be noted that Category 108, 'manufacture of other food products', is a collective category comprising seven other industry sectors. However, since several important products are made here for the Swiss market, Category 108 has been made more detailed; i.e., insofar as data availability allows - the respective sub-categories are shown. The NOGA sub-sectors reflect the most important food categories.

Table 7: Sub-sectors in the food industry (see also Swiss Federal Statistical Office, 2008, and Aepli, 2011)

NOGA Codes	Value creation process within the food industry	Category in the household budget survey
101 Processing of meat	Processing of raw meat to make dried, salted, or smoked meat, or meat products (sausages, etc.)	Meat
102 Processing of fish	Processing of raw fish through preparation and conservation, or manufacture of fish meal.	Fish
103 Processing of fruit and vegetables	Potato processing (incl. potato snacks and chips), production of fruit and vegetable juices, production of food made from fruit or vegetables (e.g., jams, preserves, nuts, salads and mixed salads)	Fruit Vegetables
104 Manufacture of vegetable and animal oils and fats	Manufacture of crude and refined oils and fats of vegetable or animal origin (e.g., margarine, edible fats)	Cooking fats and oils
105 Manufacture of dairy products	Manufacture of fresh dairy products, cheese, ice cream, milk powder, canned milk, condensed milk	Milk, cheese, eggs
106 Manufacture of grain mill products, starches, and starch products	First-stage in the production of bread and pasta. Grinding of grain/cleaning and polishing of rice, manufacture of flour mixtures	Bread and cereal products
107 Manufacture of bakery and farinaceous products	Secondary processing stage. Includes baked goods, so-called long-life bakery products (pastries, biscuits, waffles), and pasta.	Bread and cereal products
108 Manufacture of other food products	Production of sugar and confectionery, ready meals, coffee, tea, and spices	

1081 Manufacture of sugar	First-stage processing in the production of foods and beverages containing sugar: Production and refining of sugar	Sugar, confectionery incl. chocolate
1082 Manufacture of sugar confectionery	Secondary processing stage in the preparation of confectionery: Cocoa and chocolate products, sugar confectionery (e.g., candy, caramels, chewing gum)	Sugar, confectionery incl. chocolate
1083 Processing of tea and coffee, manufacture of coffee substitutes	Decaffeination and roasting of coffee and coffee substitutes,	Coffee, tea, cocoa
1084 Manufacture of condiments and seasonings	e.g., mayonnaise, mustard flour, prepared mustard	Sauces, salt, spices, and other foods
1085 Manufacture of prepared meals and dishes	Dishes that have been preserved through processing (e.g., freezing or canning)	Sauces, salt, spices, and other foods
1086 Manufacture of homogenized food preparations and dietetic food	Foods for particular nutritional uses, e.g., baby foods, gluten-free foods, foods for diabetics	Sauces, salt, spices, and other foods
1089 Manufacture of other food products n.e.c.	Various foods such as soups and broths, perishable convenience food (e.g., sandwiches, pizza), egg products, dietary supplements	Sauces, salt, spices, and other foods
1107 Manufacture of soft drinks; production of mineral waters and other bottled waters	Beverages, sweetened and flavored drinks	Mineral water, soft drinks, and juices

II. DATA SOURCES AND BASES OF CALCULATION

Foreign Trade

Foreign trade data was collected from foreign trade statistics. However, these figures cannot be reconciled directly with turnover since the foreign trade goods and trade statistics ("Impex") are categorized by means of so-called tariff numbers while VAT statistics are based on the NOGA codes. NOGA codes and tariff numbers are not compatible but this study attempts to relate the figures to one another. Anomalies in the data presented here, compared to other studies, may be due to self-imposed conversion.

End-Consumption

Statistics on the consumption of food in Switzerland are generated with the help of the Household Budget Survey 2013. The data indicates the average monthly spending profile of a household. The data includes expenditure on food for home consumption, which are differentiated according to the main categories. In addition, figures covering the amount of expenditure on consumption away from home (restaurants, canteens, etc.) are included here although they are not specific as to the actual food consumed. From the data concerning household expenditure, it is possible to estimate the market volume for food in Switzerland.

VAT Statistics

VAT statistics were used for the presentation of sales-related figures and analysis of the number of places of work per sub-sector. This data source which identifies the information based on the NOGA codes is the only original source for sale figures about the food industry in Switzerland. However, it is inaccurate in two respects, thereby making analysis difficult:

1. The turnover generated by large food companies is possibly associated with only one NOGA code. However, it may happen for accounting purposes that the turnover of a large conglomerate is recorded under just one NOGA category even though different products are manufactured which would otherwise be assigned to other NOGA categories. This leads to inaccuracies in the analysis of turnover by sub-sector. After reviewing the data, it is obvious that the majority of large corporations such as Nestlé, Unilever, Bischofszell Food, Hochdorf Holding AG, etc., are placed under 'other foods, not elsewhere classified (1081; 1089)' even if the foodstuffs produced by those companies have almost nothing to do with the description of the products under this code. Table 8 gives an estimate of the accuracy of the data as it was perceived during the course of the research.

Table 8: VAT statistics and their accuracy

Inconspicuous categories:	Data from the following categories should be interpreted with care:
<ul style="list-style-type: none"> • 101 Meat • 102 Fish • 104 Fats and oils • 105 Manufacture of dairy products • 106 Grains and mill products • 107 Baked goods and pasta • 1082 Confectionery 	<ul style="list-style-type: none"> • 103 Vegetable and fruit: Zweifel potato chips are assigned to Category 1089. Zweifel is the largest potato chip manufacturer in Switzerland. • 1081 Manufacture of sugar: This is reported together with 1089. No possibility to obtain data about sugar production separately. • 1083 Coffee: Sales of Nespresso and Delicat are recorded under 1089. Sales in Category 1083 are too low to reflect the actual turnover of coffee processors • 1085 Ready meals & 1086 Homogenized and dietary foods: Companies in these categories are frequently assigned to 1089 (Hochdorf, Bischofszell Food) • 1089: Other food products n.e.c.: Distorted by the fact that many conglomerates are classified here.

2. VAT statistics used in this study may only provide reliable information on domestic turnover: Reported sales figures include foreign to foreign sales, exports and financial profit, and therefore overestimate turnover associated with production in Switzerland. To get an indication of the turnover arising from consumption in Switzerland and respective exports, the following method was selected: *Taxable transactions* were used as an indicator of *domestic turnover* and then added to the *exports* according to *foreign trade statistics*.

Table 9 combines the key indicators and the underlying data in one format.

Table 9: Overview of data and calculation

Indicator	Remarks	Source
Turnover	Taxable transactions plus exports	VAT Statistics 2012 Foreign Trade Statistics
Domestic market turnover	Taxable transactions	VAT Statistics 2012
Market volume	<ul style="list-style-type: none"> - End-consumer stage: See end-consumption - Industry level: Domestic transactions plus imports 	
End-consumption	Projection based on the average monthly household budget spend	Household Budget Survey 2013 Swiss Federal Statistical Office for the number of households
Import / export	Information	Foreign trade statistics (Impex) and authors' own calculations
Turnover per working place	Turnover divided by number of working places	Statistics of Corporate Structures, STATENT, 2013, Swiss Federal Statistical Office
Employment		Employment Statistics, BESTA, Swiss Federal Statistical Office
All other data		OECD (2015), Credit Suisse (2015a, 2015b)

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