International Food and Agribusiness Management Review
Volume 24, Issue 1, 2021; DOI: 10.22434/IFAMR2019.0176

16 November 2018 / Accepted: 8 July 2020

Future and recent developments in the retail vegetable category – a value chain and food systems approach

RESEARCH ARTICLE

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Abstract

In this study, the value chain perspective was combined with a food systems approach to assess food system responses in the value chain and external drivers from environmental and socioeconomic perspectives. The research object was the Swedish value chain for vegetables, with the aim of providing a comprehensive picture of current trends and drivers and identifying future developments important for vegetable growers, producer organizations, wholesalers and retailers. The empirical data is based on in-depth interviews with key-decision makers in the Swedish value chain, constituting a single case. The point of departure is that key actors in this chain, from producer organizations to retailers, can provide a comprehensive picture on the category's past development and future directions. A combined food systems and value chain approach has been applied. Drivers and chain responses have been identified and categorized into six main categories related to: (1) health; (2) consumer interest for food and variation; (3) convenience; (4) origin; (5) sustainability; and (6) urbanization. Value chain responses and future challenges as well as aspects on value chain dynamics and sustainability issues in the food system are presented and discussed.

Keywords: value chain, food systems, trends, vegetables, retail
JEL code: M30, L22

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1. Introduction

The vegetable category in food retail is changing rapidly, with the introduction of new varieties of vegetables and innovative convenience products such as fresh mixed vegetables and ready meals. This is accompanied by increased consumer interest in taste and quality, local production, sustainability, health issues and novelty. Over time, these changes are manifested as 'food trends' that may derive from external drivers such as socioeconomic or environmental factors. These changes affect the value chain actors in the food system in different ways (Bokelmann and Adamseged, 2016). Studying market trends is one way to identify changing consumer demands and gain knowledge of market development and corresponding value chain activities to meet these demands. Actors in the value chain must respond to them in order to maintain competitiveness.

General trends in food choices have been identified as: health concerns, convenience and process characteristics related to e.g. organic production, local production, animal welfare and sustainability (Grunert, 2013). A more recent review of the literature identified the trends of health, sustainability, authenticity and convenience (Grunert, 2017a). However, as pointed out by Grunert (2013), these can be regarded as indicators of changes in what people eat, rather than providing evidence for the trends themselves, as longitudinal data are often lacking. Previous research has mainly focused on only one or a few trends and their drivers. For specific retail categories, such as vegetables, systematic exploration is needed to understand market development and future practice. Although national statistics and various surveys on vegetable consumption and consumer behaviors provide empirical evidence for some of these trends, the data normally do not specify sales of e.g. different varieties, product sizes, ripening stage or type of packaging. Further, detailed retail sales statistics are not openly available due to competition issues. Thus, insights on these changes must be identified in other ways than through existing data.

In this study, the value chain perspective was combined with a food systems approach to assess value chain responses to external drivers from environmental and socioeconomic perspectives. By combining the two approaches, influences from outside the value chain can be explained through the food system lens. The research object was the Swedish value chain for vegetables, with the aim of providing a comprehensive picture of current trends and drivers for the category and identifying future developments important for vegetable growers, producer organizations, wholesalers and retailers. This could facilitate more effective and efficient management of innovation and development, marketing and strategic decision making. It could also provide insights on external drivers affecting the food system as a whole.

2. A value chain and food systems perspective

A value chain commonly refers to actors conducting activities in a network to respond to consumer demands (Donovan *et al.*, 2015; Gereffi and Kaplinsky, 2001). Walters and Lancaster (2000) proposed the definition of a value chain as a business system creating end-user satisfaction (i.e. value), realizing system stakeholders' objectives of maximizing value creation. In food and agriculture, concepts such as food value chains (e.g. FAO, 2014), or food supply chains (e.g. Mena and Stevens, 2010) are often used for describing the chain of activities along a line of actors from farm to fork. However, as pointed out by Sobal *et al.* (1998), there is a limitation with these ordered and linear food chain models, in that they lack consideration of influences from outside the chain. A food systems approach could better explain the interactions with external drivers. A general definition of a food system is that it encompasses the entire range of actors and their activities and relates them to the broader economic, societal and natural environments in which they are embedded (FAO, 2018).

One model that has been used for studying multiple interactions of food systems in the perspective of e.g. global environmental change and for evaluating societal outcomes of these interactions is the 'food systems approach' (Ericksen, 2008; Ingram, 2011). This approach can be useful for integrating analyses of food system activities corresponding with the value chain (i.e. producing, sourcing, processing, packaging, trading and consuming food), and their effect on system outcomes, such as stability of access, utilization and availability

of food and impact on social and environmental welfare (Ingram, 2011). As shown in Figure 1, outcomes from the food system in turn provide feedback for external drivers, which generally comprise socioeconomic and environmental drivers (Ericksen, 2008). Thus, one of the complexities of food systems is that they for example are affected by, and are drivers of, global environmental change (Ericksen, 2008). However, there are other categorizations of food system drivers, reflecting different approaches in describing these. Bené *et al.* (2019) categorized food system drivers into: (1) consumption/demand drivers (e.g. urbanization, demography, incomes); (2) production/supply drivers (e.g. technology, climate change, infrastructure); and (3) distribution/trade drivers (e.g. internationalization, food safety concerns, trade policy). These drivers influence the food system and over time lead to transformation of the system through e.g. changing demand, production and trade (ibid.). These, often gradual, changes in supply and demand may be identified as 'food trends', Accordingly, they may be interpreted as demonstrating food system transformation in practice, influenced by a range of external drivers.

Food systems analysis has been applied particularly for issues relating to food security (Ericksen, 2014; Ingram *et al.*, 2016), and environmental impacts, e.g. in life cycle analysis (Ingram *et al.*, 2016; Westhoek *et al.*, 2016). There has been less focus on the consumer side and on interrelations between external drivers putting pressure on food system activities, resulting in changes in consumer demand. However, there is a growing understanding that food systems not only affect how and where food is produced, but also influence consumer eating habits and diets (Westhoek *et al.*, 2014). Vermeulen *et al.* (2012) listed demand-side drivers influencing the food system, such as population growth, shifting patterns of consumption, urbanization and income distribution.

Food systems analysis can be combined with value chain analysis, as done by e.g. Graef *et al.* (2014) and in a study on a horticultural innovation system by Bokelmann *et al.* (2016). The combined value chain and food systems framework is illustrated in Figure 1, where 'Food system activities' are activities and responses to various drivers experienced by value chain actors. 'Food trends' are shaped by external drivers (e.g. social, economic and environmental) and manifested through consumption changes and responses by value chain actors. These responses in turn generate new outcomes (e.g. healthier food, less climate impact, better access and availability to food), which affect the external drivers, closing the loop. Ericksen's (2008) model also assumes that different system drivers may interact in various ways.

Using the combined food system-value chain framework, external drivers in the food systems model can be identified, since trends in food consumption and food retailing reflect changes in demand and responses to these. Further, analysis based on the framework can reveal how actors in the supply chain adapt to system drivers through e.g. changing production, product development, sourcing, management practices, marketing and communication, distribution and logistics system. The responses may differ within the value chain, depending on the position of actor/s and the dynamics between them. In the present analysis, system drivers were categorized according to Ericksen's original model and a delimitation was made to value chain activities and their external food system drivers. Specific food system outcomes from changes in practices were not analyzed in detail (e.g. through life-cycle analysis or by assessing consumers' nutritional intake), as this was outside the scope of the study.

3. The Swedish vegetable market and food retail structure

Total sales in the Swedish food retail sector amounted to approximately 26 billion Euro in 2017 (Market, 2018), of which the vegetable category comprised 2.6 billion Euro (3.5% increase over 2016, 1.2% increase in volume). Swedish per capita consumption of fresh vegetables increased from approximately 15 kg/person/year since the 1960s to 47.1 kg in 2015, while fresh potato consumption decreased from ~90 to 45 kg/person/year and consumption of other root crops and tubers increased moderately from 8 to 13 kg/person/year (Swedish Board of Agriculture, 2018).

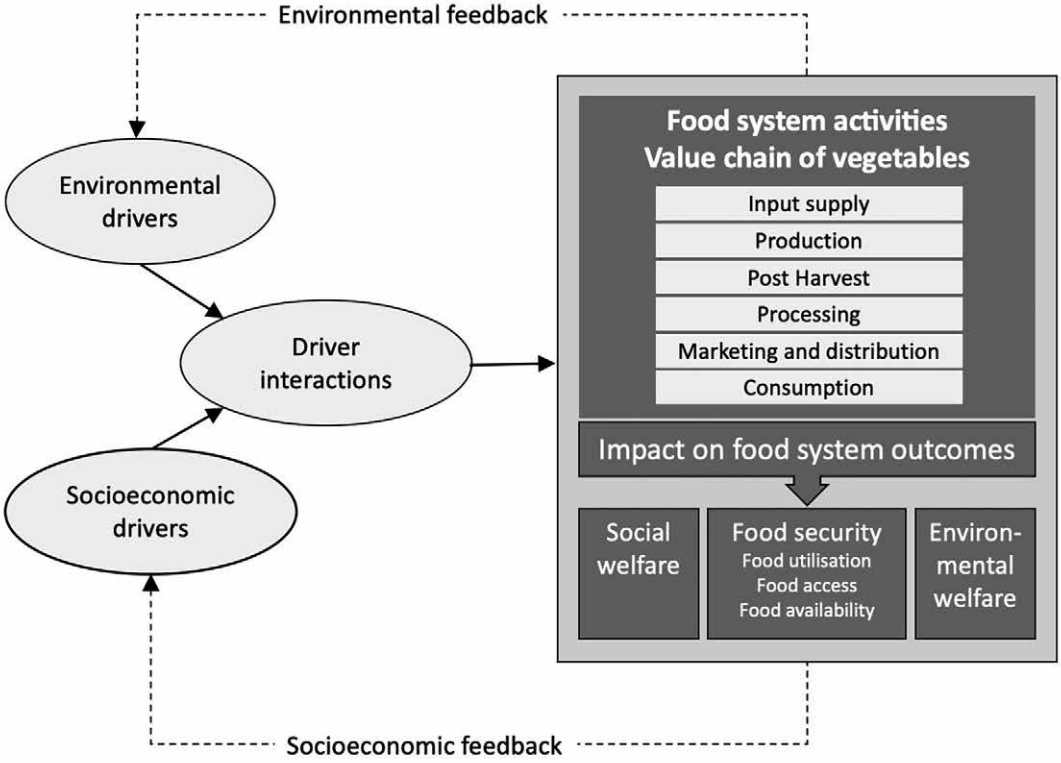

Figure 1. Overview of the combined value chain and food systems framework. Based on Ericksen (2008), Ingram (2011) and Bokelmann *et al.* (2016).

Vegetable production in Sweden is almost solely intended for domestic consumption. Total production area is 8,311 hectares and involves 816 producers. The main vegetables produced are carrots, onion, lettuce, beetroot and brassicas (e.g. cauliflower, cabbage, broccoli), representing 75% of total production area (Statistics Sweden, 2019). Around half the domestic supply of vegetables is channeled through one of four co-operative producer organizations (Sydgrönt, Svenska Odlarlaget, Mellansvenska odlare i förening (MOEK) and Grönsaksmästarna). Producers outside these organizations can sell their produce through wholesalers or directly to retailer chains or individual stores, but from the retailers' view preferably through their integrated wholesalers.

The Swedish food retail market is highly concentrated to four large supermarket chains. Sales statistics for 2018 (DLF *et al.*, 2019) show that the largest, ICA group, has nearly 52% market share, with supermarket formats from small convenience stores to hypermarkets. The co-operative group (COOP) has 17% market share, with stores ranging from small convenience stores to large hypermarkets. Axfood has 18% market share (supermarket chain and discount hypermarket). Bergendahls has 7% market share, mainly hypermarket format. The German hard discount chain Lidl has 5% market share and Netto (a Danish discounter acquired by COOP in 2019) has 2%. The online Swedish food market represented a mere 2% of the total in 2017, compared with 7.5% in Great Britain and 20% in South Korea (Svensk Handel, 2018). Linas matkasse (0.2% of total market) and Mathem.se (0.4%) are the largest specialized online retailers. The established retailers have their own online formats. Around 4% of food sales (2010 data) occur outside the large-scale retail system, in independent convenience stores, ethnic food stores, food markets, independent box schemes, etc. (Statistics Sweden, 2011). The ICA group and Axfood have fully integrated fruit and vegetable wholesalers. COOP and Bergendahls use an independent wholesaler (Everfresh group), a subsidiary of an international actor (Total Produce). There are some smaller wholesalers supplying individual stores. As in Sweden, the

food retail market is increasingly being concentrated to a few large actors in other countries (Sexton and Xia, 2018).

The large-scale value chain for vegetables in Sweden is thus concentrated to 15 main players, who tentatively possess key information on the current state of the vegetable market and drivers of change. On retailer level, information from supermarket category managers and sales data are aggregated centrally. Sales forecasts, marketing strategies and central ordering from suppliers are made by accessing internal longitudinal data on category development. Wholesalers, working as mediators between producers and supermarket chains, but often vertically integrated with the retail chain, manage product ranges and marketing activities for their buyers. Key decision makers at wholesaler level have knowledge of sales development, demand, trends and future demand through contact with several buyers. Produce is likely to be channeled through one of the main producer organizations, which have knowledge of drivers affecting demand for their produce through contacts with wholesalers, supermarket chains and individual store managers, but also through other sales channels and marketing activities (e.g. consumer contacts and market research). In-store managers of the fruit and vegetable section (all main retailers) have direct interactions with consumers, knowledge of the products sold and more direct information on the direction of change, based on observations made in-store.

4. Material and methods

The Swedish vegetable supply chain was analyzed as a single case following methodology described by Yin (2008), using the value chain as the unit of analysis. The value chain was restricted to producer organizations (4 actors), wholesalers (4), retail chains (5) and on-line retailers (2). Empirical material was obtained through in-depth interviews with key decision makers among these actors.

4.1 Participants and procedure

A total of 16 key decision makers were selected for in-depth interviews (at executive director or managing director level in retail), sometimes representing several actors (the fully integrated retail wholesalers). These included seven key decision makers from the main food retailer chains (ICA, Axfood, COOP, Bergendahls, Lidl), some of which also act as wholesalers (ICA, Axfood). Two additional wholesaler managers were interviewed (Everfresh, Greenfood Retail Sourcing), and five managing directors/sales directors responsible for the four producer cooperatives (SydGrönt, Svenska Odlarlaget, MOEK, Grönsaksmästarna). Individuals from two internet retailers (Linas Matkasse, Mathem) were also interviewed.

The interviews lasted 1-2 hours and followed a semi-structured interview guide, with mainly open-ended questions. They were conducted by one researcher and one business advisor from a collaborating advisory service organization. The questionnaire, which covered recent development and drivers in vegetable retail and possible future scenarios, was developed together with representatives from the Swedish University of Agricultural Sciences, a farm advisory service organization (LRF Konsult) and the Sydgrönt producer cooperatives. Background material used for questionnaire development included information on category development and 'food trends' taken from different sources (e.g. market consultancy firms and company reports). The final interview guide (Supplementary Material) was tested on two representatives from a producer organization. Questions were divided into seven thematic sections:

1. Trends and drivers for category development (drivers)
2. General development of the vegetable category (background)
3. Changes in how vegetables are sold (e.g. packaging, convenience products, changed sales practices) (responses)
4. Predictions on future sales (drivers, responses)
5. Role of packaging in sales and category development (drivers, responses)
6. The future of convenience products (drivers, responses)
7. Strongest drivers for the future (drivers)

The sections on packaging and convenience products were added to reflect recent increases in sales of packaged vegetables and convenience products.

In addition, 20 vegetable department managers at store level were interviewed (nine from ICA, two from COOP, five from Axfood, three from Bergendahls and one from Lidl) by a research assistant using the same questions, but with no deeper follow-up questions. These interviews normally took 20-30 minutes, due to time constraints for in-store managers, and were recorded as informal notes immediately after each interview, as full recording was not always possible within-store. These interviews were aimed at gathering data on managers' views of current trends, changes in sales, store responses to market development and changes in-store.

4.2 Data analysis

The 16 full interviews were transcribed, and the content was subjected to thematic analysis (Boyatzis, 1998; Knight *et al.*, 2007). This followed the steps described by Seidel and Kelle (1995), including noting relevant phenomena, collecting examples of these and analyzing them in order to find commonalities, differences, patterns and structures. Themes were coded using NVivo qualitative data analysis software (QSR International Pty Ltd. Version 12, Melbourne, Australia). Coding initially followed thematic sections 1-7, but new themes and sub-themes evolved during the analysis (Supplementary Material). Given the exploratory character of the study, not all themes were anticipated. The analysis was primarily based on the coding of trends and drivers for the vegetable category and actors' responses (activities) and on contrasting different views in the value chain (value chain dynamics). The shorter interviews with vegetable department managers were analyzed separately, adhering to the main themes. All quotes given are anonymized, at the interviewees' request, and only refer to the stage of the chain where the respondent is located, so that they cannot be traced to a certain actor. The interviewees were sent a preliminary report on the findings, to allow them to correct misunderstandings or add new information.

5. Results and discussion

The results generally indicated that the vegetable category is increasing in volume and value, confirming consumption statistics (Swedish Board of Agriculture, 2018). All respondents stated that the retail vegetable category is growing and will continue to grow. Annual sales growth based on volume was an estimated 3-10% and growth in value somewhere higher. Increased sales of convenience products, consumer interest in more expensive varieties (e.g. cherry tomatoes instead of standard tomatoes) and increasing demand for organic produce were cited as the main reasons for value increasing faster than volume sold. In-store vegetable department managers reported that customer interest in vegetables has increased in recent years. Investments have been made to increase sales, by expanding the area of the fruit and vegetable department in stores, widening the range available and, in particular, installing chill cabinets for displaying sensitive products.

5.1 Trends and drivers affecting development of the vegetable category and chain responses

Several trends and drivers influencing the development of the retail vegetable category were identified through the interviews. For analysis, these were bundled into six major categories, some encompassing several drivers: (1) health (vegetarianism, organic food); (2) increased interest in food, variation and special qualities; (3) convenience; (4) origin (domestic and local) and seasonality of vegetables; (5) issues of sustainability; and (6) urbanization and demography.

■ *Health, vegetarianism and organic food consumption*

The majority of the interviewees at all stages in the value chain mentioned increased interest in health as an explanation for the increased sales of vegetables and for future development (Table 1). Increased sales were reported for products specifically associated with 'health', e.g. cabbage and kale, ginger, turmeric and avocado.

Organic vegetables have shown extraordinary growth in recent years and, according to the retailers interviewed, now comprise 15-25% of sales, partly because the price premium is decreasing:

> 'We decreased the price slightly on organic produce to bring it closer to that of conventional produce. For products we sell in large volumes in particular, the difference between organic and conventional is very small.' (Retailer)

Two store managers also noted that the margins on organic products are now smaller than for conventional produce:

> 'The dealers really don't want to increase the organic range as the profit margin is lower, on average 25% profit compared with 40% on conventional.' (Retail store)

Although the organic range is growing, supply is sometimes lacking. Lack of organic growers was a concern for one producer organization. Another problem is that organic produce may have uneven quality and uniformity, as mentioned by one wholesaler who had stopped purchasing organic cucumbers. Some Swedish producers feel that their production is already 'almost organic', according to one producer organization representative. This may lower the incentive to change to certified organic production, particularly if the price premium decreases. Thus, some interviewees believed that organic sales would continue to grow, but others believed that the share of organic is about to plateau, partly through lack of supply.

Vegetarianism was seen as related to health, but also ideological concerns. Younger consumers, in particular women, were reported to prefer vegetarian or 'flexitarian' foods:

> 'We have a large proportion of vegetarians in Sweden, I believe 10% or even more in the age group 15-25 years. I see no reason to believe this will change, quite the opposite. I believe we have a very bright future in sales of vegetables.' (Wholesaler)

A 'protein shift', whereby consumers change from animal to vegetarian proteins, was also noted. Increased demand for 'filling' vegetables (e.g. root crops, tubers, thick leafy vegetables) and for vegetables rich in certain nutritional components and fresh legumes was predicted:

> 'We will see growth in 'green' vegetables such as legumes. They are the most healthy [foods] and people will have an even stronger interest in them, and also kale, spinach, beans and such things that vegans use to get protein. We will perhaps also see growth in more exotic things that are not on the market today.' (Retailer)

> 'Demand for beans will generally expand, if you have the supply. There are so many other varieties than green beans [string beans]. If you could find varieties that are easily handled and transported, they could be a tremendous success.' (Retailer)

The supply of fresh vegetables rich in protein is currently limited. This might be a promising avenue for growers willing to try new crops. Interestingly, while retailer chains and associated wholesalers mentioned the vegetarian trend and ´protein shift´ as a strong driver, only one producer organization explicitly mentioned the potential for replacing animal protein with plant-based alternatives.

The health, vegetarian and organic trends were bundled together by some interviewees, with health as the common denominator. This is in line with the general trend for healthy food (Grunert, 2017b), with increasing consumer willingness-to-pay for it (Palma *et al.*, 2016). Organic was seen as a way to signal several different product attributes, such as health, quality and sustainability. Previous studies show that organic is most often associated with health, but occasionally also with environmental issues (Aertsens *et al.*, 2009). Organic consumption is also correlated with consumer characteristics, such as being well-educated,

having above-average income, being female and living in urban areas (Hughner *et al.*, 2007; Vukasovič, 2016). Vegetarianism has similarly been shown to be associated with health arguments (De Boer *et al.*, 2017; Fox and Ward, 2008; Ruby and Heine, 2012), but also moral considerations, disgust at eating meat or even religious practices (Ruby, 2012). Environmental reasons for vegetarianism have also been reported (De Boer *et al.*, 2017; Fox and Ward, 2008). Supermarket manager interviewees in stores and higher up in the retail chain reported increased interest in vegetarian food as an alternative to meat consumption, mainly for health reasons, but also ethical reasons, with particularly strong interest among young female consumers (20-30 years), corroborating previous findings (e.g. Kubberød *et al.*, 2002). Thus, the increased purchases of organic produce, as well as increased interest in vegetarianism, appear to be mostly associated with health but also other sustainability-related issues. This indicates the complexity of food choices in this context.

Applying a food systems approach, drivers for the increased interest in health, organic and vegetarian consumption may include socioeconomic drivers (educational level, income, lifestyle), food safety and security drivers (e.g. access to healthy, nutritious food), ethics-related drivers and environmental drivers (environmental impact from food production and consumption, climate change). The increased demand for more healthy produce is thus driven by several external food system drivers and creates an area with strong potential to which actors in the value chain can adapt.

■ *Drivers related to interest in food, variation and special qualities*

The interview responses indicated increased interest in food and cooking, taste and quality of vegetables (i.e. premium products) and variation and a changing market due to migration and demand for 'ethnic' food. All retailers reported that consumers in general are more aware of what they purchase and have a genuine interest in food. Interest in food and cooking appears to be connected with interest in diversity. Celebrity chefs have helped increase demand for vegetables, as have globalization, global travel, media exposure and migration. One respondent stated that: 'We are a travelling people, we have many cultures inspiring us, and this also drives the demand for taste and quality'. Asian leafy vegetables, sweet potato, chilli, ginger, turmeric, garlic, coriander and mint are examples of products that have seen increased demand related to this trend. However, some actors were concerned that consumers know too little. In particular, producer organizations would like consumers to know more about domestic production, because: 'Unfortunately consumers' knowledge is on average very bad, e.g. as regards when Swedish vegetables are in season'.

Most retailers reported changing the way they present produce, e.g. by changing the overall layout of the vegetable department:

> 'For each store we make a time plan (for change), which results in around an 10% increase in sales […]. We frame the department, add new chill cabinets and make efforts to inform consumers.' (Retailer)

This was recognized by producer organization representatives: 'The stores handle exposure of fruits and vegetables far better today.' Communication may take many forms, e.g. in-store events and meetings with growers, customer magazines, advertising or social media. However, within the value chain there was concern among wholesalers that computerized and automated ordering systems (which register when a product is sold in-store and automatically order more from the wholesaler) lead to less knowledge about produce among store managers:

> 'I believe that in five years, if sales decrease for a product and you wonder why, the stores with automatic ordering systems will not know anything about the products and will have no idea what to do about it.' (Wholesaler)

Some store managers reported that they do not receive enough information from central office: 'The buyers centrally have very much information and knowledge that is not transferred to the store personnel', They also feel tied by central advertising campaigns, which may not always be possible to fulfil at store level.

The on-line retailers interviewed described several changes associated with new ways of distribution. One is that communication with consumers may take a different form, as there are other possibilities for providing information about products directly to consumers, including other types of media (films, social media) and direct contact with the producer:

> 'For those of us selling food on the internet, this is a great advantage compared with the [physical] store. We can show the grower the area from which the product originates, so that it becomes much more personal. We can link pictures, film and product information, and we will work even harder with this in the future.' (On-line retailer)

Increased consumer interest in premium products, in particular better sensory properties, was mentioned by most respondents. Representatives from three of the large retailer groups stressed that improved taste properties increase consumer willingness-to-pay. Consequently, retailers broaden their produce range and try to signal taste, e.g. using taste descriptors or credence labels (e.g. Moser *et al.*, 2011). Some vegetable categories are becoming significantly more diversified in terms of varieties, packaging and sizes. Tomato is the leading example, followed by varieties of lettuce and brassicas and root crops such as potato and beetroot. According to the respondents, increased variation is a driver for increased sales. One of the main retailers reported having increased the range of different products sold by 25% in the past five years.

Immigration has also had an impact on the retail vegetable category. The retailer chains have conducted systematic work to identify products for immigrant groups and some are even targeting certain groups. Interviewees frequently mentioned that price is more important for these groups, as many have lower incomes. Others claimed that views on what constitutes good quality of vegetables differ between immigrant segments, e.g. the importance of supplying the right products at the right time (degree of ripeness) and the origin of imported products. Products for which demand is increasing include leafy herbs, snack/mini cucumbers, varieties of pepper, Asian vegetables, cassava and cooking bananas.

The consumer trends for diversity, variety and novelty correspond to those identified by Grunert (2006). In practice, this means that actors in the value chain may find sales opportunities in new types of vegetables and varieties, but also in the way they are displayed or prepared into convenience foods (Table 1). Underlying reasons for these trends are not well-described in the literature, although some studies list variables that may explain diversity in food purchase, e.g. consumers' education level, income, gender and living in larger cities (Thiele and Weiss, 2003). Immigration may also be driving the development of diversity and variation, as immigrant consumer segments demand different products (e.g. Kershen, 2002; Koc and Welsh, 2002), and as immigrant food cultures are gradually adopted by the majority (D'Rozario and Choudhury, 2003). Food system drivers appear to be largely associated with social and economic variables: changing lifestyles, increased incomes, less available time, more travelling, globalization and migration, but also social relations and trust in the food system. From the environmental perspective, there may be willingness to pay a higher price for food to improve environmental welfare, by e.g. saving or promoting biodiversity, lowering the environmental impacts of food production and promoting more 'natural' food production with other quality properties. Thus, the increasing interest in food and demand for variation and quality seem to be influenced mainly by socioeconomic drivers. This points at opportunities for adding value to fresh produce through variation and quality. There may be a stronger willingness to pay for such produce, but the state of the economy is ultimately likely to influence the demand for such products.

■ *Convenience*

Most respondents believed that increased demand for convenience products has greatly influenced the retail vegetable category, with consumers using less time for food preparation and demanding convenient solutions. This has led to an increase in sales of peeled, sliced and diced, and pre-cooked vegetables:

> 'The consumer wants to eat healthy [food], but preparation must be fast. […] I believe prepared [vegetables] will occupy a much larger share of [future] sales. We are good at pre-cut lettuce and baby leaves, but not so good at other [convenience products]. Now we have succeeded with the base products such as shredded cabbage, kale and carrot, and simple packaging. This will expand and become even greater. We will have meal solutions such as soup mixes or wok vegetables, that type of product.' (Retailer)

Convenience may be one of the main drivers for innovation and new product development within the vegetable category today. Producers should do more processing to increase the value of their produce, but currently lack financing and knowledge. One producer organisation is actively working on this:

> 'We are trying to increase our share of the value, to go from delivering commodities to increased processing, with cut carrots, packaged beetroots, a packaged lettuce assortment and leafy herbs. I feel we are making more packaged products and it has two effects: a more modern product and higher value.' *(*Producer organization)

Convenience products also mean that store displays will change, with more chilling capacity needed, which is currently a bottleneck for development. There is also a discussion on central level regarding the category to which prepared vegetable products belong, e.g. the vegetable department or the ready-meal department. At central level, retailers were clearly interested in speeding up introduction of new convenience products and increasing the volumes. At in-store level, however, most managers reported difficulties in handling the volumes decided at central level, leading to food waste when products cannot be handled correctly:

> 'The retailers' efforts fail, as these products are more expensive than other products.' (Retail store)

> 'You [the store] have to purchase large quantities, but much must be thrown away.' (Retail store)

> 'As they have a best-before date, customers don't choose them.' (Retail store)

The strategies for convenience thus seem to be very much driven at central level, whereas stores believe it will take years before such strategies work well.

Evidence that convenience is a strong driver has been presented previously (e.g. Baselice *et al.*, 2017; Grunert, 2013; Nagyová and Košičiarová, 2017). Convenience has been shown to be a driver for consumption (Brunner *et al.*, 2010), with consumer time constraints most often cited as the underlying motive (Buckley *et al.*, 2007). Demand for convenience products may also be related to seeking new experiences (Botonaki and Mattas, 2010). In any case, it is likely that this development will continue, and the vegetable category offers opportunities to develop convenient and healthy food options (Table 1). However, the present analysis revealed struggles between different actors in the value chain, with the actor with most power driving the agenda. Nevertheless, convenience appears to be one of the strongest developments in the vegetable category and the change in demand appears to be mainly pushed forward by socioeconomic drivers, although environmental drivers may also play a role, which is further discussed in section 'The issue of sustainability'.

■ *Origin and seasonality of vegetables*

All respondents claimed that trust in Swedish produce is high and predicted increased demand for domestic vegetables. Downstream value chain actors were also satisfied with product quality. Representatives from producer organizations predicted a future deficit in domestic supply in relation to demand, particularly for in-season produce. Increased interest in purchasing vegetables in-season was reported, but two contradicting future scenarios were outlined:

Table 1. Identified trends and drivers of current developments in the retail vegetable category, and examples of responses from actors in the supply chain. Themes: health, consumer interest and variation and convenience.

Identified trends	Value chain responses	Food system drivers
Increased interest in health Growing market/demand for organic Increased vegetarianism	Increased supply of organic food and broadened organic range Lower price premiums for organic New products with positive health properties (e.g. 'super broccoli', rich in antioxidants) Protein-rich vegetables introduced (e.g. legumes) Convenience health products Expansion of fruit and vegetable departments in-store Certification schemes to assure quality (food safety)	Socioeconomic drivers (lifestyle, status, increased incomes) Food scandals/food safety/ethics (e.g. animal welfare) Public health/food-related diseases (obesity, cardiovascular diseases)
Consumer knowledge and interest of the vegetable category/ increased interest in food and cooking Increased interest in taste and quality (increased interest in premium products) Increased demand for diversity/ interest in variation (inspiration from travel, culture, chefs) Migration and demand for 'ethnic food'	Introduction of new products and increased variation in supply Production of new types of vegetables More focus on sensory properties, e.g. taste, color and texture Imports of exotic assortment (often air-freighted) Systematic work to introduce ranges directed towards immigrants Year-round supply of all products More information about the products available, communication on packaging New information technologies used in communication with consumers	Socioeconomic drivers (lifestyle, increased incomes, less available time, more travelling) Socioeconomic drivers (globalization, migration) Environmental drivers (biodiversity, environmental effects from food production)
Increased demand for convenience	Development of new convenience products Better adapted sizes (smaller) of packs to make them more convenient for one meal (e.g. potatoes 900 g for one family) New displays in-store/increased chilling capacity Meal solutions, ready-to-eat products Preparation of convenience products in-store Making products more convenient to handle by minimizing food waste in the home Increased use of packaging, advanced packaging Online sales increased, entry of new online retailers Pre-packaged bags for convenient meal preparation	Socioeconomic drivers (lifestyle, increased incomes, less available time, more travelling, changing behaviors in eating) Environmental drivers (circular flows in the food industry, efficiency in logistics, emission of greenhouse gases and energy use, packaging)

The importance of buying produce in-season will increase, as consumers have more knowledge and interest in the origin of their food. This is connected to increased consumer interest in health, the environment and climate change, and associations with better quality, taste and local production.

The importance of buying vegetables in-season will decrease. A representative of one of the main retailers said that 'there is always a season somewhere in the world', and consumers want to have everything available year-round. Automatic ordering systems ('one product out, one product in', i.e. when a product is sold in store, a replacement is automatically ordered from the wholesaler) mean that seasonality is not considered when retailers place orders. The resulting 'eternal season', together with anonymization of origin through retailers' own brands and more convenience products, adds to possible erosion of the value of vegetables in-season, according to some representatives of vegetable producer organizations.

This dichotomy was reflected in several responses:

> 'It is important to stress the Swedish season for many products […]. Swedish quality is superior when the products become available. […]. Then, it is important to prolong the season, to make it longer and more stable.' (Retailer)

> 'People talk about it [season], but it is not really a clear pattern. Some consumers will purchase in-season for environmental reasons, but some will expect to find the product available 365 days a year. We can see the seasons being prolonged or even vanishing.' (Retailer)

> 'Consumers want more seasonal products. […]. People are more environmentally conscious and make climate-smart choices. […]. Previously, everything always had to be available and consumers would always eat it, but I don't think it's like that any longer. Consumers probably think it is nice to eat in season. This trend has lasted a long time and will continue…' (Producer organization)

> '[Season] does not exist. Before, there was one season – nectarines only during the summer – but now products are always there. […]. However, there is always a small increase in sales when the Swedish season starts, for cucumbers and new potatoes. […]. But I think that, in general, producers are expected to supply products all year round, even Swedish producers.' (Producer organization)

However, origin (domestic or local produce rather than imports) and increased interest in seasonal produce were still influential. It has been shown that consumers are willing to pay a premium for local food (Feldmann and Hamm, 2015). Although the country-of-origin effect in consumer choice has been well studied, the knowledge obtained has been difficult to generalize (Newman *et al.*, 2014). The main categories behind ethnocentric and domestic food choices have also been shown to be related to social involvement and quality, i.e. sensory quality, food safety, products, environmental concerns and job creation (Vabø *et al.*, 2017). They could also be related to associations to product 'authenticity' (Groves, 2008; Petz and Haas, 2017). It has been found that organic-minded consumers favour local food (Hempel and Hamm, 2016), but also that country-of-origin may be less important for organic consumers (Thøgersen *et al.*, 2017), a view shared by one of the retailers:

> 'I notice in the Swedish season, during spring and summer, that organic sales decrease and customers choose Swedish produce instead. If you want organic you can purchase imports, but when the season shifts and Swedish produce arrives, consumers choose that and trust it so much that they don't feel a need to purchase organic.' (Retailer)

Increased interest in local food is well described by e.g. Weatherell *et al.* (2003), but the tendency to assume that local is inherently positive can lead to the 'local trap', whether it encompasses different desires such as ecological sustainability, social justice or food security (Born and Purcell, 2006). Coley *et al.* (2009) and Edwards-Jones *et al.* (2008) showed that local purchases do not necessarily mean the lowest carbon

impact. However, in distribution and logistics, there are possibilities for optimizing energy use through new practices when handling the product from producer to retailer, which could even be better than those used in the large-scale distribution system (Mundler and Rumpus, 2012). Thus, interest in origin and seasonality may derive from environmental and socioeconomic drivers, but the finding that demand for domestic and local produce is increasing needs to be confirmed in in-depth studies and the underlying reasons identified. Examples of chain responses are shown in Table 2. The development may be a opportunity for vegetable producers to increase their competitiveness in a local and national market, but it may also require new forms of collaboration with retailers or other actors in order to capture the value from increased demand of local produce.

■ *The issue of sustainability*

Sustainability was reported to be increasing in importance as a main driver from the consumer side, as the increase in sales of organic and fair-trade products, and increased vegetarianism, may indicate. Increased interest in vegetables in general, and locally sourced vegetables in particular, was viewed by some interviewees as a response to increased awareness of the climate impact of e.g. transport and a desire to support local growers, but also to moral concerns. One producer organization representative mentioned 'general concern about health and 'Mother Earth' but no specific issues. Retailers at central level and their associated wholesalers referred to a 'sustainability trend', which is driving the development of vegetable sales. One retailer mentioned 'the discussions on health and climate… and the attention on the European meat industry and the excessive use of antibiotics.' Another retailer said that 'the media are focusing on the issues […] the environment is in focus everywhere […] There are banana scandals and such things. People are more conscious and aware.'

Many responses in the value chain related to sustainability, e.g. regarding communication, sourcing of local products, certification, logistics and ordering systems and actions to minimize food waste (Table 2). Changing marketing practices were also mentioned, such as abandoning multiple purchase offers (three for the price of two) or decreasing product sizes (e.g. smaller heads of cabbage). Comparing answers from all stages in the value chain, food waste was a major issue for all interviewees. To reduce waste, increased chilling capacity has been installed and some stores are using vegetables near or at their best-before date within in-store production of ready-to-eat meals. One store used vegetables and fruits near their end-date in innovative ways: 'we find uses for products we can't sell, [and prepare in store] salads from fruits and vegetables that can otherwise not be sold.' However, the convenience assortment also generates more food waste, leading to a conflict between these drivers. Many of the responses are about minimizing resource use (i.e. being more efficient), standardizing products through certification and taking measures to decrease food waste. Some include facilitating sustainable and healthy food choices through 'nudging'. This could involve providing simplified information and signifiers, changing visibility and accessibility, influencing size, positioning product choices or providing information about the behavior of others and ideal-type behavior (Lehner *et al.*, 2016).

Sustainability was identified as a strong driver changing consumer demands and affecting the supply chain from many different angles, ranging from policy decisions to internal sustainability strategies. Many issues identified related to food waste and how actors in the supply chain deal with these challenges. Much can be done through managing logistics (e.g. Liljestrand, 2017), or through changing interactions at the supplier-retailer interface (Mena *et al.*, 2011), but also to identify drivers and potential intervention points for household food waste (Hebrok and Boks, 2017). This study revealed other measures that can be taken in the value chain for vegetables to minimize food waste. However, when sustainability is considered in a broader perspective, several other drivers identified also encompassed sustainability issues, as shown in Table 2.

Issues of sustainability have been found to be involved in many of the other developments described here, e.g. the increased interest in organic, health, vegetarianism, vegetables in-season and locally produced food, and in strengthening social aspects within the food system. This suggests that sustainability issues are indeed strong drivers of changing consumer demands and of value chain responses. In addition, there are

economic arguments for changing practices in the value chain and sustainability may be a strategic question for future competitiveness. Thus, sustainability as a driver for the development of the vegetable category is multi-faceted and not delimited to 'food waste' or other 'environmental impacts', Instead, as depicted in Figure 1, it encompasses all sustainability dimensions.

■ *Drivers of urbanization and demographic change*

The behaviors of the urban population and their wants and demand were perceived as a strong driver by some interviewees. Respondents at all stages in the value chain reported an increase in smaller and more convenient sizes of products. This is believed to be related to smaller household sizes (both younger and older households, and more single households), less storage space than previously (due to smaller houses or apartments) and less available time for preparation of food and increased demand for convenience:

> 'There is a willingness to pay for smaller sizes and smaller packaging. Many retired consumers choose smaller sizes as they are easier to carry home. […] but we also sell more packaging suited for households with one or two members. They don't want to purchase more than they need, and they are ready to pay more to avoid the [inconvenience] of throwing it away later.' (Retailer)

Producers are responding to these changes in demand, which sometimes require new production practices, but also involve higher consumer willingness-to-pay:

> 'Retailer X will say that cabbage may have a maximum weight of 500 g. Then you start harvesting earlier, so the cabbage head does not get too large. But we also get a different (higher) price for it.' (Producer organization)

> '[Retailers] are willing to pay more for smaller products. Romaine lettuce in sold as 200 g, although we could easily produce it as 350 g. But retail wants 200 g, even if the larger size would be cheaper per kg.' (Producer organization)

Another issue identified was the difference in product range between larger cities and less densely populated areas. Larger cities demand more so-called 'premium' products, convenience products and smaller product sizes, and also more 'trendy' and 'healthier' products, such as avocado. Retail distribution also differs between urban and rural areas. A clear issue is that convenience products are more difficult to distribute to rural areas where deliveries are not as frequent, and chilling capacity in stores is still lacking:

> 'It is easier to sell premium products in Stockholm. More baby leaf lettuce in bags. Fast and convenient, always in a hurry. Here we have more success with the ready-prepared food bags. More of those things. Easy and accessible.' (Retailer)

> 'In our retail chain, we work very hard on this. In Stockholm there are more single households. We have developed special packs for them, for example 0.5 kg packs of organic carrots.' (Retailer)

Producer organizations have also noticed this difference:

> 'There will perhaps be two product ranges, one for urban customers and one for rural customers in less populated areas, farther away, with longer transport.' (Producer organization)

Retailer responses to these changes include smaller packaging sizes or selling products individually rather than in packs. In field production, this may require new growing practices to get smaller products (e.g. cabbage and lettuce). In stores, it may require cutting vegetables into pieces to get the right size. There seem to be no common strategy for adjusting the product range as a whole, although one producer organization had a dialogue with a wholesaler and adjusted their produce to requirements.

Thus, urbanization and demographic change are socioeconomic drivers of the food system, and value chain responses aim to meet these drivers by adapting to changing household structures or to differences in consumer demand between urban and rural. In addition, migration changes demographics, which also affects value chain responses. The effects of urbanization on the food system and on the external environment are doubtless larger than described here. Pradip *et al.* (2018) showed that urban consumption and transport have a strong environmental impact and that demographics and lifestyle significantly influence these outcomes. Goldstein *et al.* (2016) claim that the main driver of urban footprint is animal-based food products and tentatively call for an increase in plant-based diets, increasing the importance of the vegetable category. Thus, urbanization and demographics as socioeconomic food system drivers have very strong implications for the fresh produce sector, but also include an environmental dimension related to the long-term sustainability of the food system.

5.2 Packaging

Many of the drivers identified require the amount of packaging to increase. Most respondents reported that packaging is increasing, although a hard-discount retailer claimed that packaging is decreasing in their store format, for environmental reasons. Organic produce also needs to be packaged separately for certification, according to several interviewees. Measures to decrease packaging if possible are being introduced, e.g. one of the larger retailers recently introduced laser labels on e.g. avocado skins, which avoids the need for packaging. At store level, respondents claimed that many consumers prefer to purchase their produce unpackaged, so that they can select the amount they wish and avoid packaging:

> 'Packaging will decrease as consumers are environmentally conscious […]. They want to purchase products unpackaged and pay per piece.'

> 'Some products sell better packaged and others not […], but unpackaged sells well and some customers stress that they don't want to bring rubbish (packaging) home.'

Store managers attributed an increase in packaging to demands in other stages of the chain, in particular at retail level:

> 'The sector (retail) wants more self-scanning in stores, and packaging makes that easier. If there is a code to scan, it goes much faster. It is not because customers want packaging, but because retailers want it.'

> 'Our retail chain pushes for more packaging. It is simpler to handle than unpackaged vegetables.'

One producer organization also believed that increased packaging is being driven by retailers centrally. Thus, future packaging may be a conflict of interests between different stages in the value chain. Packaging is a way to provide more information to consumers, in particular as regards signaling 'feelings' and 'trust' (i.e. credence) through pictures of landscapes and producers and recipes. This was mentioned in particular by retailers and producer organizations. On store level, however, many claimed that customers do not have time to read and devote most attention to origin, weight and price. The internet retailers do not need special packaging for increasing the information they provide to consumers, which also means that packaging can be standardized, and costs can be cut.

From a sustainability perspective, most interviewees recognized that packaging may have an environmental impact, but believed that more environmentally friendly packaging will be developed:

> 'We are working on making our packaging environmentally friendly, in particular for our own brands. We use biodegradable plastic from sugarcane, we choose paper instead of plastic boxes for our products and we try not to mix paper and plastic in the same packaging.' (Retailer)

Table 2. Identified trends and drivers of current developments in the retail vegetable category, and examples of responses from actors in the supply chain. Themes: origin, sustainability and urbanization.

Identified trends	Value chain responses	Food system drivers
Consumer interest in origin, domestic and local supply Increased interest in (local and domestic) vegetables in-season	Increased supply of vegetables in-season Longer seasons (e.g. new storage practices) Offering local produce Updated ordering systems to allow stores to source local vegetables Cooperation between supermarket chains and growers to promote domestic produce	Socioeconomic drivers (lifestyle, status, increased incomes) Situation (concern) for local rural communities (socioeconomic driver) Health issues (lower trust in imports)/food scandals (imports) Environmental drivers: Climate change and environment (food miles, belief that local is better)
Sustainability, environment and climate (including food waste minimization)	Communication of sustainability More organic and fair-trade products Corporate social responsibility (CSR) actions More locally sourced products Demand for certification schemes to assure quality Improved logistics Better adapted sizes of packs to decrease food waste Chilling compartments for vegetables in-store to prolong shelf-life Packaging to minimize waste, move towards bio-based materials in packaging Automatic ordering systems (one product out, one in) Smaller product sizes (e.g. smaller heads of cabbage, lettuce), also requiring changed growing practices at farm level. Changing marketing practices (e.g. abandon price packs, such as buy three for the price of two) Waste from the processing of convenience products can more easily be recirculated or used for other purposes	Environmental drivers, food wasted, inefficient use of resources (waste) Socioeconomic drivers (inconvenience with treating waste) Environmental drivers (climate change, environmental degradation, loss of biodiversity) Animal welfare issues and ethics (vegetarianism) Socioeconomic drivers (workers' rights, fairness, inequality), livelihoods, lifestyle
Urbanization/demographic change	Product sizes for small households Products for immediate consumption, not storing Local assortments adjusted to local setting	Socioeconomic drivers (migration, household status, single households, labor market, lifestyle, status, increased incomes)

Thus, packaging has many uses (e.g. Rundh, 2005) and retail chains favor packaging for several reasons. From the producer perspective, use of retailers' own brands means that the origin and identity of the producer are not as visible on the packaging, which may otherwise be a way for producers to differentiate their product. The roles of packaging may be to significantly alter the appearance, increase storage life and reduce food losses, maintain the nutritional value and content of the raw materials, promote hygiene and safety of the

food product throughout the supply chain and facilitate better resource use in the distribution chain (e.g. Licciardello, 2017; Rundh, 2005). Packaging may thus help reduce food waste and prolong the shelf-life of food (Licciardello, 2017). However, there may be a negative environmental impact due to use of resources, generation of waste and emissions, resulting in negative effects on climate change, health and ecosystem quality (Licciardello, 2017; Siracusa *et al.*, 2014). Much can be done to reduce the negative impact of food packaging, e.g. by using packaging material with lower environmental impact (Huang and Ma, 2004), thinner plastic film thickness (Siracusa *et al.*, 2014), use of renewable energy in production (Ingrao *et al.*, 2015) or changing to novel bio-based plastic materials (Sorrentino *et al.*, 2007).

The responses from retailers in particular revealed awareness of these issues. Many respondents claimed they were working to decrease the amount of packaging, although increases in sales of convenience products and small pack sizes lead to more packaging. Some consumers want less packaged foods, to avoid excessive packaging and perceived 'chemicals' in packaging (Hoek *et al.*, 2017). In the vegetable category, it has been found that consumers view plastic packaging as negative from an environmental perspective but appreciate its convenience and the information provided on packaging (Fernqvist *et al.*, 2015). Similar findings have been reported by Lindh *et al.* (2015), who also found that consumers often ignore the product protection function of packaging.

Thus, environmental drivers (e.g. food losses, inefficient resource use) and socioeconomic drivers (e.g. demography, increased incomes, convenience) are driving food system actors to increase the use of packaging, but also to minimize its effects. Packaging represents a significant environmental impact of the food system, but may be positive for food system outcomes such as food availability, access and utilization. Actors in the value chain are changing their activities in response to these drivers. Given the many variables involved, the use of packaging in the food system is a complex issue.

5.3 Competition and dynamics in the value chain

Although diversity is increasing and more expensive varieties, convenience products and organic and local products are being introduced, price is still an important factor. Several interviewees stressed that low price is important for many consumer segments. They also saw the growth in the vegetable category as being correlated with the general economic situation. There is a trade-off between price and quality and retailers recognize the need for targeting different consumer segments with different products, e.g. price premiums, mid-segment products and price fighters:

> 'If you want a cheap apple you must be able to get that too. If you want more taste, those consumers are willing to pay more.'

> 'Price is a limiting variable. People are not willing to just pay any price, and they are aware how much [products] should cost.'

From a producer and independent wholesaler perspective, retailers push down prices and increase imports. Producer organizations claim that the prices they receive are generally too low: 'profitability is not so good', or 'profitability… we cannot always compete, then we end up with imports. No one fights against the imports, and the chains set so many requirements on us'. The latter interviewee also recognized that the producer organization needs to add value to their products as the convenience segment increases and that it needs to take a share of the growing market for convenience products to increase revenues.

Producer organizations want to increase collaboration with retailers, in order to plan their production and adjust it to customer needs and wants. They also want to gain a higher share of the price, as profitability is considered too low. However, the market structure with few dominant buyers may push down prices. Retailers and wholesalers want more initiatives from producers on new products and more organic production. They

also want larger volumes and uniform, predictable quality, demands which production may have difficulties in meeting.

Within retail chains, views differed between individual stores and chains centrally. Store managers reported that central strategies and plans are not always applicable on local level, and that certain product characteristics (e.g. packaging and convenience) are promoted although consumers have not asked for them. Locally, store managers appreciate meetings and dialogue with customers, but there are indications from other steps in the value chain that knowledge and information about products and the market do not reach store managers, and that automated ordering systems and central decisions prevent them from providing the right products and solutions for their customers. These issues related to the dynamics of the value chain may be explained by the power dependencies between its actors (e.g. Cox *et al.*, 2001). Concentration of food supply chains and dominance of few retail chains is an international trend (e.g. Maglaras *et al.*, 2015; Sexton and Xia, 2018). This development represent both a current and future challenge for producers and independent wholesalers.

6. Conclusions

Food systems and value chain approaches were combined to assess the Swedish retail vegetable category and system drivers, using empirical material obtained in interviews and from the literature. The results showed that the vegetable category is growing, owing to both socioeconomic and environmental drivers. Different trends can be explained by different drivers, but the relationships between drivers are complex and the food system activities may provide both positive and negative feedback. The dynamics within the value chain are also affected in different ways by these drivers.

From the Swedish case presented here, there are also lessons for other countries. From a producer perspective, the results stress the necessity to increase the degree of market orientation and build strategies based on knowledge of market development and system drivers, in order to take appropriate decisions on what to produce and how. Producers and their organizations must cope with increasing dominance of a few large retailers downstream in the value chain, with several examples emerging in the case study. They could do this by taking a larger share of value added through developing convenience products, building value with local and sustainable products and developing attractive packaging with convenient sizes that meet demand. Producer organizations with exclusive national rights for certain varieties of vegetables could gain a competitive advantage and stronger bargaining position towards stronger buyers. Prolonging the season through better production and postharvest practices may strengthen their position, by increasing market share in relation to imports and satisfying retailer demands. However, longer seasons may mean that growers do not receive the same price premiums as they do in a short and intense season when consumer demand is high. In addition, there is a seasonal peak in qualities such as taste for many fresh products. New types of collaboration throughout the value chain could facilitate development of innovative and sustainable products for the consumer market, but would also require more openness between the actors.

Swedish retailers are in a strong position as buyers. Through their size and dominant position, they can implement sustainability actions that improve food systems outcomes. However, they must meet the demands of many different consumer groups, so there is always a trade-off between offering attractive prices on base commodities and offering differentiated higher-value products, while taking into consideration the many issues of sustainability. It is clear that retailers are working to improve sustainability, for example through nudging, facilitating healthy choices, reducing packaging and food waste, improving distribution and logistics, prolonging product shelf-life and promoting organic food. All these measures could easily be practiced elsewhere. On the other hand, retailers must provide a low-cost range and year-round supply of most products, while maintaining profitability and a strong market position. Retailers at central level can dictate many conditions for their suppliers and their different store concepts and individual stores. However, there are indications that they are willing to find new ways to collaborate with producers and to allow more freedom at store level in purchasing e.g. produce from local growers.

There are several relevant areas for future research. This study focused on a particular part of the food system, but food trends affecting the vegetable category identified here are likely to affect other food categories, although possibly in other ways. Thus, comparative studies on other food categories could add knowledge on food system responses to external drivers. Best practices from different parts of the whole food system could also provide useful examples for facilitating adoption of sustainability practices. In this study, we obtained access to key informants in the value chain. However, the study could have benefited from surveying the views of co-workers at different levels and with different functions, adding an organizational perspective on people's individual actions within the structures of the food system. Such research could also provide insights on behaviors and norms within the system and, from a business management perspective, identify organizational practices that may assist a sustainability transition. Balancing the outcomes from the study using e.g. the Delphi methodology (Linstone *et al.*, 2002) could also have strengthened the results and provided a more consistent outlook, as would similar studies in other countries where conditions and drivers may be different. Finally, the study did not include an assessment of consumer behaviors and views, data on which were taken from other research.

The Swedish food retail market is one of the most concentrated in the world, with a few retailers dominating. Access to all key informants at all levels throughout the value chain, who were willing to share their views and knowledge, provided unique insights on the views of actors in this particular chain and a comprehensive picture that may be applicable elsewhere. The results can be useful in practice, and also validated the theoretical framework used for analysis. Understanding the complexity of system drivers, value chain activities, food systems outcomes and relations between different parts requires knowledge from many different research fields, creating a need for interdisciplinary research and knowledge synthesis.

To conclude, the findings in this study can help actors in the value chain meet future changes in the retail vegetable category, through product planning, innovation and new product development, and through distribution and communication with consumers. Understanding future challenges in this value chain, and how market development is influenced by various drivers, can allow actors to respond accordingly. They can thereby improve their own competitiveness and contribute positive food system outcomes, such as lower environmental and climate impact and healthier food consumption.

Acknowledgements

Our thanks are due to Partnership Alnarp and SydGrönt for providing funding. Partnership Alnarp is a collaborative organization between the Faculty of Landscape Architecture, Horticulture and Crop Production Science, Swedish University of Agricultural Sciences, Alnarp, and businesses, authorities and branch organizations in the Southern Sweden region. The partnership funds applied research projects together with its over 90 different partners. For this research project, the Swedish producer organization SydGrönt provided co-funding and helpful input in preparation of the study.

Supplementary material

Supplementary material can be found online at: https://doi.org/10.22434/IFAMR2019.0176

Interview guide.
Coding.

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