ABSTRACT.—A geography of short distribution channels in Provence-Alpes-Côte d’Azur. The current situation and potential for development.—Short supply chains in the food industry are currently a growing, multifaceted reality. They have become increasingly structured and their expansion is enjoying growing support from local authorities. This article identifies the real development potentials of these Territorial Food Systems in the Provence-Alpes-Côte d’Azur region, particularly as they apply to market gardening. We used integrated exploratory multivariate statistics to analyze the potential demand, as well as the potential and existing offer in terms of a local food system. This methodology produced an overall map of the development potentials of short food chains.

CARTOGRAPHY, EXPLORATORY DATA ANALYSIS, LOCAL FOOD SYSTEM, SHORT DISTRIBUTION CHANNEL

RÉSUMÉ.—Une géographie des circuits courts en région Provence-Alpes-Côte d’Azur. État des lieux et potentialités de développement.— Les circuits courts alimentaires apparaissent aujourd’hui comme une réalité multiforme, en expansion et de plus en plus structurée, dont les collectivités cherchent à accompagner le développement. L’objet de cet article est d’identifier la réalité des potentialités de développement de ces systèmes alimentaires territoriaux dans la région Provence-Alpes-Côte d’Azur en nous concentrant en particulier sur le maraîchage. La méthodologie employée consiste en une analyse statistique exploratoire de données communales relatives à la demande potentielle, à l’offre potentielle et à l’existant en matière d’alimentation locale. Cette méthodologie aboutit à une cartographie synthétique des potentialités de développement des circuits courts alimentaires.

CARTOGRAPHIE, CIRCUIT COURT DE PROXIMITÉ, STATISTIQUE EXPLORATOIRE, SYSTÈME ALIMENTAIRE TERRITORIAL

Since the 2000s, a number of initiatives have developed to encourage short food chains in France and Western countries in general as society has become increasingly aware of the impact of food choices on health. There is also a growing acknowledgement of the environmental and social impact of agricultural and mass supermarket distribution (distances in kilometers between producers and consumers, dumping costs for producers, wasted products, etc.)

In the 2000s in France, the Association to Maintain Farmer-centered Agriculture (Associations pour le maintien de l’agriculture paysanne – AMAP) appeared alongside a growing preference for farmers’ markets and a rise in points of direct sales. The consumers and
producers who use such distribution chains have chosen an “alternative” agriculture and food system, based on ethical and political considerations. Some have gone so far as to talk about political consumerism as practiced by consumers (Dubuisson-Quellier, Lamine, 2004 ; Deverre, Lamine, 2010 ; Counihan, Siniscalchi, 2013). Local authorities are strengthening their support for short food chains (studies, specific financing plans, observatories), thanks to their increased awareness of the potential for local development (Pecqueur, 2001; Renting et al., 2003). A recent example is the Provence-Alpes-Côte d’Azur (PACA) region with the implementation of the Barnier project.1 A large number of participants wish to structure and institutionalize these short supply chains and have requested funding, such as the European Agricultural Fund for Rural Development (EAFRD). Short food chains are thus perceived as a lever to maintain “services and an economy in rural zones, thus [increasing the value] of local agriculture and reinforcing social ties.”2

The term “short food chain» remains vague in the discourse of the majority of actors; despite the fact that it has been defined at the national level. Furthermore, little is known about how these chains really developed and there has yet to be a spatialized study on the topic. To the best of our knowledge, only Hein et al., 2006; Pouzenc et al., 2008; Scheffer, Dalido, 2010; Raynal, Razafimahefa, 2014; Guido et al., 2014, have developed this approach, which renders these networks tangible. We are offering here a quantitative approach to the current state and the development potential of short supply chains in the PACA region, France’s foremost region in terms of surface area used for certified organic farming (COF)(according to data from Agreste3 2010 and the Organic Agency in 2013). We have focused on market gardening in particular because fruit and vegetable farmers are second only to beekeepers in direct sales (Agreste Primeurs, 2012).

This study is based on three food diagnostics at the municipal level: potential demand, potential supply, and existing supply. Quantitative and qualitative data come from several sources (the 2010 General Agricultural census, Bio de Provence, INSEE, the Regional Observatory) and were compiled by the regional observatory of short food chains in 2012.

We have categorized the forms of short supply chains according to two criteria: whether or not there is an intermediary and whether marketing is collective or individual. Consumer and producer pools are also categorized according to their local food potential. By comparing these two typologies, we can highlight the existence of key territories for the local food chain. Based on these results and taking into account (qualitatively) the dynamics of governance, we offer an indicator of the potential for development of short supply chains.

**Short food chains: A diversity of forms against institutional supervisory attempts**

**A well established if misunderstood phenomenon**

The trend towards “organic” and “local”, strengthened by political debate and citizens’ mobilisation, has taken on such proportions that it has become a major economic issue. A specific supply and demand cycle is emerging. Over the past few years, a number of marketing trends in mass distribution have focused on short supply

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1. The Barnier plan was announced in 2009, the PACA rural network was launched in 2009, and the PACA regional council initiated an observatory for short food chains in December 2010.
3. Data from the studies of the Service de la statistique et de la prospective (SSP) of the Ministry of Agriculture, Agri-food, and Forestry can be found on the Agreste website.
chains in their offer in order to attract consumers who are already aware of the issue. Supermarket distributors and service providers for institutional catering identify the origins and production modes of their products. Sodexo, France’s number one foodservice company, is a clear example of adapting to demand with their participation in the program “eat organic in the workplace”. Sodexo also offers 400 organic product ranges, representing 2.5% of products supplied. It has also created a position for a buying manager for organic products, locally sourced, and obtained through short supply chains.

In parallel, local, national, and European institutions have seized the topic. They see these supply chains as a means to help partially reconvert an ailing agricultural sector. In 2011, the PACA regional council created a framework policy for short supply chains and implemented an observatory with several technical participants. In 2010, for the first time, the General agricultural census integrated data on short supply chains. The Ministry of Agriculture defined short food chains in 2009 during the launch of a work group (consisting of scholars and civil society4), and developed an aid program for short food chains (“to improve knowledge of short food chains, to adapt training for farmers, to encourage farmers to use short supply food chains, and to organize short food chains”5). Since, the Ministry has presented a bill for the future of agriculture, food, and forests in which short food chains are mentioned three times (p. 1 and p. 2, and again p. 33), with a special mention for the implementation of projects to supply public and private institutional catering (p. 2).6 The European Commissioner for Agriculture and Rural Development, Mr. Dacian Ciolos, has often talked of short supply chain and launched a study (Kneafsey et al., 2013) and a project to create a European “short supply chain” certification, based on the fact that “15% of farms in Europe have declared that they sold over half their products in short supply chains”7. However, there are no specific measures in the new common agriculture policy and the certification project has been the subject of strong debate.

**Definitions for better management: expectations and hesitations**

The mobilization of local authorities and institutions can be seen in a need to define the object represented by short supply chains. This aspect is highly political because it determines what will or will not be taken into account in their measures. A report by the Agreste of Limousin8 underlines the fact that there is a certain distrust of normative procedures and institutionalization. These tensions stem mostly from agricultural actors and consumers who are concerned that the definition they have given to short food chains will not be respected.

Growing demands for locally produced food should not obscure the fact that short supply chains are alternative forms of organization for an ailing agricultural sector, an agri-food sector that has been devalued and criticized, and a mode of consumption that lacks information and social ties. Such an alternative was built by institutional innovations that are based on the collective dimension of the creation of the chain and then of its functioning. There has been an increase in interest for all forms of short supply chains (including traditional modes such as farmers’ markets, direct farm marketing) thanks to media exposure of these issues and innovations in food chains.

Short supply chains can be classified according to two main criteria. The first, the existence of intermediaries, is used in all official definitions. In 2009, the French Ministry of Agriculture defined short food chains as a direct food marketing chain or one with at most one intermediary. As for the European Union, it adds geographic

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8. “L’hétérogénéité des circuits courts : un défi pour le soutien institutionnel”, no. 96, May 2013
proximity to its definition of short supply chains. To better define this criteria of proximity, certain actors have chosen a limit – 100 km is often mentioned. Others prefer a pre-defined territory (the agglomeration of Marseille or the regional natural park of the Luberon are two such examples). Many actors present the geographic proximity as a condition for creating social proximity and solidarity (support for farmers). The limit thus corresponds to a distance that allows for regular physical exchanges between producers and consumers. For certain, this means an hour’s drive; for others 50 kilometers. Proximity can also mean that the food supply exists on the consumer’s daily commute, which would involve no extra trips or costs.

To conclude, we will use the following definition created by the PACA region’s observatory for short food chains. Short supply chains are marketing chains for agricultural or agri-food products that are either direct or indirect (with no more than one intermediary), according to criteria of proximity. The regional observatory takes into account collective projects (collective farmers’ shops, farmers’ markets) and individual projects that belong to a larger network (Bienvenue à la ferme – direct farm marketing and farm activities, AMAP – community supported agriculture). The observatory, in line with an institutional vision, excludes the wine sector, because the latter is already well structured for specific direct sales (wine cellars), enjoys strong support, and has few connections to other food sectors.

This definition results in five types of short food chains: farmers’ markets, AMAP baskets, direct farm marketing, collective farmers’ shops, and sales intermediaries (Internet or local shops). A new form is emerging: supply platforms for foodservices.

We would like to add three additional aspects to this categorization of forms that have resulted from the observatory’s definition: the age of the form of marketing, the original sector of the creator of the project, and the collective nature of the form. Older forms (farmers’ markets, direct farm marketing) and more recent ones (CSA baskets, collective farmers’ shops) coexist but do not share the same origins. The former allows farmers to increase and develop local sources of revenue whereas the latter are based on a recent change of food paradigms in terms of environmental, health, cultural, and even social considerations, which the public has acquired concerning agriculture through food consumption (Lamine, 2008). Furthermore, some have been launched by producers (farmers’ markets, collective farmers’ shops, and direct farm marketing); while others were created by consumers (CSA baskets) and shopkeepers (trade intermediaries). Finally, we can see a difference in the creation and the functioning of a project depending on whether it was defined and carried out by a single actor (direct farm marketing) or by a group of actors (collective farmers’ shops, CSA baskets). This last subtlety is linked to the way in which the short food chains are organized:

- Individual approaches generally reinforce existing activities and sectors: a producer diversifies his points of sales by opening a direct point of sales on the farm or by organising a “text messaged”, CSA basket, small food shops sourcing a portion of the products they offer among the group of regional farmers at the MIN (marché d’intérêt national – state controlled wholesale food markets) or by establishing partnerships with local farmers;
- Collective approaches are more likely to create new local networks: a network of CSA baskets that allow for mutualized contracts, creation of farmers’ markets, supply platforms for catering. Within these chains, the actors, from producers to consumers, are more implicated in the day to day functioning: decision making processes, evaluating

9. This observatory was established following the Deliberation no. 10-1571 of the PACA regional council, on December 10, 2010.
10. The general agricultural census of 2010 presents its statistics on short food chains by differentiating vineyards from other farms.
11. This is a form of CSA basket commonly found in France. For ease of reading, the term “CSA basket” has been maintained throughout the rest of the text.
activities, implementation of participative systems of guarantees. The latter are integrated within the CSA network of the PACA region since 2006. New forms have been tested since 2009; but their application remains rather chaotic and is still not recognized by local authorities (Mundler, Bellon, 2011).

In addition, these collective approaches help develop the territory in which they are established. This can take on two forms: either as a territorial source of income (Mollard, Pecqueur, 2007) or simply to strengthen an identity without any further mobilization of territorial resources (Gumuchian, Pecqueur, 2007).

**A geographical approach to the development of short food chains**

The issue of ties between local food sources and the territory is particularly central. A number of studies have already underlined the importance of such links by describing the role of the territorial context (whose level of pertinence remains to be defined) in the emergence of local food chains and territorial food systems (SAL) (Born, Purcell, 2006; Derkzen et al., 2009; Scheffer, Dalido, 2010; Chometon, 2011; Mount, 2012; Minvielle et al., 2011; Raynal, Razafimahefa, 2014). Other studies focus on the impact of local food systems and the development of agricultural activities on the territory as well as the reinforcement of territorial identities (Bertrand et al., 2006; Mollard, Pecqueur, 2007). The city of Aubagne is a good example (Consales, 2005; Brand, Bonnefoy, 2011).

The idea that territorial issues extend past administrative divisions has long been accepted (Antheaume, Giraut, 2005). However, local powers have a tendency to describe and grasp the development of short food chains in terms of their administrative territory. In contrast, when one of these chains is created, it connects a specific supply and demand, producing a food flow; short supply chains develop according to a reticular logic, which is not necessarily limited to any given administrative entity. This was underlined by Anaïs Hanus in her analysis of the Natural Regional Park of Luberon (Hanus, 2011, p. 54)

When local authorities launch or accompany a short supply project, their financial considerations can sometimes inhibit development potential. Several scenarios are possible. The demand on which the project is based does not reach the necessary levels for the network to function; another possibility is the offer within a territory is insufficient to satisfy all demands. The issues in both scenarios could be solved through the development of partnerships with neighbouring territories.

The notion of a territorial (or local) food system is important in the understanding of these issues. Its most commonly accepted definition underlines territorial and sectorial approaches to short supply chains: a territorial food system is “all of the production, processing, distribution, consumption in a given territory, whose geographical limits are determined by consumption. It is influenced by food habits, public policies, know-how in terms of production or processing, territorial characteristics... This corresponds to the way in which society is organized to feed itself.” (Dénechère, 2007). The “territory” is determined here by consumption. Inversely, the notion of a local agri-food system defines the territory through the characteristics and the functioning of its agri-food sector, in other words through production and processing: “an organization of production and services (farming units, agri-food companies, trade companies, catering companies...) associated by their characteristics and functioning to a given territory.” (Muchnik, 2010). In this article, the given territory of a food system emerges from the...
combined organization of consumption and production. For ease, we will continue to use the term TFS territorial food system).

To make this concept operational, we will describe the constitutive dimensions of a food chain (from production to consumption) in view of observing at which geographic level emerges a set that functions as a system. This bottom-up approach seems key to furthering the characterization of the territorial dimension of short supply chains.

**An analytical grid inspired by the TFS program (Territorial Food System)**

To establish a territorial diagnostic of local food systems in the PACA region, we will describe the current situation in order to uncover potential development opportunities for short supply chains. We have based our approach on the TFS program’s methodology (Berger, 2010), which suggests establishing a food diagnostic through the simultaneous study of data relative to demographic realities, to agri-food system, and to the territorial organization of the space studied, in order to identify more circumscribed territories, which present particular food characteristics. TFS’s food diagnostic consists of “re-establishing food as a trigger for territorial development and trying to understand how agriculture and food are linked and organized within the territory”.

Our research began with the survey of short food chains in the PACA region (fig. 1). Logically, the layout of the various chains generally follows population levels. We thus find the importance of the Marseille urban area and its main axes: the seaboard, the Rhône valley where fruit and vegetable farming is particularly developed, as well as the Durance valley, where the population pool in Manosque and Gap figures clearly. More specifically, distribution logics change according to whether or not the forms were initiated by individuals or collectives. The former follow the main agricultural production zones (Comtat basin, Durance, Laragnais, and Gapençais axes). The latter more closely follow the division of (medium to large) cities in the Bouches-du-Rhône and the Côte d’Azur and their peri-urban spaces. To further this first approach of the development dynamics of short supply chains in the PACA region, we performed a food diagnosis at the municipal level on the basis of the four sets of thematic data (table 1). The first two group together descriptive variables that estimate local supply and demand. The third data set assigns to the municipalities a group of variables describing the organization of the territory at a more general level, with an impact on mobility. The last data set includes descriptive variables of farms that market their products within short food chains or with other forms of local distribution, in other words the current state of things.

Data concerning demand (table 1a) includes variables describing the density, the social and economic level, and the age structure of the population. These variables are associated with considerations on food habits in order to characterize an individual’s potential demand for local goods. Consumer profiles in short food chains, and more specifically within more recent forms, is comparable to the profiles of consumers of CSA baskets and organic produce (Lamine, 2008; Recours et al., 2005). While we must not lose sight of the diversity of consumer profiles, several trends stand out. These consumers are for the most part urban, between 30 and 40 years old, and are “people with higher degree levels, but with average income” (Lamine, 2008, p. 34 et p. 36). To complete this observation on individual demand, we have included the density of local food shops (grocer’s, mini-markets), establishments that manufacture food products, and restaurants, all of which are potential outlets for local produce.
The data on the supply describes the organization of the potential supply for local chains for fresh produce. We observed sectors of agriculture activity where local food consumption can be considered a potential outlet (table 1b). These sectors include organic agriculture, heavily solicited by the short food chains, and more generally market gardening and fruit farming. Fresh produce is the base of the majority of short supply chains, especially the more “recent” ones. Finally, we based our observations on the established fact that farms using these chains are small to mid-size (Recensement général agricole – RGA from 2010) with a diversified production.

Fig. 1/ Cartography of different forms of short food chains in the Provence-Alpes-Côte d’Azur region

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### Table 1/Variables chosen by data sets and interpretative explanations

<table>
<thead>
<tr>
<th>Term</th>
<th>Chosen variables</th>
<th>Source</th>
<th>Interpretation</th>
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<tbody>
<tr>
<td><strong>a. Relationship between demographic dynamics and consumer profiles</strong></td>
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<tr>
<td>Densité</td>
<td>Population density (local)</td>
<td>INSEE 2009</td>
<td>Demographic pressure</td>
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<tr>
<td>Épicérie</td>
<td>Number of local grocery stores per 1,000 inhabitants</td>
<td>INSEE 2010</td>
<td>Potential professional demand (restaurants, retailers)</td>
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<tr>
<td>Établissement alimentaire</td>
<td>Number of establishment offering accommodations and restaurants per 1,000 inhabitants</td>
<td>INSEE 2011</td>
<td>Impact on food habits: populations with higher revenues and degree levels consume more fresh fruits and vegetables</td>
</tr>
<tr>
<td>Revenus</td>
<td>Median fiscal revenues per unit of consumption</td>
<td></td>
<td>- Younger populations consume less fresh fruits and vegetables;</td>
</tr>
<tr>
<td>Sans diplôme</td>
<td>Portion of the population without a degree</td>
<td></td>
<td>- People between 30 and 60 years old consume more fresh vegetables;</td>
</tr>
<tr>
<td>Cép-Brevet</td>
<td>Portion of the population with a degree level of: Cép-Bac (middle school)</td>
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<td>- Older populations consumer more fresh fruit</td>
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<td>Cap-Bac-BEP</td>
<td>Undergraduate</td>
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<td>Supérieur court</td>
<td>Graduate</td>
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<td>Supérieur long</td>
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<tr>
<td>15-29 ans</td>
<td>Portion of youths (15 to 29 years old) per municipality</td>
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<td>30-59 ans</td>
<td>Portion of the population from 30 to 59 years old in the municipality</td>
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<td>+ de 60 ans</td>
<td>Portion of elderly (60+ years old) per municipality</td>
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<td><strong>b. Relationship between agricultural statistics and types of production oriented toward local food consumption</strong></td>
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<tr>
<td>Arbo. Bio</td>
<td>Number of organic farms in 2011 specializing in: Fruit trees, Market gardens, Large scale farming, Medicinal plants, Husbandry</td>
<td>Bio de Provence 2011</td>
<td>There is a large percentage of organic farmers among those who market their products in short food chains as well a among those who consider a reconsideration</td>
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<td>Maral. Bio</td>
<td></td>
<td>General agricultural census 2010</td>
<td>Good practices in local, short food chains are similar to organic practices, without the accreditation</td>
</tr>
<tr>
<td>Grèdes cult. Bio</td>
<td></td>
<td>INSEE 1999</td>
<td>On average, farms using local, short food chains mobilize 2.2 units of work per year. The other farms use 1.4.</td>
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<td>Herbo. Bio</td>
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<td>Farms in local, short food chains are generally small</td>
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<td>Elevage Bio</td>
<td></td>
<td></td>
<td>Focus on fruit (permanent crops) and vegetables (arable land): crops at the base of most short food chains</td>
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<td>Olives Bio</td>
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<td>Among those participating in short distribution circuits, 1 out of every 5 are less than 40 years old. This proportion is higher than all other farmers combined; regardless of the marketed products</td>
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<td>Autres Bio</td>
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<tr>
<td>Uta_Expl.</td>
<td>Unit of annual work (uta-equivalent of 1,800 hours of man labour per year) per farm in 2010 in the municipality</td>
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<td>Sau_Expl.</td>
<td>utilized agricultural area per farm in 2010 in the municipality</td>
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<tr>
<td>Sau_surf.com</td>
<td>Portion of utilized agricultural area per municipality</td>
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<tr>
<td>Terre lab._sau</td>
<td>Portion of arable land and permanent crops in the municipality (in % of utilized agricultural area) in 2010 and its evolution since 2000</td>
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<td>Cult._perm._sau</td>
<td>Portion of work on agricultural worksites in the municipality in 2009 and its evolution since</td>
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<td>Part emplo agri.</td>
<td>Portion of economically active farmers in 2009: 15 to 24 years old, 25-54 years old, 55+ years old</td>
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<td>Diff emplo agri.</td>
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<td>Agri 15-24 ans</td>
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<td>Agri 55 ans et +</td>
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<td><strong>c. Relationship between the current and the development state of short food chains</strong></td>
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<td>Paniers</td>
<td>Number of forms of short food chains in the municipality: baskets</td>
<td>Observatoire PACA</td>
<td>Localization of mobilized demand</td>
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<tr>
<td>Pvc</td>
<td>Collective farmers’ shops</td>
<td>General agricultural census 2010</td>
<td>Differentiation of older and more recent forms</td>
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<tr>
<td>Vaf</td>
<td>Direct farm marketing</td>
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<td>Stemming from a collective and/or individual dynamic</td>
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<tr>
<td>Autres</td>
<td>Others</td>
<td></td>
<td>The importance of such marketing in terms of farmers’ turnover: from niche markets to well established distribution chains</td>
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<tr>
<td>Modalité _1000 habitants</td>
<td></td>
<td></td>
<td>Focus on fruit and vegetable farmers</td>
</tr>
<tr>
<td>Ca ccp Cant. 10%</td>
<td>Number of forms per 1,000 inhabitants in the municipality</td>
<td></td>
<td>The relative portion of farmers using short food chains: marginal?</td>
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<td>Ca ccp Cant. 20-40%</td>
<td>Number of farms selling within short food chains in % of turnover in 2010: less than 10% between 10 and 30% between 50 and 75% 75%+</td>
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<td>Ca ccp Cant. 50-75%</td>
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<td>Ca ccp Cant. 75%</td>
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<td>Part CCP</td>
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<td><strong>d. Impact or territorial organization on the emergence of a territorial food system</strong></td>
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<td>Surface BV</td>
<td>Surface area of living areas in to which belongs the municipality</td>
<td>INSEE 2012</td>
<td>Accounting for mobilities</td>
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<tr>
<td>Tol. Territories</td>
<td>Number of organized territories: Établissement public de coopération intercommunale (EPCI – Public establishment of intercommunal cooperation), Provence, Groupe d’action local (GAL-Local action group), parcs naturels régionaux (PNR-Regional natural parks)</td>
<td>Observatoire PACA</td>
<td>Accounting for the number of administrative territories referenced as actors who would potentially accompany short food chains</td>
</tr>
<tr>
<td>CATAEU</td>
<td>Zoning of urban areas according to the INSEE (classification by use)</td>
<td>INSEE 2010</td>
<td>Impact of urbanization on supply (land pressure) and on demand (patterns of consumption)</td>
</tr>
</tbody>
</table>
The data set of the current situation (table 1c) describes the state of the development of chains in terms of producers and of marketing forms. The 2010 RGA offers information on the percentage of farms that markets all or a part of their production in short chains. As for the PACA regional council, its list of forms of short supply chains presents a localized inventory. For each of these data sets an analysis of the matrix of correlations was carried out beforehand in order to select the variables retained for factorial analysis.

The first step (1) in our methodology (fig. 2) consists in exploring the sets of data with factorial principal component analyses (PCA) in order to characterize the potential supply and demand. The second step (2) compares the results in step 1 with data on territorial organization through multiple factor analyses (MFA). We thus define the spatial structures that can be interpreted in terms of local food supplies: areas of consumption and supply zones. The third step (3) consists in a PCA of current data: short distribution marketing areas (fig. 1) for demand, RGA statistics from 2010 on short food chains for supply. The last step (4) compares the typology from step 2 that characterizes the balance between potential supply and demand at the local level and the typology of current data from step 3 in order to create a summary of the data on...
the development potential of short food chains. A hierarchical classification of the results of this PCA classifies the municipalities in four groups and a map of these results offers a snapshot of the development potential for short food chains in the PACA region.

**Identification of territorial food systems in Provence Alpes-Côte d’Azur**

In order to identify consumption and production basins directly implicated in local food systems, we began by identifying supply and demand trends through factorial analyses of the constituted databases (appendix 114). Next, we performed a new factorial analysis to compare these trends with data on territorial organization in order to observe the emergence of local food potential at the territorial level (appendix 215).

**Supply and demand trends in regional, short supply chains**

The table of correlations between the variables and each of the factorial axes (appendix 1) allows us to interpret each axis as a separate potential demand for local, fresh food, specifically fruits and vegetables. We based our conclusions on the interpretative relationships explained above (table 1).

Thus, the first axis combines the criteria of a “typical” potential demand for short supply chains, a fairly young population (with few individuals over 59), with a high population density and degree level, and a median revenue above regional averages.

The second and third axes present two potential demands with constraints for short supply chains: axis 2 is a potential “young” demand, with low degree levels and low median revenue. Thus despite the strong population density and points of sales, access to local networks remains limited, even if there are currently short distribution projects looking to improve access. A case in point is the Solid’Arles shop, which has adapted the prices of their CSA baskets. They also donate baskets to the Paniers marseillais. For axis 3, cultural and generational traits explain why these populations are rarely attracted by local networks, other than traditional forms of short distribution (farmers’ markets).

The table of correlations between the variables and each of the factorial axes (appendix 1) allows us to define each of the axes as a separate potential supply. The factorial axes define two potential “types” of supply in terms of short supply chains:

- **Type 1** (axis 1) where organic products of all kinds make a strong showing, the portion of annual work units) per farm is important, and the surface of arable land is over-represented (vegetables). These municipalities have a large percentage of utilized agricultural areas but employment is shrinking within the agricultural sector.
- **Type 2** (axis 3) where organic orchards and market gardening are predominant, as well the portion of agricultural employment. These municipalities, where farmers are relatively young, are also characterized by a high annual work unit per farm and an over-representation of surface area dedicated to permanent cultures (fruit). The other two axes characterize a potential offer adapted to short supply chains.

Axis 2 characterizes an “inadequate” potential offer in that the agricultural sector is important but generally specialized (agricultural employment on the rise), whose networks are extremely structured and with little involvement in local outlets (large farms). Finally, for these “older” potential offers (axis 4), employment in the agricultural sector...
is decreasing and the percentage of farmers over 55 is important. Local outlets could potentially encourage a diversified agricultural activity in these municipalities.

Consumption and production areas: identifying territorial food systems?

We attempted to predict whether territorial sets emerged at the regional level based on these potential supply and demand trends, but also on the capacity of territorial organization to balance supply and demand (table 1d). By taking into account the number of organized territories to which a municipality belongs, the surface of inhabited areas, and the INSEE’s typology of urban areas, we integrated within the analysis the concentration of administrative actors potentially willing to support the offer of short supply chains. These factors were considered along with the daily commute of inhabitants as well as their anchoring point, which influences consumption practices. With this in mind, we performed a multiple factorial analysis (MFA) where each factorial axis chosen describes a configuration of the local food diagnostic (appendix 2).

Axis 1 highlights the municipalities with strong potential demands among the “typical” and “young” sectors (high population density). They belong in large part to major urban poles that structure major population bases in terms of surface area, such as Aix-en-Provence – Marseille, and Nice. In these locations, the local food system is organized around consumption and therefore in terms of daily commutes (work, leisure, consumption).

Axis 2 highlights the municipalities whose potential offer is mostly “types 1 and 2”. They belong to mid-size urban poles or to their peripheries, in relatively small population bases, and are characterized by their affiliation with a large number of organized territories (provinces, natural regional parks, local action groups, public establishment of inter-municipal cooperation). The local food system is organized in terms of supply, notably through developed territorial identities (thanks to national or regional parks, provinces, local action groups…). A notable example is the case of the natural regional park of Luberon or the Asses-Verdon-Vaïre-Var province.16

Axis 3 presents municipalities where a “typical” potential demand is balanced with a potential supply of “type 2”, as both are over-represented.

Supply and demand are equal in these municipalities. The territorial food system emerges in a highly localized manner: populations looking for local fruit and vegetables should find this supply in their municipality. It remains to be seen what is the proportion of demand and what are the means required for such a demand to find a local supply, taking into account neighboring municipalities.

The cartographies of axes 1 and 2 (fig. 3) respectively highlight a dichotomy between the seaboard (Bouches-du-Rhône, Var, and Alpes-Maritimes) and the hinterland (Alpes de Haute-Provence and Hautes-Alpes), and an opposition between the West (Bouches-du-Rhône and Vaucluse) and the East (Alpes-Maritimes) of the region. Though the region’s departmental limits are clearly outlined, when both logics are compared, large groups emerge. The West displays a food system structured by a high potential demand and a very localized existing potential supply. Examples are Aubagne and Allauch, Saint Martin-de-Crau and Pertuis. In the Alpes-Maritimes, the potential supply is very limited but demand is high and fairly specific. The population is mostly elderly and well-off, especially on the Côte d’Azur. In the Hautes-Alpes and the Alpes de Haute-Provence, potential demand is largely under-represented. In the Var, there is no discernible structure.

Towards synthetic data on local food systems

The above analyses helped unveil trends in potential supply and demand of local food systems as well as their spatial organization in the PACA region. By comparing this food diagnostic with the current system in terms of short food chains throughout the region (appendix 317), we can qualify the development potential of short supply chains at the municipal level (fig. 4).

The development of short food chains in the Provence-Alpes-Côte d’Azur region: four municipal profiles

Using the existing data sets, a principal components analysis (PCA)(appendix 3) was performed where each factor axis describes a trend in the development of short food chains relative to the various forms of marketing and to the farmers who sell their production through such forms.

There are four major trends. The first is the presence of a large range of forms but few farmers using short food chains. The second corresponds to a large part of farmers within short supply chains but where established forms offer no significant presence. We surmise that these farms must sell their production in large part within short food chains outside their municipality or in chains not inventoried by the regional observatory. This is either due to difficulties in obtaining information or to the fact that the sales network is not integrated into the observatory’s definition. The third trend is that of the simultaneous presence of a large portion of established forms alongside farmers who market their production (over 10% of their turnover) within short supply chains. The fourth and last trend is characterized by a high density of short food chains and the predominance of marketing forms initiated by the agricultural sector: traditional farmers’ markets and more modern collective points of sale.

Synthetic municipal data

To estimate the development potential of short food chains in the region, we compared the existing trends to the organization of potential supply and demand for local food. By development potential, we designate an interpretation of the grid of multiple criteria with which we characterize the municipalities: the comparison of potential supply and demand (MFA of food diagnostic, appendix 2) with the existing supply and demand of short food chains (PCA of the current situation, appendix 3).

This is why we performed a principal components analysis based on these two groups of variables (factorial axes – appendix 418). The analysis of factorial axes allowed us to observe whether or not a development potential exists for short food chains. We could then analyze whether this potential is affected by demand or by supply.

The first axis presents a configuration with a high degree of development potential. It is based on demand, with the accessibility constraints described above. The second axis corresponds to a configuration where short food chains (aside from forms such as CSA baskets) are well developed and where development potential is relatively weak and based on supply. Axis 3 defines the municipalities where short food chains established by the agricultural sector are highly developed. However, considering the balance between potential supply and demand, these territories risk saturation. Should this happen, the development potential would be low. Axis 4 identifies the municipalities where short food chains are well developed but where population density is low. In light of the non-significant variables of the food diagnostic, it is difficult to determine an orientation for the development potential, other than this potential is limited.
Territorial food system based on demand
Cartography of factorial axis 1 of the multiple factorial analysis
Discretization method: standard deviation

- Negative coordinates
- Non-significant
- Positive coordinates

Source: Observatoire régional des circuits courts de PACA, RGA 2010, INSEE, Bio de Provence.
Author: Guiraud N., 2014.

Cartography of the first two factorial axes of the multiple factorial analysis

Fig. 3

Territorial food system based on supply
Cartography of factorial axis 2 of the multiple factorial analysis
Discretization method: standard deviation

- Negative coordinates
- Non-significant
- Positive coordinates

Source: Observatoire régional des circuits courts de PACA, RGA 2010, INSEE, Bio de Provence.
Author: Guiraud N., 2014.

Cartography groups issued from the hierarchical classification of the results of the factorial analysis of principal components*

* Factorial analysis of the principal components of factorial axes issued from the PCA of the current situation and the factorial axes issued from the MFA comparing potential supply and demand, and territorial organization

- Group 1: Strong development potential based on demand
- Group 2: Strong development potential (comparison of supply and demand)
- Group 3: Weak development potential based on supply (saturated?)
- Group 4: Weak development potential based on supply (not adapted?)

Source: Observatoire régional des circuits courts de PACA, RGA 2010, INSEE, Bio de Provence.
Author: Guiraud N., 2014.

Fig. 4

Cartography of common classes according to their development potential in terms of short food chains

Source: Observatoire régional des circuits courts de PACA, RGA 2010, INSEE, Bio de Provence.
Author: Guiraud N., 2014.
Finally, a hierarchical classification allows us to consolidate the statistics concerning the grouping of individuals in terms of their contributions to the factorial axes described above. Four groups of municipalities are isolated (appendix 4):

- Group 1 includes municipalities whose development potential is strong and based on demand. These localities already have diverse forms of short supply chains but the current and potential supply is limited. It is therefore necessary to find a supply source outside of the municipality (at the very least) in order to develop short food chains.
- Group 2 includes municipalities where short food chains are well developed and where potential supply and demand are balanced. Based on this balance, these municipalities have a strong development potential in terms of short supply chains.
- Group 3 consists of municipalities where the density and diversity of short food chains are high, as is the percentage of farms that market within such chains. Should the situation of neighboring territories be excluded, this group has a low development potential because the sector is already well developed and thus probably saturated. However, the strong potential supply suggests that there are possibilities for further development, notably to satisfy a high potential demand from neighboring municipalities belonging to group 1.
- Group 4 includes municipalities whose potential demand, and to a lesser extent the potential supply, is low. The development potential is also low. This group would need to reorient a portion of its agricultural sector towards short supply chains at the departmental or regional level.

The cartography reveals a regional, organizational logic. Strong development potential is linked to demand on the seaboard and in the Rhône valley. These areas include interstitial municipalities whose potential is linked to a balance between supply and demand; but who risk saturating their short supply chains or whose agricultural sector is inadequate. There exists a concentration in the Alpes de Haute-Provence of areas whose potential is low and based on a supply that is not adapted to short food chains; aside from a handful of exceptions such as Digne-les-Bains. Finally, in the Hautes Alpes, the situation is much more contrasted. There are all types of potential; however the encounter between supply and demand is more clearly visible. This cartography suggests two territorial food systems: on the one hand the seaboard and its hinterland, in its broadest definition including the Alpes de Haute-Provence and on the other hand the Hauts-Alpes.

**Conclusion**

Thanks to this statistical analysis comparing the supply and demand of short food chains in the PACA region, we obtained three types of results: a classification of local food diagnostic in three categories (based on supply, on demand, and on both); a study of the pertinent territorial levels for territorial food systems; and a typology of development potentials for short food chains.

Three trends in terms of the organization of local food systems into short supply chains emerged. These chains can be organized according to demand, to supply, or through a combination. The agricultural sector has a tendency to develop individual forms first. There are older forms (farmers’ markets, direct farm marketing), which are often federated within networks (Bienvenue à la Ferme Welcome to the Farm, Marché Paysan – Farmer’s Market), as well as more recent forms such as collective.
points of sale. Consumer initiated chains are characterized by collective forms (AMAP). The spatial differences (fig. 1) can generally be explained by two different forms: the AMAPs are mostly urban whereas direct farm marketing is rural.

We observed the limits of establishing new local food systems at the municipal level. The balance between supply and demand rarely happens at the municipal level. It is necessary to create such systems at a higher level, either departmental or regional. The cartographic analysis allows us to clearly visualize and detail this aspect of our analysis.

The cartography (fig. 3, then fig. 4) highlights the fact that municipalities whose food system is oriented towards demand are often more widespread than those whose systems are supply based. An example of a demand-based system is the seaboard and the Rhône valley, with a spatial organization linked to the region’s population geography. For supply-based systems, there is the Vaucluse, and in a more localized manner, there are also the municipalities of the Bouches-du-Rhône, the Var, and the Alpes de Haute-Provence, depending on the geography of the agricultural sector in question. The first group seems capable of answering the needs of the latter. The strong potential demand identified in the Bouches-du-Rhône, and more particularly in the Marseille agglomeration, could structure a local food system, insofar as short food chains first call upon producers in neighboring municipalities (in urban interstices), and after, those in the Vaucluse and the Var, and even all the way to the Alpes de Haute-Provence for certain products (cheese and meat) – which extends past the fruit and vegetables that are the focus of this article.

This article shows that the social and economic profiles of the consumer population and the orientations of agricultural activity determine territorial contexts that are more or less favorable to the development of short food chains. We thus note that the consumers’ social and economic profiles influence (culturally, ideologically, financially) access to local food products. Agricultural practices also play a role: specialized agriculture, concentrated in defined production areas, is rarely if ever interested – or organized – into local outlets. A cartographic analysis of the four municipal profiles of development potential (fig. 4) confirms the territorial level of two territorial food systems in the region: the seaboard and the vast hinterland (Alpes de Haute-Provence and Hautes-Alpes).

Our analysis sheds light on the spatial forms of organization and the dynamics of developing short food chains. We believe that it can be used as a basis to accompany the local food sector, notably by public authorities, in order to create an integrated policy for the development of short supply chains. The cartography of the typology of the development potential of short food chains (fig. 4) could thus be a prerequisite to encourage actors to consider contrasted municipal situations, while placing them within a more global territorial context through the qualitative analyses of neighboring municipalities. The importance of taking into account the different forms and different levels of organization should be underlined to show actors how to achieve, case by case, a balance between the supply and the demand of a given territory.
References


