

The Logistic leverages of short food supply chains performance in terms of sustainability
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THE LOGISTIC LEVERAGES OF SHORT FOOD SUPPLY CHAINS PERFORMANCE IN TERMS OF SUSTAINABILITY

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ABSTRACT

Local food supply chains seem now to be considered as a serious alternative to global ones in terms of sustainability. A lot of initiatives are developed and they often are associated with economical, social and environmental benefits. The main objective of this paper is to discuss the reality of these advantages.

They are notably considered as a way to relocate or maintain agricultural activities, particularly in suburban areas. They are also supposed to be able to restore the connection between producers and consumers and to promote an alternative agricultural model based on “greener” production methods and the reduction of transport distances (the “food miles”). However, several studies have shown the limits of these models. Firstly, many important retailers have developed short food supply chains, questioning the local food system as an alternative business model. Moreover, it needs specific resources that many producers can't always offer. Secondly, an inadequacy between consumer's and producer's expectations can be observed, and many initiatives aren't based on collective approaches but on individual actions. Thirdly, these models aren't always based on alternative producing models (as organic agriculture) and the limitation of distances isn't always a factor of reduction of greenhouse gases.

The paper tries to assess the performance of local food systems and the logistic leverages that could improve that performance. Long food chains have demonstrated the importance of logistic as a means to improve performance, and we can wonder how the improvement of the logistic organization of short food systems could increase their economical, social and environmental performance.

Considering the fact that there's not only one local food system but a wide range of possibilities based on different numbers of intermediates or different geographic scales, our

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work will, at first, be based on Parker's article [2005] that defines short food supply chains as systems that reduce both the distance and the number of intermediates.

After a brief presentation of short chains and of the advantages related to them, we will discuss their environmental assessment and impact, showing the role of transport and production mode in that dimension. An analysis of long food chains will then enable us to show how strategic logistics has become in that sector and the means necessary to the implementation of efficient logistic schemes.

After a first look at logistics in short chains, we will propose a detailed study of the logistic schemes observed in fruit and vegetable basket systems in the Paris Region. This will lead us to build a typology of organizations to study their potential role in the improvement of short chains performance and more specifically their ability to improve coordination between the actors of those chains.

Keywords: Short food supply chains, performance, fruit and vegetable baskets

INTRODUCTION

Many works in the literature propose the hypothesis that the development of short food supply chains is explained by their contribution to the renewal of food supply and by their ability to limit the constraints imposed to the farmers by the industrial and / or commercial intermediates. Thereby, they should be strong driving forces for the transformation of food supply chains regulation. If there are many advantages associated with them, many constraints limit their development. These constraints are often analysed from an agronomical point of view or through the resources and time necessary to implement these chains.

Although the logistics issues are considered as strategic in long food supply chains, few researches are dealing with the subject in short food supply chains. However, logistic organizations play an important role in the performance improvement of the short chains, particularly as far as their environmental performance is concerned. The objective of this article is to fill the lack of knowledge and analysis about the short food chains logistic organization.

The research that has been conducted puts the stress on the fruit and vegetable baskets in the French Paris Region. Its goal is to develop knowledge about the specificities of the baskets supply chains and their developing logistic scheme.

After a short presentation of short food supply chains and their potential advantages, we will focus on their environmental performance. More particularly, we would like to discuss the traditional assessment of this environmental performance, which is only based on the positive impacts of the reduction of distances without taking into account the other logistic dimensions.

We will demonstrate in this paper the strategic dimension of the logistic organization in the long food chains contrasting with the few studies about the logistic of the short ones. Our purpose is to show the diversity of the logistic organizations that are implemented and their

determinants. This will enable us to show the interactions between the strategic choices made by the farmers and the nature of their relationships with the other actors of the chain.

ARE THE SHORT FOOD SUPPLY CHAINS A REALLY SUCCESSFULL SCHEME?

The increasing media exposure about the development of short food supply chains has recently become more and more important, more particularly about the most innovating systems (for example “AMAP” that is to say Community Supported Agriculture, Internet sales and direct sales at farms with a teaching purpose such as pick-your-own food farms). However, a formal definition of short food supply chains doesn't exist. Most of the studies are case studies on a regional scale and focus on a specific system, without drawing general conclusions.

Short chains definition:

According to Parker (2005) short food supply chains are chains in which the geographical distance and/or the number of intermediates is reduced. So, this kind of system concerns a wide range of supplying networks from farmers' markets, direct sales on farms, farmer's shops, fruits and vegetables baskets, pick-your-own food farms etc... to the marketing of local products without a decrease in the number of intermediates. For example, some local productions are sold to supermarkets through a complex logistic organization. It can also be marketing systems that reduce the number of intermediates but not food-miles (which is the case of the internet sales of farmers' products). Those two last kinds of systems are extreme cases but a short food supply chain usually combines a geographical proximity and a decrease in the number of intermediates. According to Parker (op. cit.) a system combining these two criteria can be considered as an “alternative food networking”.

Depending on the actors involved, their objectives, their territories or their issues, the limits of the short chains will not be the same. In France, to be considered a “local” or short chain, the distance around the farm should not exceed 80 kilometers (decree n° 2002-1468¹). According to Chaffotte and Chiffolleau (2007) this decree defines what is called long distance supply chains. Online sales or sales to a retailer located far away from the farm are not considered proximity supply chains. Concerning the number of intermediates, the National Agency for the Development of Agriculture (ANDA) considers that a short chain cannot involve more than 1 intermediate.

¹ Decree n° 2002-1468, December 12 2002 « Relative aux modalités particulières de contrôle de la reconnaissance de qualité pour les producteurs agricoles et les artisans qui commercialisent leur production en petite quantité sur le marché local ».

Potential advantages of short food supply chains:

Many virtues are associated to these schemes, starting with local and sustainable development, and farm perennality.

As far as local development is concerned, short food chains are supposed to encourage the relocation of agricultural activities in suburban areas, activities whose profitability might be lower when included in conventional food chains due to lower wholesale prices and gross profits.

In addition, the farms involved in these schemes require more manpower. Small farms that are part of these systems seem to demonstrate many socio-economical advantages compared to big farms, notably concerning the employment in rural areas.

These chains are also supposed to guarantee the perennality of farms by limiting the number of intermediates whose gross profits can make 60% of a product retail price (Bressoud, 2006). Moreover, long food chains seem to have reached a maximum efficiency, whereas the organization of short ones might still be strongly improved. Short chains also seem to be based on cooperative movements, constituting a counter-power in front of conventional distribution channels.

However, these virtues may be discussed. Firstly because short chains remain marginal. For fruit and vegetable they represent about 7% of French consumers' procurements, less than 10% of French production (Dubon et al., 2008) and 70% of them remain distributed by hypermarkets. In addition, these distribution channels aren't excluded from the short food supply chains as an increasing number of large-scale retailers tend to have more direct links with producers for their procurements. This strategy of stores procurement directly by the producer isn't new, but the promotion of special trademarks, sometimes associated with good agricultural practices is a fast developing model².

The economical perennality (profitability, property transfer ...) of farms involved in short food supply chains is also far from being demonstrated. Pailler (1998), who has studied the case of wine producers in Gironde, shows that the implementation of a direct selling strategy doesn't automatically increase their profits. Morizot-Beau (2008), in his recommendations to farmers who would try direct sale, insists on the importance of a detailed economical study of each project, as farmers of rural areas come up against many difficulties to access markets. Furthermore, short chains are, most of the time, individual initiatives and, for some of them who are very recent like baskets of products, the collective dimension doesn't play a central part in the organization.

² For example, collective initiatives in supermarkets : Les Maraîchers de Traditions (Île de France), les Saveurs du coin (Rhône), Terres d'ici (Grenoble), les Maraîchers des Campagnes Lilloises, Saveurs en Or (Pas de Calais), les Jardins du pays d'Aubagne (Bouches du Rhône), Traditions maraîchères Marne, Haute Garonne, Pyrénées Orientales, Var), Terres de goût (Provence), Le petit producteur (Fraises de Carpentras).

The environmental performance of short food supply chains:

The development of these systems is also part of nowadays concerns about more sustainable practices in agriculture and in the way of consuming. The debate is particularly lively in Anglo-Saxon countries where the concept of food-miles³ has become very important, notably because of the high proportion of imported food.

The decrease of transport distances leads to consider those short chains as sustainable systems that reduce the environmental nuisances caused by food supplying. In their study, Pretty and al. (2005) have assessed the external costs due to transport for an average basket of products (based on a classical procurement model with long supply chains). It shows that the consumer should pay 3% more if the environmental costs were taken into account in the final price⁴. But if these products had originated from a maximum distance of 20 km around the place of consumption, environmental costs would be 90% lower.

In addition, recent studies show that the producers involved in short chains tend to have more environmentally friendly practices (Spanu, 2008), notably to meet the consumers demand for “greener” products.

However, more detailed studies are necessary to determine how far those short chains may be factors of environmental performance.

For example, Carlsson-Kanyama (1997) show that the distance is only one of the parameters that determine the ecological impact of transports. The indicators may thus be used with caution. They can notably be used to identify the consuming models based on an important rate of imports, and which are huge energy consumers, before further analysis such as products life cycle analysis.

So, the food miles, by integrating one and only criteria of geographical distance, only gives a first indication concerning the environmental impact of a product. The environmental performance of a food providing system as a data must be associated with others data. It means that the transport modes, the type of fuel used, the filling rate of the vehicles, etc, are also very important and should be considered.

This explains why further studies like carbon assessment have generally been used to qualify the impact of supply chains on the environment⁵.

³ The food miles indicate the number of kilometres covered by food from its production area to its consuming place, in other words the consumer's plate. Introduced by Tim Lang (professor of food policy at London's City University), this concept is today widely accepted and taught as an indicator in Anglo-Saxon countries, notably by large-scale food retailers (Tesco, Marks and Spencer) which have decided to indicate on overseas products the production area or the transport mode (airfreight being the least environmentally friendly).

⁴ This additional cost is mainly made up of public subsidies for agriculture (£0.93), agricultural externalities (£ 0.81), road freight transport for retailing (£0.76) and the transport of products once they've been bought by customers (£ 0.41).

⁵ The « Bilan Carbone » (Counting of Greenhouse Gas Emissions) is a tool designed by the ADEME (French Agency for the Environment and Energy Management) to assess the greenhouse gas emissions. It was developed in 2000 by Jean-Marc JANCOVICI from the MANICORE consulting firm. Data can easily be found in a database of emission factors developed by the ADEME.

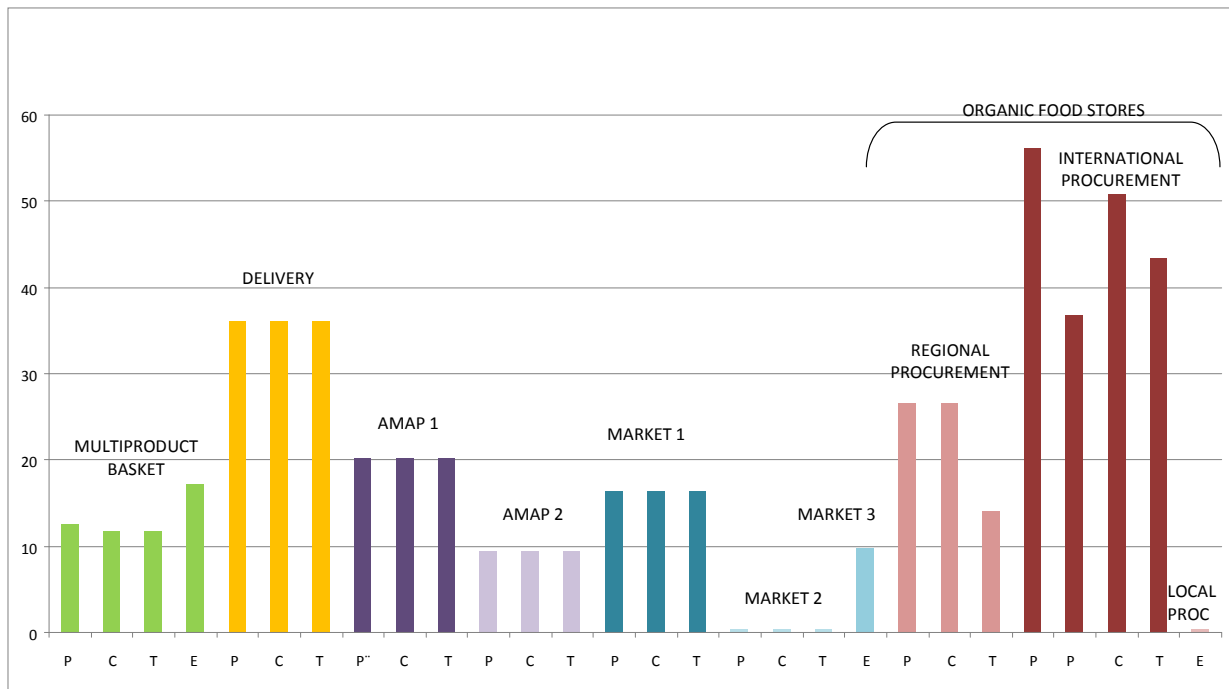


Figure 1 – Greenhouse gases emissions at km per product (in G equivalent c/km). Source :Original chart elaborated from Perez-Zapico (2008)
 P: potatoes; C: carrots; T: Tomatoes; E: Eggs

This bar chart shows the emissions of different products (a column = a product). Four products have almost systematically been evaluated (potatoes, carrots, tomatoes, eggs) in all types of supply chains. Four types of short chains are described, the organic food store being considered as a structure combining short and long chain. The variables used are the type of vehicle, its greenhouse gases emissions and its filling rate. In short chains, vehicles have lower emission factors but also much lower loading capacity.

The “market” system is a model of hyper-proximity with, in this case study, a rather high filling rate. It represents the systems with the lowest rate of carbon emissions.

Imported products sold in organic shops represent the logistic model with the highest rate of carbon emissions.

Delivery is the system that produces the highest rate (in this study, the filling rate is very low and goes on decreasing thru out delivery round). The emissions in that system are comparable with those of organic shops regional supply.

So, the strategic part of logistics in the economical and environmental dimensions of short food chains is confirmed by the Perez-Zapico’s study (2008). It shows that new types of logistic organizations have to be implemented to reduce the number of trips and to increase the offer for specific outlets. We can take for example the pick up at farms of the products used to elaborate baskets or the creation of local platforms to group them.

At the same time, the actors of short chains are becoming more and more concerned with the logistic organization, as they are aware of the fact that they’ll have to improve it soon.

THE LOGISTIC ORGANIZATION AS A MEANS TO IMPROVE THE SHORT FOOD SUPPLY CHAINS PERFORMANCE

But the logistic organization and the resources dedicated to short chains (infrastructures, skills, strategies...) remains ignored or under-estimated whereas logistics as been identified since many years as an essential way to improve conventional chains performance. If we consider, as B. Redlingshöfer does in a recent collective book (Maréchal, 2008), that the long chains organization has already reached its maximum efficiency, the short chains can still be widely improved. Innovative solutions have to be found, notably by stimulating collective strategies.

Logistics: a tool for long chains performance improvement:

There's not only ONE type of logistic organization in long chains as it can vary according to the supply mode, to the destination of the product (exchanges within or between areas, international exchanges) and its purpose (sale to customers, catering industry and eating outside of home or food processing). But a global pattern can be drawn, as shown in the example below based on the analysis of the fruit and vegetable industry.

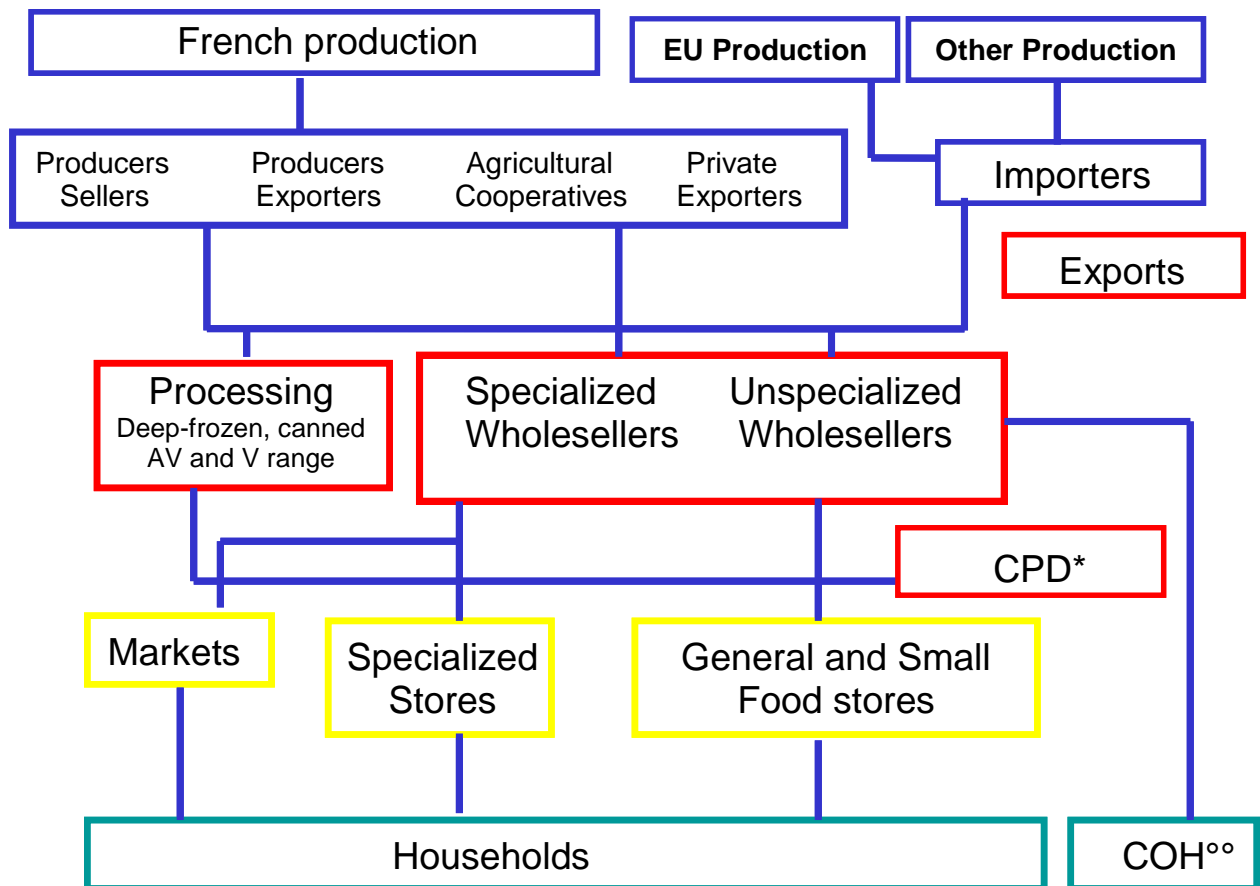


Figure 2 – Long food chain organisation – elaborated from Xerfi (2008)

* Central Purchasing Department

°° Catering industry and eating outside of home

The graph shows the major role of intermediates in the chain: traders, central purchasing departments of large-scale retailers and/or logistics service providers. Producers are deprived of the control of flows and information.

To have a better control of their procurements, large-scale retailers and local authorities have developed their own buying structures, which limit the use of dedicated intermediates. As a result, traders have lost their importance and represented only 2 112 firms and 26 105 employees in 2006 (Xerfi, 2008) whereas the sector had already been declining since the beginning of the decade.

An evolutionist model with three steps (Paché & Colin, 2001) enables us to understand the logic behind the development of the retailers' logistics:

- At the beginning, the control of the flows in the distribution channel remained under the control of industrial firms and wholesalers, which were the only ones able to deal with wholesaling.
- Then, following quite diverse trajectories, the first insourcing strategies of the logistic activities by the retailers appeared. The first logistic initiatives taken by major food retailers occurred early on (Crespo de Carvalho et Paché, 2002) and took place in the 1920s, when branch firms implemented a network of regional warehouses for the procurement of their stores. The goal was to benefit from the leverage effect due to the multiplication of branch firms to short-circuit wholesalers and to have direct links with providers (Meuleau, 1988) in order to reduce the cost of products.
- The last step is based on a will to rationalize the flows so as to obtain a lasting competitive advantage towards upstream actors of the sector.

The mastering of flows and information makes logistics a strategic activity. Thus, the service provider who interfaces between production and markets can implement logistic solutions based on a massification of flows and on a mutualisation of the assets which satisfy both retailers and industrial firms. They are at the intersection of several value chains, which enables them to consolidate the demands sent by their diverse clients and to invest more easily in appropriate assets (Paché, Sauvage, 1999).

...which needs complex and costly assets:

The management of the numerous assets needed to organise logistics justifies the resorting to service providers. When industrial firms were in charge of logistics, the stores procurements came directly from factories or suppliers' warehouses. The retailers had little power in the organization of the supply chain as they had no logistic assets. This system related with "EX works" contracts enabled the industrial firms to adopt a policy based on the retention of productivity gains (Carbone, 2004).

Among those assets, the importance of the logistic infrastructures can be noticed. Today, in France, approximately 80% of the flow of items intended to the supermarkets transit to a warehouse or a platform. The retailers organise their stores procurements from central

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platforms and regional or local warehouses that become obligatory as the stores have to be supplied faster and faster to avoid stocks.

The **warehouse** carries out several functions from massification, shipping re-composition, dispatching to storage. It's also the place where the break of load is used to realise some operations: repackaging, labelling etc... They are mixed or dedicated to a type of product (dry, fresh, frozen...). This specialization enables the retailers to overcome the risk of gigantic storage areas due to flow massification. It offers a better coherence of assets and logistic practices, of skills, of the needs for specific temperature or specific storage height.... Another advantage is the coherence of the stocks turnover. The degree of specialization of the sites depends on the diversity of the stores selection and on the number of warehouses. However the implementation of a logistic scheme inspired by a just-in-time model to meet the need for reactivity has lead to an evolution of the use of logistic sites: the warehouse is no longer the main asset used by retailers.

Platforms have become more and more important in flows management, notably for certain types of products such as fresh products. The platform appears to be a key of the optimization of bulking and un-bulking without storage. It is now only a transit zone for the customer's order. It's the best place for cross-docking (dispatching of items without storage (Carbone, 2004)).

But the management of these assets needs a critical mass, the implementation of technologies that fit the needs and an important capital.

Either the retailer wants a very specialized logistic support. In a situation of strong logistic constraints, the retailer who wants to manage the whole process on his own may not reach the required mass necessary, may not have the right technological tools and, as a consequence, might be behind compared to competitors.

Or the retailer wants to use specific logistic structures without tying up financial capital. Here, outsourcing of the products delivery enables him to use financial resources to develop his network and marketing strategy.

The outsourcing chosen by Carrefour and Cora is extreme as they delegate some entire parts of their activities to service providers. But most of time there's a coexistence of internal and outsourced infrastructures in the logistic chain of a retailer.

A first look at short supply chains:

Paradoxically, the logistic of short chains remains badly informed and eludes the question of the assets, in the analysis but also on the field. The short retailing systems / short supply chains do not benefit specific initiatives to improve transport and logistic organization.

A study was nevertheless conducted in 2008 about the logistic organization of these systems (Perez-Zapico, 2008). Hochedez (2007) also made an analysis of two systems of biodynamic baskets in Sweden. These researches illustrate that the logistic organizations of these

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systems remain quite unsophisticated. They also show their variety, related to the number and the nature of the products.

Perez-Zapico distinguishes baskets from a single producer and from several producers. The diagrams below illustrate these two systems of baskets.

Mono-product basket system (elaborated by only one producer) → AMAP

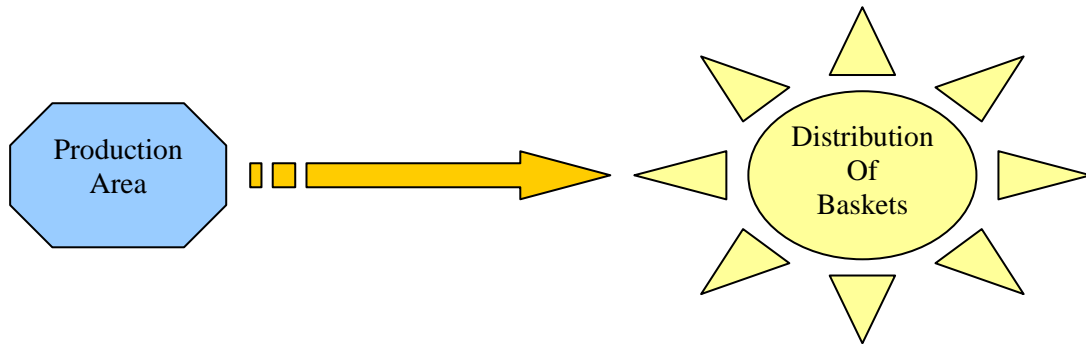


Figure 3 – Diagram of a basket from a single producer – Perez-Zapico (2008)

Multi-product basket system (elaborated by several producers and allowing the expansion of the range of products sold to consumers).

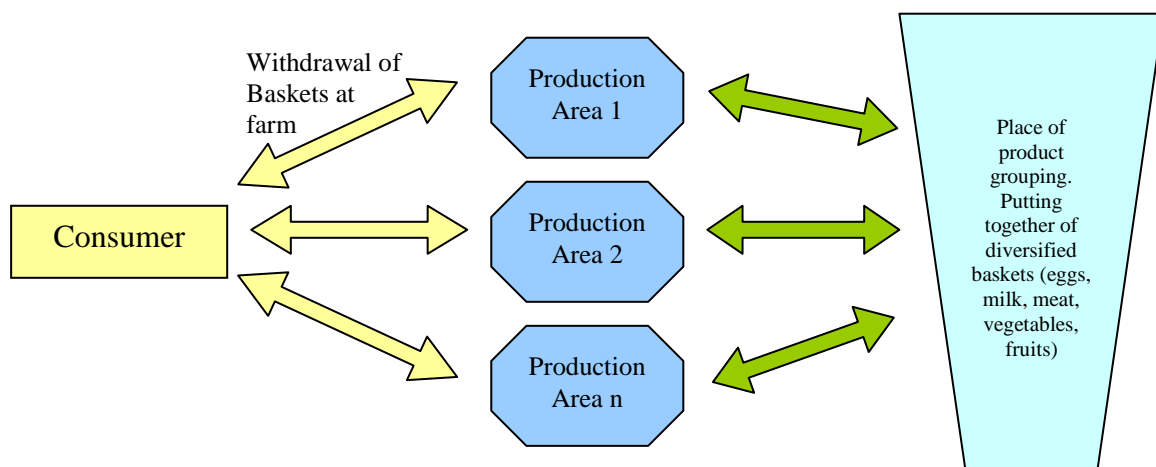


Figure 4 – Diagram of a basket from several producers – Perez-Zapico (2008)

In this last case, the collaboration of several producers to make diversified baskets can require a more complex logistic organization, with an operation of bundling / unbundling and the need for the producers to meet each others. Besides, the dairy products and the meat require specific equipments to respect the cold chain and the transport organization can rapidly become complex.

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The biodynamic basket, including local and international products, is at the same time a traditional scheme of supply chain with many intermediates and a mode that is more craft like for local supplies.

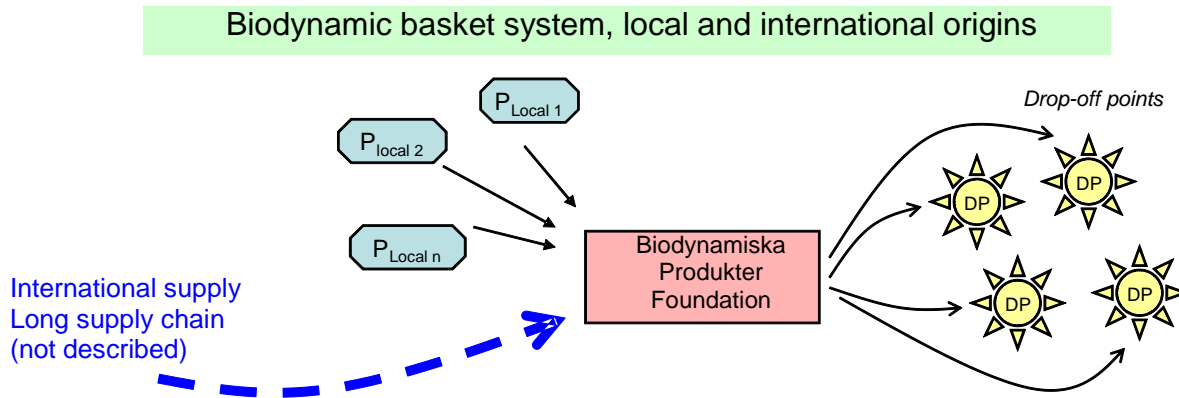


Figure 5 – Diagram of multi-origin basket – Hochedez (2007)
 P Local = Local Producer

Our objective is to complete the analysis of the logistic organizations of the short food supply chains, as far as these concerns begin to appear in many groups of producers. The members of the association “Saint Gilles's baskets” are looking for solutions to reduce their members’ trips. In order to optimize their delivery system, the ‘Baskets of the Val de Loire’ have also chosen to create a logistic hub in the Paris Region with a structure specialized in occupational integration.

LOGISTICS FOR BASKETS DISTRIBUTION IN THE PARIS REGION

Methodological elements

Fruit and vegetables basket is a supply of services and products (fruit and vegetables), which can be fresh or processed, sold in a single batch, proposed by a producer-farmer, a group of producers or a commercial intermediate, meant for the consumer or a group of consumers, with or without a long-lasting commitment.

The baskets systems, even if they are marginal in the food economy, are a very mediatized distribution scheme. As an innovative system that sometimes uses new technologies, it has become more and more relevant as the origin and quality of products and the associated services has become a major concern for consumers. Baskets distributed and sold to “AMAP” (association for the preservation of farming) are well known in France. But there are also other commercial organizations which distribute and deliver baskets, with organic products or not, at home or in drop-off points. There is a large variety of models for the

baskets distribution and their analysis is complex because of their fast evolution. The AMAP remains the most famous commercialization scheme. The basket sales which do not come from AMAP result from a farmers' or intermediate's supply.

Currently, the baskets business has become more and more dynamic and has increased, especially for the commercial intermediates. Thus, it is difficult to estimate the economic importance of the phenomenon. All the French Regions have a more or less important baskets network, in particular big towns where there is a strong demand. The baskets supply is concentrated in the Provence-Alpes-Côte d'Azur, Rhône-Alpes and Paris Regions, each having about twenty commercial operators. To a lesser extend, Languedoc-Roussillon, Brittany and Midi-Pyrénées Regions have about ten operators each.

In this research project, we have analysed the networks of fruit and vegetable baskets delivered in the Paris Region, with products coming from the Region or from other Regions or countries but with a delivery area in the Paris Region. Some quantified elements help presenting the phenomenon: at the end of 2008, the AMAP network for Paris identified 106 groups of consumers and 71 farmers under contract. The other basket networks include at the same time producers who deliver consumers without belonging to AMAP and also include commercial intermediates who supply baskets to people thanks to various modes. The chart below illustrates the various types of baskets taken into account in the study.

Table 1 - The various concepts of baskets in our analysis

Consumers Producers	Group of consumers	Individual consumers
Producer - farmer	AMAP type baskets Work council baskets Deliveries: various places, farms, firms	Baskets in drop-off points Baskets in stations Baskets at farmers' markets Deliveries: in stations, at farmers' markets, in various drop-off points
Commercial intermediate	Baskets for works councils Deliveries: firms	Baskets in drop-off points Baskets delivered at home Deliveries: in various drop-off points, at home

- 14 detailed interviews were realized with:
- Basket producers
 - A representative from a group of consumers
 - A representative from a Chamber of Commerce

A variety of logistic organizations

The survey shows a variety of logistic organizations according to the following criteria:

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- The number of suppliers / farmers involved in the preparation of baskets
- The nature of the demand: "AMAP" or " without AMAP ".

It indeed seems that these two variables impose constraints and different opportunities that can lead to a typology of the logistic schemes associated with the basket systems we have analyzed.

The four logistics schemes we have identified are located in the various spaces bounded by our two variables:

1. Case I: basic logistic organization, centred around a small or medium sized farm and the farmer, with commercialization in AMAP: this is the case in which a single producer (1 or 2, rarely more) attends to all the operations of the supply chain associated with the baskets production.
2. Case II: basic logistic organization but in a bigger farm and with commercialization in AMAP. This case is similar to the first one: case in which a single producer (1 or 2, rarely more) attends to all the operations of the supply chain associated with the baskets production. We are dealing with bigger farms, so the system remains the same but on a larger scale.
3. Case III: basic logistic organization with commercial links without AMAP (sales of baskets in stations, at farmers' markets, or in works councils): this is the case of baskets sold by one or two producers in which there are products from their farms and sometimes complements from other producers.
4. Case IV: complex and subcontracted logistic organization with commercialization outside the AMAP system (commercial intermediates): case of commercial intermediates who centralize the products of various farmers to put together baskets (or have them put together) and who deliver them (or have them delivered). There is commercialization outside AMAP, by using drop-off points.

The typology can be seen in the following diagram. On the X-axis is the nature of the demand (AMAP or without AMAP) and on the Y-axis is the number of producers or suppliers associated to the preparation of the basket.

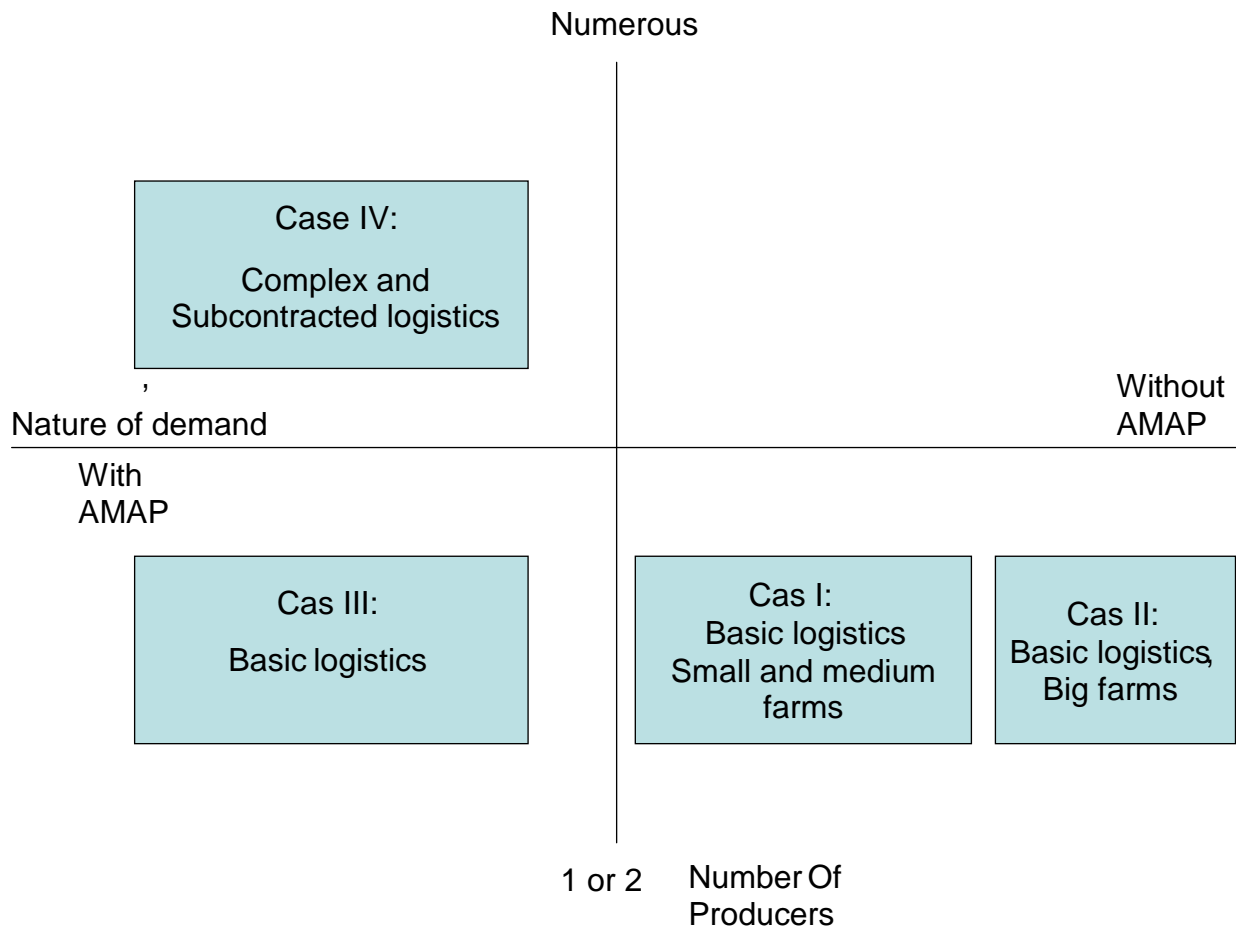


Figure 6 – Typology of logistic schemes identified – Original figure

The cases I, II and III describe the logistic organization of baskets from producers, made by a single producer or a small group, with products that come only from their own farms. It is a basic logistics managed by the producer (s), relevant for small volumes and flexible in spite of the constraints of baskets content and of regularity of the deliveries. The counterpart of this flexibility is the time needed for the management of this logistics and for the implementation of a successful organization for the producer. These cases also have in common an organization in which there aren't any delivery rounds, but one route for each delivery and no subcontractors.

The four cases have all adopted just-in-time (with sometimes a short storing), because baskets include essentially fresh or extra fresh products (same-day picked). Besides, the sharing of the logistic tools remains very marginal as well as the global logistic strategies. The main issues often are the optimization of the load of the vehicles or the decrease of the time dedicated to the preparation and delivery of baskets.

There is no case in box two (numerous producers / commercialization in AMAP). It can be explained by the AMAP contract which stipulates that it can only be supplied by a single producer.

Case I: basic logistic organization, with a small or medium sized farm and commercialization in AMAP

It is the case in which a single producer (1 or 2, rarely more) is in charge of all the operations of the supply chain associated with the basket production. The delivery areas are between 8 and 110 km (about sixty kilometers on average). The number of baskets is lower than 200 a week. The frequency of deliveries is on a weekly basis (a delivery per week for each AMAP) and deliveries take place on a given day and at a fixed hour. Deliveries are made with a single vehicle: personal car or small vans containing 8 to 10m³ on average. Flows are then direct, and logistics is basic.

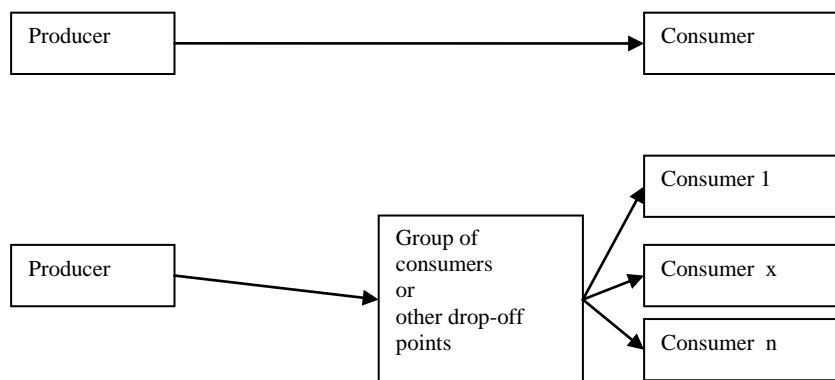


Figure 7 – The basket of producer a basic logistic scheme – Original figure

Case II: basic logistic organization but bigger farms

This case is similar to the first one: a single producer is in charge of all the operations of the supply chain associated with the basket production, but on a larger scale. The number of baskets is over 200 per week. The producers make a weekly delivery for each AMAP. The use of 2 to 4 vehicles can be noticed, various types of vans containing 7m³ to 20m³.

Case III: basic logistic organization with commercialization outside AMAP

It is the case in which baskets sold by one or two producers contain products from the farms with sometimes complements from other producers. It is in particular baskets sold in stations, at the farmers' markets, or to works councils. The volume is between 60 to over 200 baskets per week. There are 1 to 4 deliveries per week using 1 to 4 vehicles, essentially vans containing 7m³ to 20m³.

Case IV: complex and subcontracted logistic organization with commercial links without AMAP

In that case, we can find commercial intermediates who centralize the products from various farmers to put together baskets (or have them put together) and deliver them (or have them

delivered). Products come from numerous farms (between ten and 400), sometimes from abroad. They are centralized at the intermediate's location. The delivery areas stretch from ten kilometers to approximately 180 km, especially in the Paris Region and sometimes outside (Lyon, Orléans among others). Volumes span from 50 to more than 1000 baskets per week. Deliveries are weekly or twice-weekly according to the drop-off points. There are from two to five delivery days a week. Forms of subcontracting were observed in particular cases for the transport as well as the packaging of the baskets. Flows are organized in rounds. The intermediates who are in charge of the deliveries use up to 5 vehicles. They are mainly vans containing 2m³ to 20 m³.

We should distinguish the case of the local commercial intermediate and the case of the global commercial intermediate.

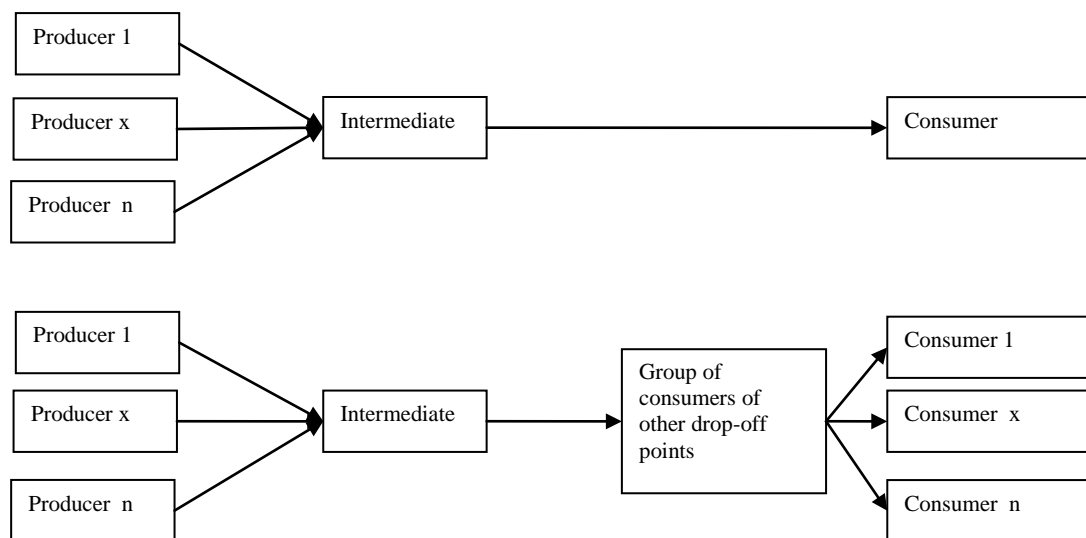


Figure 8 - The basket of the local intermediate, the flows in beam – Original figure

In that case, the commercial intermediate groups together products from local farms (located in the same Region in which the baskets are made or in the same Region of points of delivery). The products transport towards the place where baskets are put together can be done by the producers or the intermediates. The preparation and the distribution can be subcontracted or not, and when it is subcontracted, in our study, it is done by associations specialized in occupational integration. The producers' implication in the creation of the offer of products and services is varied, but very strong for some of the intermediates such as farmers' cooperatives. This system allows more important volumes, bigger variety of products in the baskets and the ability to react if a producer can't deliver the products. But it means for the intermediate an important effort of coordination between the producers, so as to have a permanent and diversified offer.

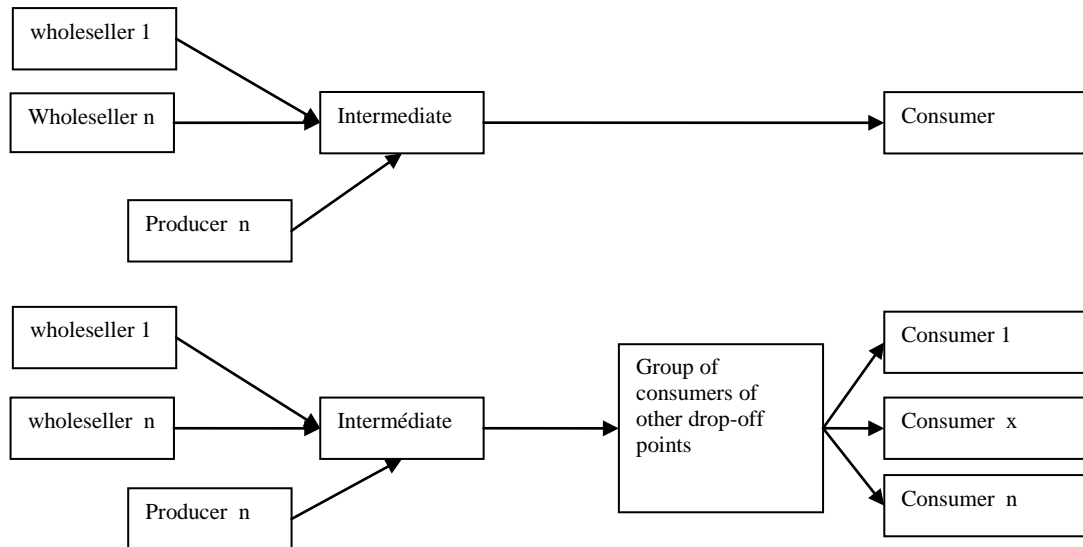


Figure 9 – The basket of the local intermediate, a logistic scheme based on the segmentation of the different functions – Original figure

These intermediaries are global because they belong to longer supply chains that allow them to choose more easily between important and diversified volumes of products. They can, according to the cases, stock up at local producers (in particular at the Rungis market) as well as at other wholesalers. Thus, they are able to satisfy consumer demand for local production and variety, and to react to the changes in that demand. These intermediaries always choose the selection of products (regional, national or international), the baskets preparation and their marketing. They can also be in charge of the delivery or the delivery can be subcontracted.

AS A CONCLUSION: LOGISTICS, A TOOL OF THE COORDINATION BETWEEN ACTORS

The typology illustrates the importance of upstream (producers/suppliers) and downstream (demand) relationships in the organisation of the logistics schemes that are implemented. Thus logistics becomes a tool of coordination between the actors of the supply chain. Logistics is not only a way to optimize costs (transport costs or transaction costs). Logistics include all the activities that coordinate the activities of production to their environment of resources and demand. There is thus a variety of forms of interaction and coordination between the actors and thus a variety of logistic organizations in which transport will play different roles.

Therefore, the logistics has to be considered as a strategic activity in the process of coordination between the actors. Improvements in the logistic organisations also allow improvements in the relations between the actors, that is to say improvements in the performance. This is very important to ensure the continued existence of the short food supply chains and to ensure that producers get this complementary income.

BIBLIOGRAPHY

- Bressoud F. (2006). Vente directe - Questions autour de la vente directe de légumes dans les Pyrénées-Orientales, Serres et plein champ, 66. 4-5.
- Carbone V. (2004). Le rôle des prestataires logistiques en Europe – Intégration des chaînes et alliances logistiques, Ecole Nationale des Ponts et Chaussées, Paris.
- Carlsson-Kanyama A. (1997). Weighted average source points and distances for consumption origin-tools for environmental impact analysis?, *Ecological Economics*, 23:15-23.
- Chaffotte L., Chiffolleau Y. (2007). *Vente directe et circuits courts* : évaluations, définitions et typologie, Les cahiers de l'observatoire CROC.
- Dubon G., M. Serres, V. Bargain and C. Brunner (2008). *Distribution: un lien entre producteurs et consommateurs*, Dossier Felscope, Fruits et légumes, Réussir, 270. 30-44.
- Hochedez C. (2007). Le bonheur est dans le panier: réseaux alimentaires et commercialisation des produits issus de l'agriculture biologique: l'exemple suédois. Mémoire de master Lettres, Arts, Sciences humaine et sociales, ENS LSH.
- Maréchal G. (Coord.) (2008). *Les Circuits courts alimentaires : bien manger dans les territoires*, Educagri, Dijon
- Meuleau M. (1988). L'introduction du Marketing dans l'entreprise en France (1888- 1973), *Revue Française de Gestion*, 70, 58-71.
- Morizot-Beau F. (2008). Les questions à la recherche de la production et de la vente de biens alimentaires, *Filières Courtes de Distribution Développement Durable et Territoires*, INRA-AgroParistech, Paris.
- Paché G. and T. Sauvage (1999). *La logistique: enjeux stratégiques*. Ed. Vuibert, Paris
- Paché G. and J. Colin (2001). Period changes and inventory management : three ages of retail logistics, *Supply Chain Forum: An International Journal*, Vol. 2, 2, 58-67.
- Paché G. and J.M Crespo de Carvalho (2002). Les distributeurs alimentaires adoptent-ils un modèle logistique universaliste ? L'exemple des enseignes françaises au Portugal, *Logistique & Management*, vol. 10, 2, 51-61.
- Pailler J. (1998). Identification et analyse de l'efficacité des principales stratégies des domaines viticoles de l'Entre-Deux-Mers, *Revue des IAA* 6:8.
- Parker G. (2005). Sustainable food? Teikei, Co-operatives and food citizenship in Japan and the UK. *Working Papers in Real Estate & Planning*.
- Perez-Zapico B. (2008). Une évaluation de l'impact du transport dans l'alimentation. Comparaison entre circuits courts et circuits longs du Pays de Dinan., Université Rennes 2 Haute Bretagne, FRCIVAM Bretagne.
- Pretty J.N., A.S Ball, T.Lang and J.I.L Morison (2005). Farm costs and food miles: An assessment of the full cost of the UK weekly food basket. *Food Policy* 30:1-19. DOI: 10.1016/j.foodpol.2005.02.001.
- Spanu A. (2008). La pratique des circuits courts par les agriculteurs favorise-telle l'adoption de pratiques agricoles plus respectueuses de l'environnement? Cas du bassin de consommation de Rennes, Ecole Nationale Supérieure d'Agronomie de Rennes, FRCIVAM Bretagne.

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Xerfi. (2008). Fruits et légumes (négoce).