SCIENTIFIC ARTICLE

SUMMARY

THE LOGISTICS OF URBAN AGRICULTURE

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BACKGROUND

Urban agriculture has been developing fast in recent years, which raises many questions about the viability and sustainability of these projects. One of the issues underpinning this sustainability is the distribution of food produced in urban centres. Starting from the premise that production close to consumers in the city would facilitate direct sales as well as logistical tasks such as packaging and delivery, the question then arises of how to adapt these just-in-time systems to an environment which offers many opportunities but also imposes constraints (congestion, pollution, limited space). This study by Fanny Provent and Gwenaëlle Raton was the subject of a more comprehensive article published in the journal Territoires en Mouvement, and aims to understand the extent to which urban location helps to structure sustainable logistics, for example by limiting journeys and emissions, or by strengthening relational proximity and enabling a quick turnaround between harvesting and consumption. The aim is to highlight the diversity of production and commercial models for urban agriculture in Paris and to study their impact on the organisation of logistics, revealing the constraints that the urban environment puts on its day-to-day planning.

LOGISTICS

"The art of routing the flow of goods entering, leaving and circulating in the city in the best possible conditions. It involves a wide range of actors with often conflicting interests: public authorities, economic actors, institutions, residents, etc." (Patier and Routhier, 2009)

KEY FIGURES

40 800 vehicles/day
In the Ile-de-France region as a whole, 17% of the products carried on the road network are food products, with 40,800 vehicles a day dedicated to food transport.

660 km
On average, a product travels 660 km before reaching the plates of Parisians (City of Paris, 2016).

1540 projects
At the beginning of 2023, the observatory of urban agriculture and community gardens counted around 1,540 projects operating across France (AFAUP, 2023).

31 %
Transport can represent up to 31% of the climate change impact of an urban farm (Dorr et al., 2021).

OBJECTIVES

- **TO CONDUCT** an exploratory inventory of the logistical organisation of urban farms in Paris
- **TO IDENTIFY** the constraints, but also the logistical advantages stemming from this urban location
- **TO SUGGEST** solutions to optimise the existing logistics of these urban farms

METHOD

In order to understand the extent to which urban producers are taking advantage of the urban environment to distribute their products and organise their logistics, we chose the Greater Paris metropolitan area as our field of study. This area comprises 131 municipalities, including the 20 Paris arrondissements, and is considered to be intra-urban due to its high density of population and infrastructure. This area is particularly interesting in that it is highly active in terms of urban agriculture and hosts a diversity of projects with different forms, functions, technical systems and production, making it possible to cover a variety of productive and commercial activities.

SELECTION CRITERIA

1. Sites located within the Greater Paris metropolitan area, excluding peri-urban farms.
2. Commercially oriented projects (to varying degrees). Non-market projects such as shared gardens and civic initiatives are therefore excluded.
3. Producers marketing food products other than animal feed.

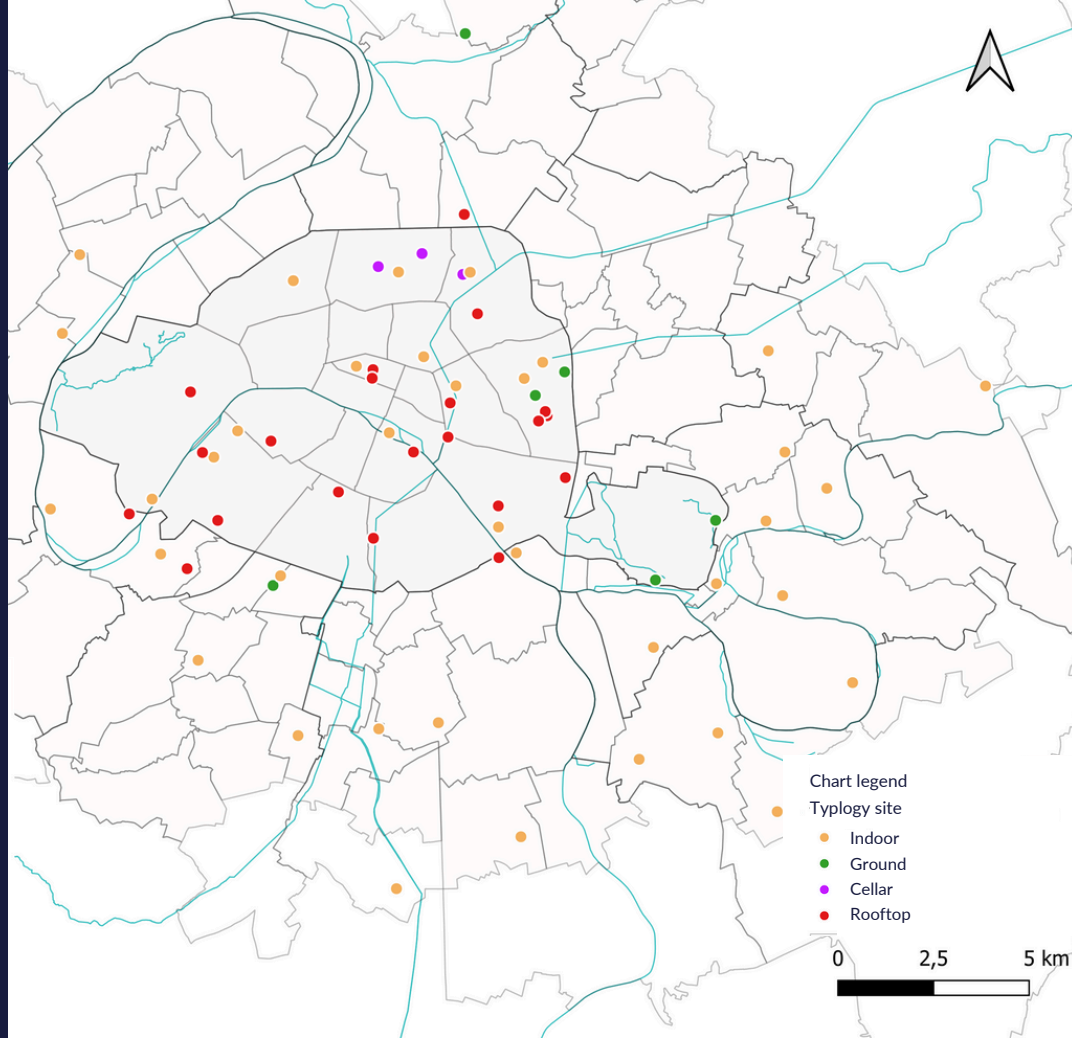
INTERVIEWS

The data were collected between March 2020 and June 2021 during semi-structured interviews which firstly allowed us to understand how the production and commercial systems work, and secondly to take a closer look at the resulting logistics practices. The data are mainly qualitative, although some quantitative data have been collected. This is partly due to the multi-activity nature of urban agriculture projects, which means that urban farmers are not always able to keep precise track of all the data flows (volumes, times, distances, etc.) required for a thorough and complete logistical analysis.

Compositi on of the panel studied

Map 1 shows the constraints on cultivated areas: there is very little space available on the ground within the city, unlike on the outskirts, making rooftops and buildings highly sought-after areas. It also highlights the presence of multi-site operations, i.e. a total of 75 sites cultivated by 20 urban growers.

Map 1 - Distribution of surveyed producers' production sites by type of cultivated area. Source: author



20 Productive micro-farms and urban farms studied

For... **75** total sites cultivated

15 Companies (SAS/SARL)

1 cooperative (SCIC)

4 Associations

60% Indoors (indoor farming)

28% rooftop

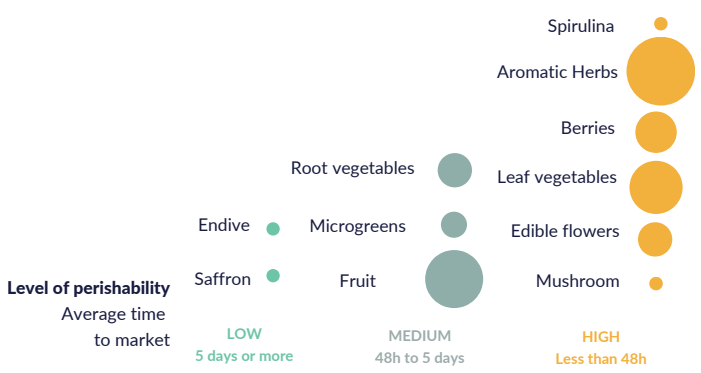
8% on the ground

4% underground

MODELS BASED ON HIGHLY PERISHABLE PRODUCTS

Mainly products with a time-to-market < 48h

Few models for low-perishability products



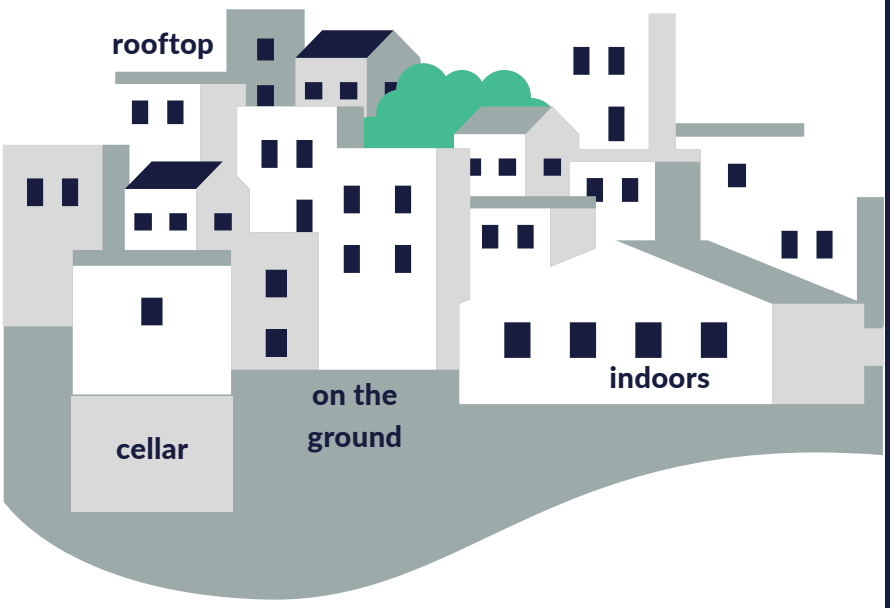
*"We have the advantage of being in an extremely short supply chain, so **it makes all the more sense to produce highly perishable products locally** (...)" (producer F).*

*"For us, urban agriculture is all about **ultra-freshness. Once you've let a day go by, there's little point in growing crops in the city at all.** That's basically our starting approach" (Producer P).*

Production models based on minute harvesting on maturity require:

- a very strong connection to the market
- respect for freshness and delivery speeds
- appropriate and meticulous handling, packaging and shipping
- logistical tasks added to all services that these multifunctional forms offer

In this context, **geographical proximity or even proximity in terms of relationship between producers and consumers is a key condition for success.**



A special urban setting

One of the special features of urban agriculture is the way it can be set up in original, small-scale, dispersed locations.

We find sites with sometimes limited accessibility (30% of the sites on the panel) and sites which are spatially fragmented (7 producers have more than one production site) requiring inter-site transport and packaging to ensure freshness during transport.

Alongside the benefits of the location in the city centre, in terms of access to the market, the density of customers, the centrality of the city as well as the organic resources that the town has to offer, there are the problems of cramped conditions, coexistence with other activities, pollution and congestion.

This raises questions about the ability of urban agriculture to adapt logistically to its environment, which is rich in opportunities but also in threats.

SPECIFIC LOGISTICAL REQUIREMENTS

These urban characteristics call for **a high level of logistics** on the part of the grower to ensure this "ultra-freshness" from harvest to marketing. To achieve this, **they take on a range of logistical tasks that would have probably been unanticipated at the outset**.

Precise management of harvests and orders

*"**It's also up to the producer to organise the logistics to supply what's required**. Our standards are responsiveness. It's up to the producer to be able to take an order the day before and deliver it the next day" (producer T)*

Packaging

*"We've had to explain to supermarkets that their products wouldn't be in plastic packaging, except for some fragile produce such as strawberries. **Producing locally is also a way of avoiding over-packaging"** (Producer B).*

*"There's a real shortage. It's always **just-in-time**. Anticipating harvests is complicated. If we had cold storage we could harvest and sell over several days and get organised." (Producer D)*

Storage

Transformation

*"At the end of the season, we had **a lot of tomatoes that hadn't had time to ripen,** so we ended up with over **a tonne of green tomatoes that we decided to turn into jam"** (producer N)*

*"I think that marketing is the **black spot** because we sell **small quantities in lots of places,** so that means a lot of transport, logistics and organisation" (producer D)*

Distribution

UNPRECEDENTED CONCLUSIONS

Difficulties in linking supply & demand

While many producers see the commercial benefits of an urban location in terms of access to outlets, others encounter more difficulties in a busy commercial fabric. Some adopt commercial principles such as direct sales and just-in-time delivery, and manage to find profitable outlets which are also reliable and stable. For others, **the constraints of just-in-time production** remain strong, while diversification, **irregular orders** and **the fragmentation of activities** and outlets call for constant adaptation

Deliveries largely handled by producers themselves

Only six producers never make deliveries because they have chosen outlets capable of providing this service or are able to use a logistics provider. Of the remaining 14, **seven still carry out their own deliveries**, as this gives them greater autonomy, is a service they can offer customers and allows them to guarantee the freshness of their product throughout the chain. Others do so because they have their own means of transport (acquired through partnerships or subsidies) or have small volumes to transport, making it too expensive to use a service provider. **The seven others only provide a partial service for customers who cannot**

Storage: a key optimisation tool

The ultra-freshness mentioned by producers implies little use of storage, or at least only for a short time. However, 15 producers have some storage space for their products. However, this is intended for small volumes and occasional use (while some have cold or air-conditioned rooms, as many others just have small refrigerators). What emerges from the interviews are **seasonal problems** (falling consumption and high temperatures in summer) which can be circumvented for a while by using storage. They are considered essential because **they allow sales to be spread out over time** and save certain products that need to be harvested at the right time (cucumbers, for example, before they become bitter).

Strong environmental sensitivities

Although producers can use packaging to ensure that their products are ultra-fresh, it is carefully selected for low carbon impact. Where necessary (small fruits, microgreens, flowers, etc.), **containers are organically sourced and/or reused.**

Transport is also a key point of environmental innovation for producers, which they are committed to and which they highlight in their communications. **Almost 80% of the transport used is soft and/or sustainable mobility,** whether on foot (4), on a conventional or electric scooter (4) or a combination of a scooter and an electric van (3). The use of soft transport seems to be a way of adapting to urban conditions and making the most of last-mile issues, against a backdrop of strong growth in alternative forms of transport.

SHORT DISTRIBUTION CHANNELS		
0 INTERMEDIARIES	Farm sales	8
	Distance selling	4
	Box schemes	2
	Delivery points	2
	Trade fairs	2
	Collective sales outlet	1
1 INTERMEDIARY	Commercial and artisanal catering and hotels	14
	Retailer (grocery, specialist, direct producer store, etc.)	11
	E-commerce platform	7
	Decentralised purchasing by supermarkets	6
	Corporate catering	2
2 INTERMEDIARIES	Wholesaler	4
	Semi-wholesaler	2
	Cooprative	1

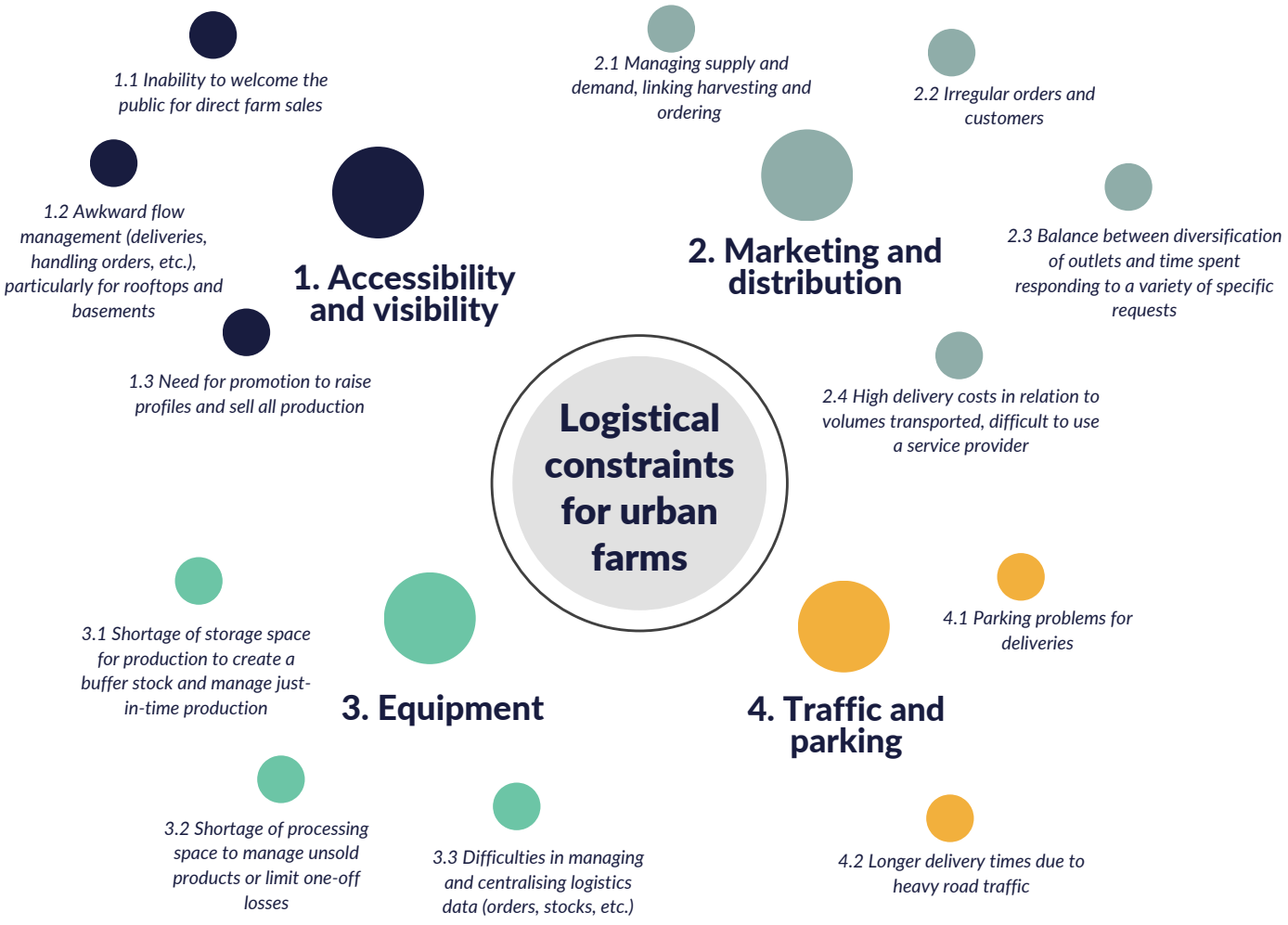
A clear preference for short distribution channels, but...

Across the selection there is a clear trend towards short distribution channels (15/20). This is mainly via an intermediary, mostly restaurants, which are the main market for certain products (microgreens, flowers) and a means of raising their profile, followed by organic or locavore groceries, and supermarkets, where the general public can be reached.

Only three producers sell directly and only eight sell at the farm gate, even though this is the main outlet for short distribution channels. Like peri-urban market gardeners, they tend to combine multiple outlets (between two and six). More unexpected, however, are sales through multiple intermediaries, such as wholesalers and cooperatives (5/20), which raises more questions about the value of urban locations. Making use of these actors ensures regular sales with significant volumes and enables time-consuming tasks such as packaging and delivery to be delegated.

SUMMARY OF OBSTACLES ENCOUNTERED

This summary of the logistical constraints encountered by urban producers in Paris, which are technical, organisational, physical and economic in nature, is based on an analysis of the testimonies gathered at interview.



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