

Distribution of precision agriculture technologies: a first survey of French dealerships

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Abstract

Precision agriculture technologies (PAT) are very diversified. The proliferation of precision agriculture products and services, as well as of their providers can confuse farmers. In addition, the lack of agronomic references for these technologies is slowing their adoption. The organization and development of the distribution network can help the providers of PAT to support farmers and other end customers. This study describes how PAT are being addressed by ordinary dealers of agricultural machinery and equipment. We aimed at identifying the main trends in the distribution of PAT among dealers, as well as the obstacles and the expected added value of these technologies for their business. We focused on metropolitan France as the first European country for agricultural production and highly committed to the development of agtech. A series of semi-direct interviews was realized on a sample covering the main tractor manufacturers on the national territory, the involvement of the dealer manager in the national trade union (i.e., SEDIMA) and already offering PAT. The interview consisted of four parts: (i) current offer by the dealership and level of PAT use/equipment by customers; (ii) 5-years strategy of the dealership about these technologies; (iii) changes in personnel (recruitment, training, etc.) and organization related to these new products/services; (iv) identification of expected added value and obstacles. The notes taken during the phone interviews were coded into themes and topics to ensure harmonization and comparability, then analyzed to provide summary statistics, and to identify main trends and recommendations about the distribution of PAT.

Keywords: agricultural technologies, digital transition, adoption, strategy, agroecological transition

1. Introduction

Precision agriculture has been defined as a "management strategy that accounts for temporal and spatial variability to improve the sustainability of agricultural production" (ISPA, 2018). Therefore, precision agriculture is somewhat intrinsic to the agronomic management of agricultural production (Brase, 2006). Nonetheless, the availability of georeferencing signal (e.g., GPS) and the diffusion of the geographical information systems (SIG) moved precision agriculture into the agricultural digitization and digitalization realm (Grenier, 2018a). The proliferation of technologies that fall within this framework comes with the multiplication of new actors who are complementary to the historical manufacturers of agricultural machinery and equipment. Overall, in this paper we will refer to the precision agriculture technologies (PAT) to encompass the various products and services. Faced with this wide range of PAT actors, agronomists and farmers can be confused when choosing products and/or services, given also that few technical references exist (Grenier, 2018b).

Even though PAT are multiplying, they can be summarized on three main actions: guidance, recording technologies and reacting technologies (Balafoutis et al., 2017). However, more recent classifications stressed the difference between data scouting and decision support systems (Leroux, 2020) The description of PAT and related products and services were addressed by the SmartAKIS project funded by the European Commission; the study founded that the main technologies were related to fertilization and pesticide application (Wolters et al., 2016). Comparable results were shown by a survey on PAT adoption for field crops in France (Chaire AgroTIC, 2018).

Although multiple studies have addressed insofar the adoption trends and criteria of PAT by farmers (e.g., Ayerdi Gotor et al., 2019), the information about PAT distribution itself is poor. Indeed, among the various actors of the agricultural sector, the distribution network can be crucial to understand the PAT adoption by farmers (Rizzo et al., 2019). Indeed, dealers are the usual contact interface for farmers when choosing agricultural machinery and equipment. However European dealers are undergoing relevant restructuring due to the deep evolution of the farmers and other customers demography (Dryancour, 2016). In addition, new PAT actors such as product providers and start-ups are seeking to build partnerships with agricultural equipment distributors in order to

enhance their prospect base and have access to the distribution network. However, even within dealerships, PAT are new and sometimes perceived as complex, as highlighted by the Centre de Liaison International des Marchands de Machines Agricoles et des Réparateurs in a position paper; they called to define new business models to exploit PAT and other products and services related to digital agriculture data (CLIMMAR, 2018).

In this work, we aimed to describe the distribution of PAT by dealers in order to identify the main trends, as well as the obstacles and the perceived added value of these technologies for their business. For this study, we focused on metropolitan France as the first member state of the European Union for agricultural production and, as such, a primary market for PAT. In addition, France is also committed to a strategy for agroecological intensification of agricultural production, to which PAT are expected to contribute (Bellon Maurel and Huyghe, 2017). As such, information about PAT distribution strategies and obstacles for French dealers can contribute to define or adapt sectoral policies.

2. Materials and Methods

The main reference on PAT distribution is the biennial precision agriculture dealer survey carried out by the Purdue University (Erickson and Lowenberg-DeBoer, 2020). Unexpectedly, no dealer survey is available for France concerning PAT distribution (Lachia et al., 2018). In this work we aimed at filling the gap with an exploratory survey that addressed the current offer and its evolution in the short term, including actions intended to be realized within 5 years.

Given the variety of actors in the PAT sector, we focused only on the interactions linking manufacturers, dealers, and start-ups (Figure 1). In this sense, we addressed a first description of the PAT distribution among ordinary actors – manufacturers to dealers and dealers to farmers – while also exploring the place for emerging actors. The study case was provided by MyEasyFarm, a PAT integrated management platform funded in 2017 and operating in France and other countries. MyEasyFarm is an example of the emerging actors in the PAT provision who are creating new interfaces in the PAT sector, and so producing a redefinition of the distribution and retail.

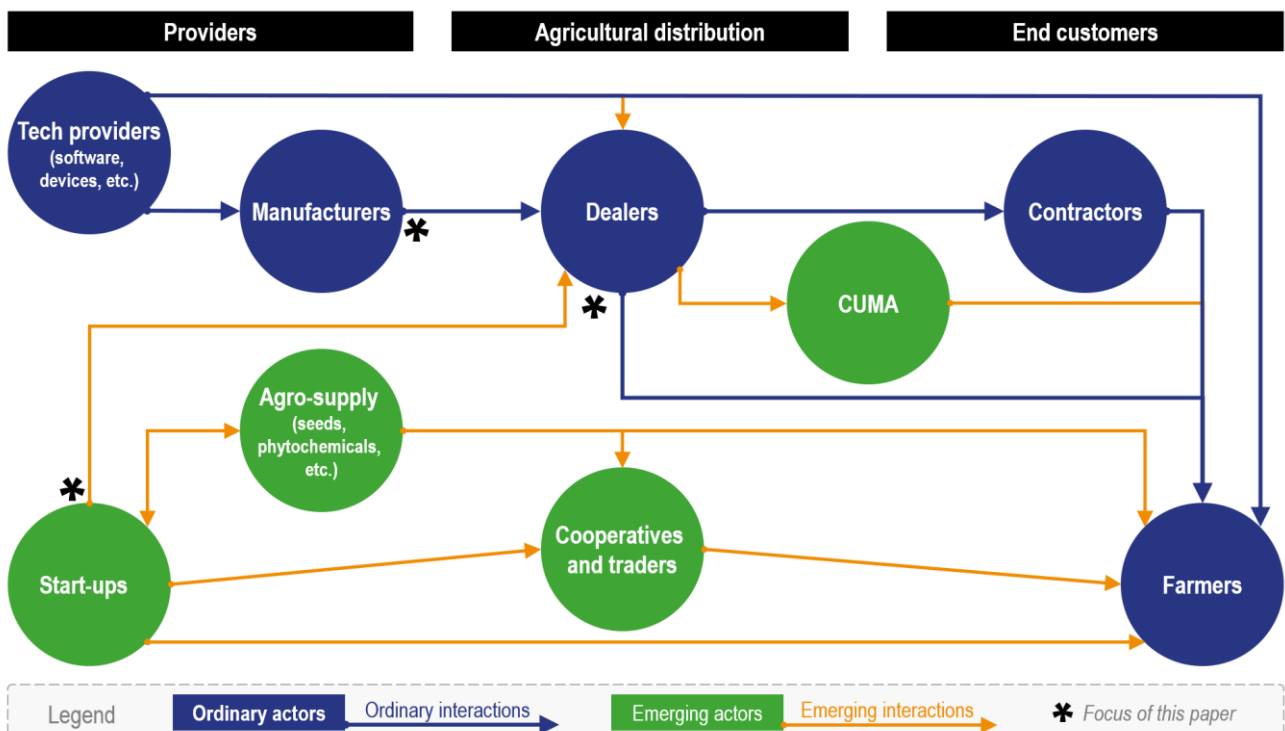


Figure 1. Distribution of products and services of precision agriculture technologies: ordinary and emerging actors and interactions (adapted from Rizzo et al., 2019).

The this first survey we opted for a semi-structured, so as to let the respondent express their vision and to cope with the exploratory stage of the study. The interview was composed of eight questions structured into four parts addressing:

- (1) the profile of the dealership and of the respondent;
- (2) the current PAT offer and of its adoption by customers;
- (3) human resources management with a focus on recruitment versus training options;
- (4) the PAT distribution strategy intended as the currently perceived value of PAT for the dealership, the obstacles to the distribution and the short-term trends.

Due to the pandemic context, all the interviews were carried out by phone by a single interviewer, who directly transcribed the answers. The notes were coded for the deductive qualitative analysis (Corbetta, 2003). The themes were defined subjectively but comparing with the previously identified technical literature (Erickson and Lowenberg-DeBoer, 2020; Wolters et al., 2016) and some complementary interviews with PAT experts. The thematic coding allowed first to harmonize the answers, then to identify sub-theme to analyze trends and perspectives (Figure 2).

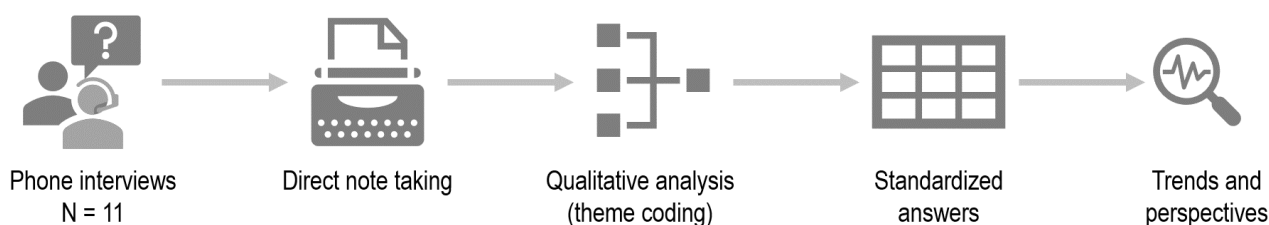


Figure 2. Diagram of the key steps of qualitative analysis.

The database of interview targets was fed upon the MyEasyFarm contact base, then expanded with a snowball approach, by asking each respondent for new relevant contacts. The interviews were held from March to April 2021. To pursue a representativity of the panel about the description of the PAT offer and distribution trends, we targeted dealership managers, by considering also his/her implication in SEDIMA (i.e., the French dealership trade union), as well as dealership already offering or developing some precision agriculture products or services.

The answers were coded by using the software MS Excel, by listing the themes and sub-themes. For the treatment, we marked 1 when the respondent mentioned the theme or sub-theme, 0 otherwise. This allowed us to present the result in a quantitative manner and to draw basic statistics. To respect sensitive and confidential information, the interviews were pseudonymized (i.e., the identity where coded) and all the data that could allow to identify the respondent or the dealership were removed.

3. Results and Discussion

A panel of 11 respondents agreed to participate, representing a total of 68 distribution nodes, where each dealership ranged from 3 to 16 nodes. All of them are based in the metropolitan France territory. Two respondents out of eleven considered that their PAT offer is already established, while the remaining 9 dealerships were still working to develop it. All the surveyed dealers provide a structured PAT department with at least one (or more) dedicated manager. This allowed us to obtain feedback about their experience on this topic.

Considering the current PAT offer, for most of the interviewed dealerships it includes telemetry. Half of the sample proposes a pack of device-and-software, while the others sell just the product. Only three dealerships also provide service and support (Figure 3.a).

Almost all the respondents perceived the consolidation of the brand image as the most important added value from PAT. This was related to the capability of such products and services to ease the customer retention, also thanks to the proximity created with them by the need to support the PAT

implementation at the farm. Complementary, other respondents indicated PAT as an opportunity to reach new customers. Nonetheless, only 4 out of 11 respondents clearly identified PAT as a booster for the sales of agricultural machinery. The panel remained skeptical concerning the capability of PAT to deliver a better profitability (Figure 3.b).

Finally, the obstacles led to the definition of the most numerous results: in this exploratory stage of the study, we opted to leave most of them to show the different visions of the respondents. Half of them, even though not exactly the same, listed the lack of relation with agronomy or the need to train sales representatives as the main obstacles to PAT distribution. Then, the uncertainty about profitability and the novelty of these products and services, as well as the lack of skilled operators, were supplementary obstacles. Alternatively, some respondents indicated the lack of the perception of a PAT added value also by the customers. Complexity of the technologies and the doubts about their interoperability were also listed by some respondents (Figure 3.c).

In terms of short-term strategy, all the respondents agree on the need to offer a breakdown cover and/or a support for PAT. Most of them consider also to provide training program to support the adoption of PAT, possibly with the help of a pilot-farmers program. Only two respondents were evaluating the creation of a dedicated PAT service based on agronomic advice (Figure 3.d).

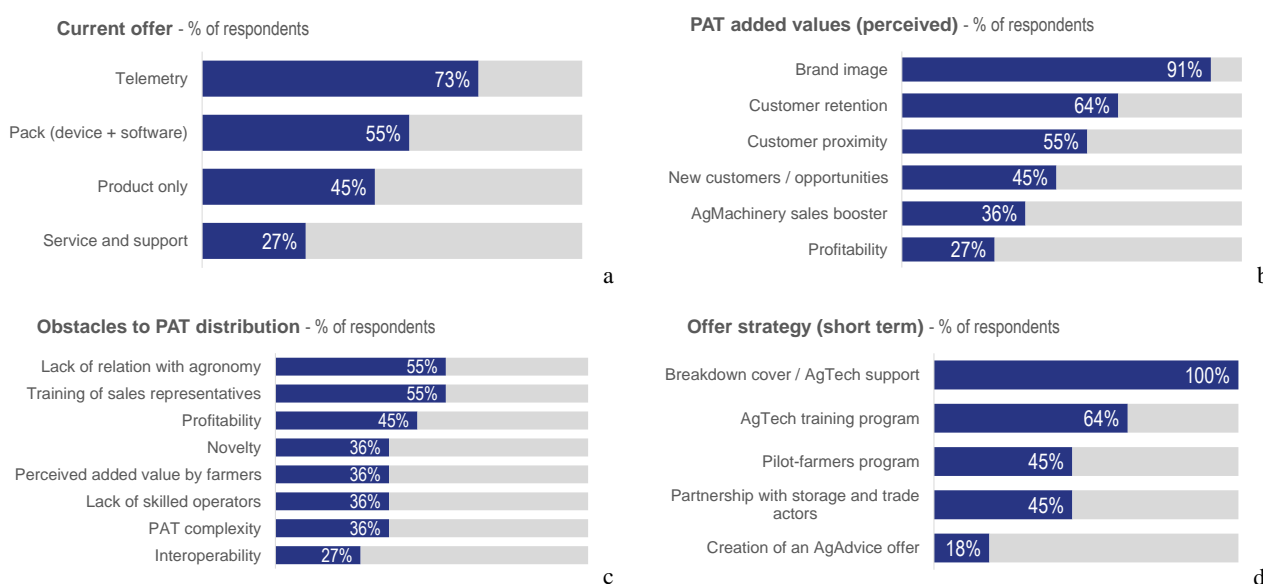


Figure 3. Survey results concerning the current offer (a), the perceived added value (b) as well as the obstacles (c), and the short-term offer strategy (d) for PAT distribution.

4. Conclusions

Precision agriculture technologies (PAT) are expected to contribute to enable the agroecological intensification of agricultural productions and to meet the ecoefficiency expectations from the society. The range of solutions and actors is growing as technologies develop, but the lack of agronomic references and advice is limiting the rate of adoption and use of these technologies by farmers. In this work we surveyed the distribution actors, in particular the role that is being taken by agricultural dealers. Dealership's strategies are mainly structured by the agricultural equipment manufacturers with whom they have contracts.

PAT distribution started with guidance technologies, which was packed as an option for tractors and other machines, and so easily coordinated with the manufacturer strategy. However, the continuously expanding offer of PAT products and solutions requires dealers to find new business models. On the one hand, dealers have to deal with new technology actors who do not have yet (or are still developing) a distribution network. On the other hand, dealers need to address farmers' demand for agronomic support in the use of PAT. Altogether, PAT distribution requires personnel with

dedicated skills and novel strategies to generate sales volumes by meeting farmers' demand for relevant products and services. In this sense, the training and education programs must merge technological and agronomic competences.

In conclusion, the survey of PAT distribution strategies highlighted that the “precision” is first a question of improving agronomy and the service provision for farmers, by exploiting technology. Therefore, we recommend replicating this survey with a larger panel, with a focus on the willingness to provide a dedicated (more structured) service to support farmers in the agroecological transition. The goal would be to understand what the PAT distribution strategy could be within or outside the ordinary distribution network, so opening the way to new dedicated services and networks.

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