ITFARM

IT for Interconnection of Social, Economic and Environmental Aspects in Agribusiness

WP2 – Survey on the ICT Technologies supplied in precision agriculture

(Please provide together with English questionnaire responded, your findings from the Survey by 1st June 2022 by summarising the feedback from the questionnaires in the following structure using the following formatting: Font Calibri, Font size: 12).

Part 1. Introduction and profile of the participants (Questions in the part: "Enterprise information")

In total, nine people took part in the survey. Almost all the respondents are representatives of private companies, only one respondent is a freelance consultant. Five companies out of nine were established after 2015, two were founded in the first decade of 2000 and only in one case the foundation dates back to the 1980s. Overall, nearly all the companies surveyed can be considered small businesses: two of them have no employees, three have between 5 and 10 employees, two have between 10 and 20 workers and only one company counts 48 employees.

Part 2. Results

Result 1. Current situation of ICT agro-Techno input suppliers (Questions in the part "Enterprise current situation" Q1-Q10)

The majority (8) of the survey respondents are ICT service providers. Only one participant in the survey belongs to the category supplier/retailer of agricultural equipment and machineries.

Here is a list of services and products that respondents offer to the farmers:

- Environmental software design and implementation; Environmental consulting; GIS and webGIS; Crop modelling; IoT systems to promote the responsible and sustainable use of natural resources.
- Crop inspection with drones.
- Financial Management Information Systems (FMIS).
- IoT sensors for precision agriculture, sustainable viticulture, pest management, water saving, remote irrigation control; Agro-meteorological weather stations; Decision Support System livedata cloud software.
- Mapping and traceability of the supply chain.
- Software that collects, manages, transfers and analyses agricultural data (Fields, Satellite, drone, weather, decision tools, agricultural equipment, ...) to enhance crop cycles, reduce product usage and preserve sustainability.
- IT solutions for monitoring, forecasting, scenario analysis and management support

All the respondents (9) reported selling their products/services mainly to SMEs, big enterprises (7) and distributors (6). One interviewee declared to work for public entities and research institutes, another one claimed to sell to independent retailers. Clients are mainly businesses active at national level (7) and, to a lesser extent, local companies (1 at local level and 2 at provincial level) and foreign firms (2).

When asked what kind of products/services they provide to their clients, respondents mentioned the following:

- **Weather connected station** (No: 66,7%; Yes: 33,3%)
- **Soil management** (No: 66,7%; Yes: 33,3%)

-Soil electrical conductivity sensor (x2)

-Electrodes for frequency domain (FDR) or time domain reflectometry (TDR) (x2)

-Tensiometer (x1)

-Multispectral imaging camera drones (x1)

-NDVI satellite imagery (x1)

-Soil Organic Carbon Calculator (x1)

- **Seeding management** (No: 77,8%; Yes: 22,2%)

-Seed drill depth control system (x1)

-Prescription mapping software (x1)

- **Water management** (No: 50%; Yes: 50%)

-Automatic irrigation system (x1)

-IoT based smart irrigation system (x2)

-Water management system using satellite LANDSAT data and meteo-hydrological modelling (x1)

-Smart irrigation system using global system for mobile communication (GMS) (x1)

-Irrigation system based on wireless sensor network using a radio frequency communication (x1)

-Smart irrigation system based on real-time soil moisture data (x2)

-Smart Irrigation Decision Support System (x1)

-Plant Water Stress Monitoring and Control System (x1)

-Drones for water management (x1)

- **Smart fertilisation management** (No: 66,7%; Yes: 33,3%)

-Variable rate fertilization mapping software (x1)

-Data collection and tracking with drones (x1)

- **Animal health and welfare** (No: 88,9%; Yes: 11,1%)

-Technologies to monitor animal behaviour (x1)

-Technologies to monitor animal feeding (x1)

- **Yield monitoring** (No: 44,4%; Yes: 55,6%)

-Field mapping with GIS (x2)

-Software for yield monitoring and data analysis (x3)

-Data collection and tracking with drones (x1)

Furthermore, participants mentioned other types of technologies not present in the list, such as drones forIdentification and Monitoring of Plant Diseases and Impact assessment of Integrated Pest Management.

When asked which kind of technology will be developed for precision agriculture in the next future, participants mentioned ICT for hyperspectral imaging and for disease prevention in agriculture.

The respondents cited the following as the main factors affecting the introduction and application of IT in agriculture:

	Factors	N° of respondents who assess it relevant
1	Availability of training opportunities	8
2	High capital investment	5

3	High technical staff required	5
4	Availability of public incentives	5
5	Collective purchase through Group Purchasing Organizations	2

Result 2. Identify and understand current and future suitable technologies for EU precision agricultural farms (Questions in the part "current and future suitable technologies for EU precision agricultural farms", Q11-Q16)

Eight respondents out of ten declared to offer training on 4.0 technologies to their clients. These training are delivered to promote the purchase of the products (5) or after-sale (3), they can take place occasionally (4) or periodically (2). Most of the training are delivered on demand (6).

Result 3. Technology training programmes on ICT for precision agriculture employees. This part includes two sections 1) Training for clients (farmers), Q17-Q29 and 2) Training for enterprise' employees, Q30-Q43.

The average duration of the training is less than a day (50%). More structured training can last one or two days (37,5%) or even more (12,5%) but they never last longer than a week. The training are often offered (7) by the companies but sometimes they are financed by third parties (2) or they are paid by the clients (4).

According to the respondents, the training should focus more on the economic and environmental benefits of introducing agriculture 4.0 in the farming industry.

Result 4. Financial support programmes for ICT development at suppliers' level Questions from Q44 to Q49.

Participants were asked to evaluate, on a scale from 1 to 5 - where 1 represents "I strongly disagree" and 5 represents "I strongly agree"- the statement "public investments and incentives in agriculture 4.0 are adequate".

Respondents provided different answers: 10% strongly disagree, 30% disagree, 20% neither agree nor disagree, 30% agree and 10% strongly agree.

Result 5. National and international legal/regulations/policy on new ICT technologies applied in agro sector. Questions from Q50-Q51.

All the people surveyed were somehow impacted by agriculture 4.0 policies. However, the majority believe that policies need to be more effectively integrated and coordinated at national level. According to a respondent, incentives for agriculture 4.0 focus exclusively on machineries, which are often very expensive and not affordable. Further incentives for the adoption of cheaper software technologies would allow a large number of small farmers to adopt 4.0 solutions in their business. In this regard, another interviewee stated that the Recovery and Resilience Plan adopted by the Italian government can promote a broader adoption of 4.0 technologies in agriculture.

Conclusions:

The fact that five companies out of nine were established after 2015 suggests that the market of agriculture 4.0 has been rapidly growing over the recent years. The companies

involved in the research offer a wide variety of services, primarily water management and yield monitoring technologies. However, the abundance of the offer is not balanced by the farmers' demand. According to the professionals interviewed, farmers lack awareness about the opportunities offered by the 4th industrial revolution in the agricultural field.

As emerged from the field research, public funding makes technology 4.0 more accessible to farmers. However, there is an unmet need for training on how to use ICT in agriculture and this prevents many farmers from adopting these solutions.

Recommendations:

It is recommended to take into account the feedback from the professionals when developing the training materials for SMEs.