Annex 4 - Target group Survey Summary Report Template – WP2

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")

The survey was sent to six companies in Bulgaria working in the field of precision farming. We received a response from four of them:
(1) ***Megatron EAD*** (www.megatron.bg) *input dealer* – the company was founded in 1998 and is the official representative in Bulgaria of the world's leading manufacturers John Deere, KUHN, Bobcat and Doosan. Megatron has eleven sales and service bases and stores in Sofia, Pleven, Ruse, Dobrich, Targovishte, Plovdiv, Stara Zagora, Yambol, Bulgarovo, Silistra and Montana. The company is one of the leaders on the Bulgarian market in the field of precision agriculture - technologies and services. Megatron EAD has 250 employees.
(2) ***Agro Gigant LTD*** (www.agrogigant.bg) *service provider/consulting firm* – was founded in 2020. They rely on powerful equipment and an integrated agricultural management system that provide intelligent data collection and analysis applicable to field planning and crop inspection. The number of employees of the company is 10.
(3) ***Nik Group*** (www.nik.bg) *input dealer* – the company was established in 2002. It is among the leaders in ICT technologies in Bulgaria. Nik Group has been awarded with FORBES Business Award 2020 for Agriculture and they have become the first agricultural company receiving this award in Bulgaria. They have been honoured with the Trimble Award for developing and promoting precision agriculture in Bulgaria for a five-year period. Nik Group has received several awards from Bulgarian Farmer newspaper for Digitalization of the Bulgarian farming industry and Agri-innovator, as well as from other institutions like Agricultural Technique newspaper and International agricultural fair AGRA. Nik Group has its own Academy which offers training to farmers. The courses are in theoretical and

practical form with the help of the latest technologies and equipment for precision farming. The company has 250 employees.

(4) ***NIK Agro Service Ltd.*** (www.nik-agroservice.com) *service provider/consulting firm* - the company was established in 2009. NIK Agro Service is part of the NIK family - a group of companies with a main focus on the integration of solutions for precision farming. The activity focus is to support farmers to achieve efficient management of fertilisation, irrigation and to get sustainable improvement of the soil fertility using modern and innovative methods and tools. The number of employees of the company is 37.

Part 2. Results

Result 1. Current situation of ICT agro-Techno input suppliers (Questions in the part "Enterprise current situation" Q1-Q7)

The companies that participated in the survey are mainly engaged in the field of crop production and machinery trade.

- Agro Gigant Ltd. is a provider of services in the field of precision farming, including training of farmers, training of equipment suppliers, soil sampling, analysis and consultancy in the agricultural sector.
- The company Megatron EAD is an input dealer. The main products that the firm offers to its customers are: agricultural, garden, construction and industrial equipment.
- Nik Group is a supplier of agricultural machinery and navigation, but also provides agronomic services.
- NIK Agro Service Ltd offers farmer training and precision farming services.

The first two companies (Agro Gigant Ltd. and Megatron EAD) indicate that their customers are both small (family) farms and large agricultural producers. For the service provider, small farmers are 60% of all clients, while for the dealer of inputs this percentage is only 10%. The latter reveals the desire of family farms to acquire the necessary knowledge and skills, as well as to take advantage of precision technologies in agriculture. It can be assumed that due to the scale of production, from an economic point of view it is better for small producers to use the services offered by the companies compared to the purchase of relevant machinery and equipment. Large producers are the main clients of Megatron EAD (90% of all clients); Nik Group (95%) and NIK Agro Service Ltd. (95%), while at Agro Gigant Ltd. their relative share is only 40%.

The clients of the companies are mainly located at the national level and a smaller percentage at the municipality and district level. Nik Group and NIK Agro Service Ltd. operate also at an international level.

Regarding the question, *"Do you think the ICT revolution in agriculture has impacts on your business results?"*, all the firms indicate that there is a significant positive impact. One of the companies emphasised that farm management software, crop afforestation drones, image processing software such as Terra, Pix4dfields, etc., mapping spraying drones, etc. have a positive impact on their business and on the entire agricultural sector. Another company has stressed that precision farming technologies and digitization are directly impacting farmers' productivity. In addition, they noted that the aim of their business is to introduce solutions for optimizations and better management of agricultural production.

The four companies currently offer the following ICT technologies to support farm decision-making in the markets: (1) Weather connected station; (2) Soil management, including soil electrical conductivity sensor; ground penetrating radar (GPR) and gamma ray spectrometry (GRS); GNSS reflectometry; (3) Seeding management, including seed drill depth control system; wheel mobile robot for the wheat precision seeding; Control system for seed-metering device using a single chip microcomputer; Air-assisted high speed precision seed metering device (4) Water management, including: automatic irrigation system; IoT based smart irrigation system along with a hybrid machine learning based approach; water management system using LANDSAT satellite data and meteo-hydrological modelling; smart irrigation system using global system for mobile communication (GMS); IoT-based renewable solar energy system; smart irrigation system based on real-time soil moisture data; (5) Smart fertilisation management, including variable-rate fertiliser control system based on ZigBee technology; IoT-based fertigation system; (6) Field mapping with GIS; (7) Yield monitoring and data analysis, as well as (8) the following additional services: multispectral imaging, analysis and processing of the obtained data, yield prediction, determination of vegetation, water in plants. Three of the respondents explained the reason for offering these types of ICT technologies as follows (Box1).

Box 1

Firms explain the reason(s) for currently marketed ICT technologies to support farm decision-making as follows:

"When using the relevant technologies, we should always ask ourselves, the question: "What kind of land will we leave to our children?". In recent years, farmers have mostly taken from the soil, leading to soil depletion. They do not sow cover crops, which leads to water and wind erosion. They apply an excessive amount of fertilizers and plant protection products, which leads to poisoning and overstocking of the soil. Through the services and research we do, farmers deal with the listed problems, get better yields with lower costs, apply the so-called green fertilization and above all protect the land."

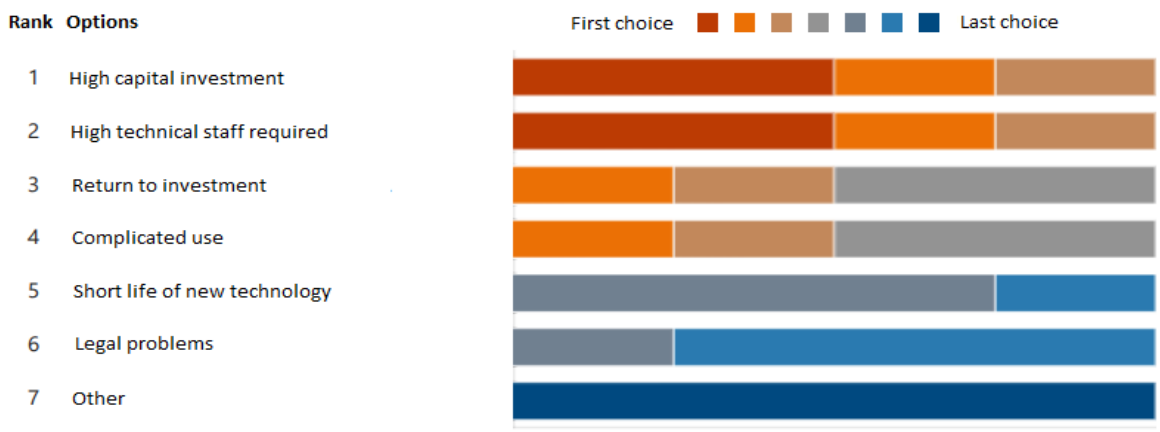
''Optimization, better monitoring and management of agricultural production.''

"Optimization and modernization of agricultural production"

The ranking of the main factors affecting the sale of new ICT technologies to farmers is presented in tabular form (Figure 1).

Half of the companies ranked "high capital investments'' in the first place, and the remaining half identified the need for employees with high technological knowledge as the most important factor (''high technical staff required'').

Figure 1: Ranking of the main factors affecting the sale of new ICT technologies to farmers



Source: ITFARM Project survey

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", Q8-Q10)

Regarding the question *"In your opinion, which advanced ICT technology will be developed for precision agriculture in the future? Why, by whom, and for whom?"* the companies have responded as follows (Box2):

Box 2

"In your opinion, which advanced ICT technology will be developed for precision agriculture in the future?" Why, by whom, and for whom?"

"To begin with, there will be a common agricultural platform, most likely it will also include an stock market. In it, we will examine the history of each field, and carbon certificates will also be included. This system will be developed and provided by the government. The greatest importance for the future will be robots - analysing and mechanical operations in viticulture, fruit growing and field farming, drones and software for them, navigation systems for automated control of agricultural machines, high-resolution satellites specialized in the field of agriculture (not as the ones we currently have), with crop determination, precision farming zoning, soil moisture determination, full 10-year field history, ERP farm management systems. All of this will be tied into IoT systems."

"Autonomous machines"

"Software products, data analytics, autonomous machines, conservation agriculture"

"Autonomous machines, software products, conservation agriculture"

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, Q11-Q23.

Respondents indicated that they provide training to their clients, 30% of which are tailored to the individual case (Case-by-case basis). The relative share of training for after-sale product; new product promotion trainings and periodic technical repeated trainings amount to 20%. The share of „other forms of training“ is 10% - agronomic ones.

To the question *“In your opinion, in which areas is training/education lacking the most? “*, companies have indicated that in all areas there is a need for improvement. One of the companies specified: *VRA maps, navigation systems and innovation, in general*. An opinion was expressed that, according to their company, the universities do not have the "latest" technologies and equipment to do such training at this stage. We partially agree with the relevant statement, because we don’t have all the technologies mentioned, but we work in very close partnership with the leading companies in the industry, using their resources in the training process - there is a master's program that is implemented in cooperation with NIK Electronics. Within this program, students are trained to work with relevant technologies directly from business representatives. This allows the university to provide its students with access to the necessary knowledge and skills, as well as the opportunity to be practically trained to work with the latest ICT technologies. Other companies define as a challenge the lack of knowledge to use high-tech products and tools - software, navigation, autonomous machines, sensors, cloud technologies, as well as practical skills in digitization and new technologies.

To the question "*What kind of new ICT technologies do you think that your clients should obtain?*", one of the companies replied: “First of all, they should get a unified ERP/CRM system. Then focus entirely on VRA maps and technology.” The other companies noted: “high-tech products and tools - software, navigation, autonomous machines, sensors, cloud technologies, as well as practical skills in digitization and new technologies’’.

All companies confirmed that these new technology trainings help generate additional profit. The trainings are held on demand, periodically and annually, with a duration of 1 day or between 1-2 days. Usually the costs for the training are covered by the company, and some of them are included in the price of the product or service. Two of the companies have indicated that clients also pay for the training.

The trainings are held at the clients’ places, with one company stating that it also holds them in its office and two companies in their own training base.

Result 4. Financial support programmes for ICT development at suppliers’ level Questions from Q24 to Q25.

To the question *"Which of the following financial support programmes does your enterprise offer to your new ICT technologies clients?*", three of the companies indicated that they provide such support, including post-paid with low interest; deferred payment in equal monthly instalments or support in partnership with a financial institution for direct financing.

The respondents answered that they do not receive financial support for new ICT technologies business.

Result 5. National and international legal/regulations/policy on new ICT technologies applied in agro sector. Questions from Q26-Q27.

One of the companies emphasised „that the use of technology must have an appropriate legal framework, which is overdue".

Conclusions:

Based on the above, it can be summarised that ICT technologies are in demand, both by large agricultural producers and by small family farms.
Input dealers and service providers in the country offer a wide range of products and services to their customers, with training being a mandatory element and offered by the companies. The most popular form of training is short training, conducted on a case-by-case basis, usually at the companies' place or training bases.
High capital investments and the need for high technical staff were identified as the most important factors affecting the sales of new ICT technologies.
Three of the companies offer their customers financial support programs in the form of post-paid with low interest, deferred payment in equal monthly instalments or in partnership with the financial institutions. Respondents do not receive support for new ICT technology businesses.
One of the respondents highlighted the lack of a sufficient legal framework in the relevant area as a challenge.

Recommendations:

The main recommendation is to maintain close partnership relationships between the relevant companies and universities, as in this way ICT technologies will very quickly find real practical application on a wider scale, and universities will be able to provide their students with access to the newest technologies in the industry at a given time.