



ICT SKILLS DEMANDS OF THE AGRICULTURAL LABOR MARKET IN HUNGARY

Survey evaluation based on 64 submitted questionnaires

AUTHORS:

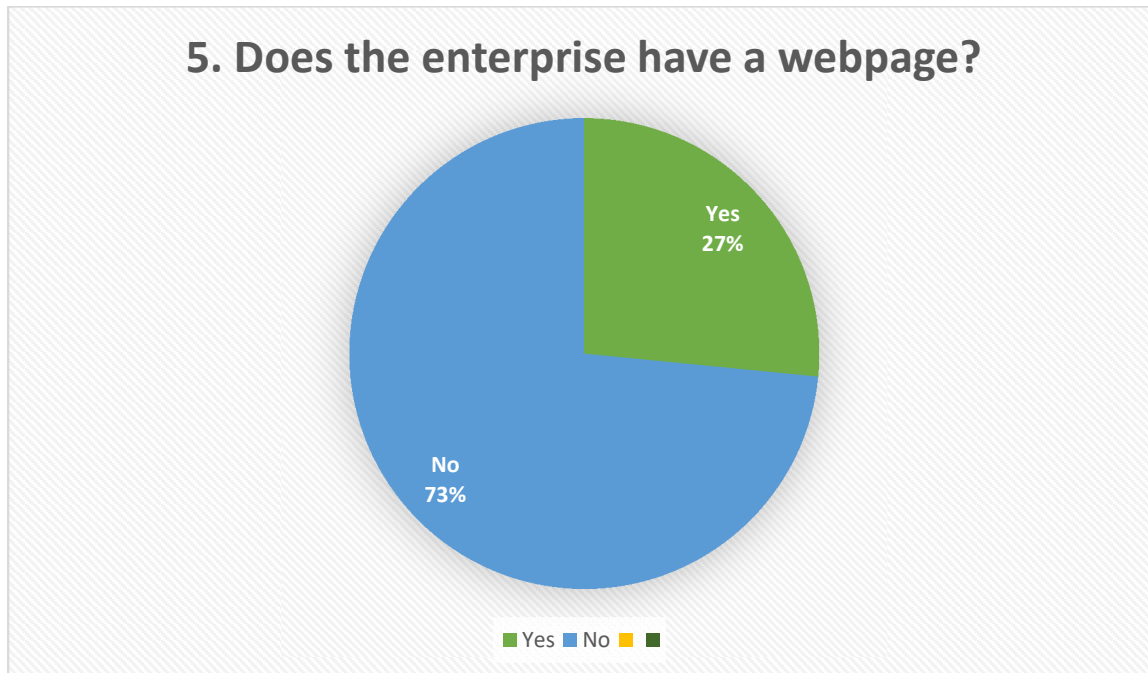
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A) BASE DATA

5. Does the enterprise have a webpage?

Yes	17
No	47

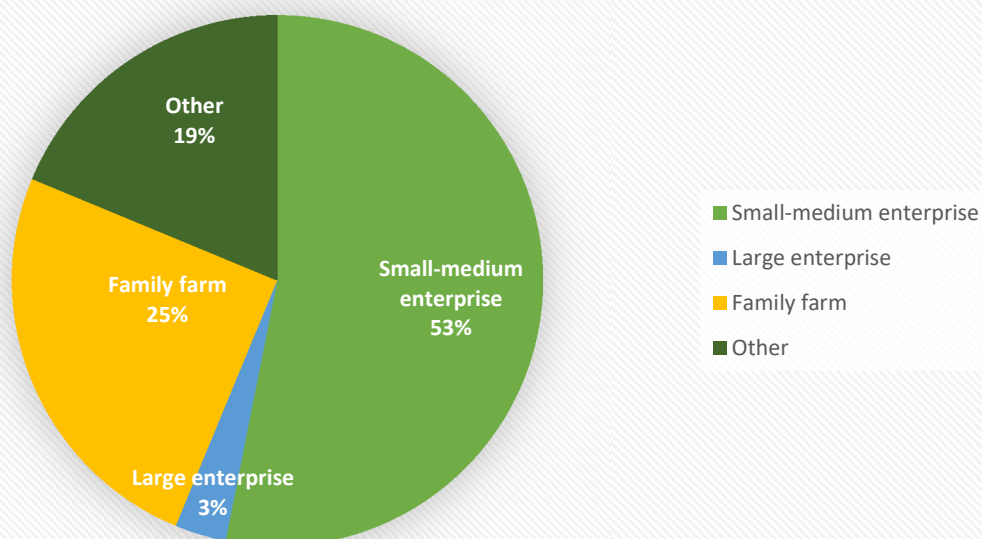


According to the given responses to the question, the vast majority of small businesses and private holdings don't have internet site. Almost all large companies and non-profit organizations have a website.

6. Type of enterprise:

Small-medium enterprise	34
Large enterprise	2
Family farm	16
Other	12

6. Type of enterprise:

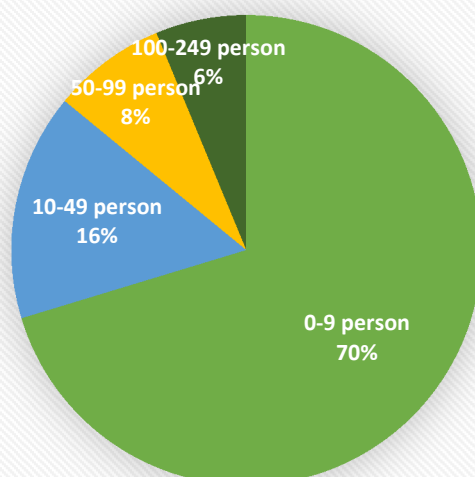


One of the main aims was to glean information from the broadest segment of the business. Therefore, we chose the method of targeted filling. Respondents' composition is representative; essentially corresponds to the national ratios (see, for example, a previous study that would give similar results today: http://www.ksh.hu/statszemle_archive/2005/2005_08/2005_08_705.pdf and the agricultural policy of the countryside due to the further fragmentation of the farm size)

7. Number of employees:

0-9 person	45
10-49 person	10
50-99 person	5
100-249 person	4

7. Number of employees



■ 0-9 person ■ 10-49 person ■ 50-99 person ■ 100-249 person

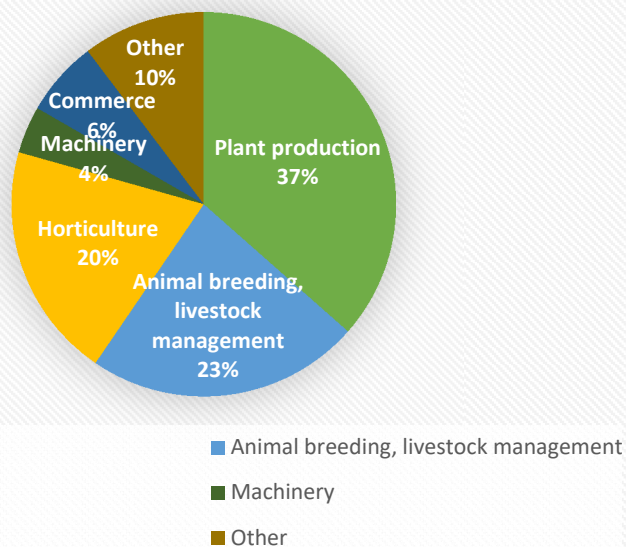
Based on the sampling, it is clear that today most agricultural production in Hungary is done by SMEs. These enterprises and organizations account for 86% of the survey respondents. It is important, therefore, to adequately inform and train individual farmers, as information must be provided in many places.

The risk of isolation is particularly high. The role of programs established by state-run professional organizations, educational institutions and domestic and EU-funded support systems is enormous on this issue

8. What is the main sector of activity?

Plant production	46
Animal breeding, livestock management	29
Horticulture	25
Machinery	5
Commerce	8
Other	13

8. 8. What is the main sector of activity?

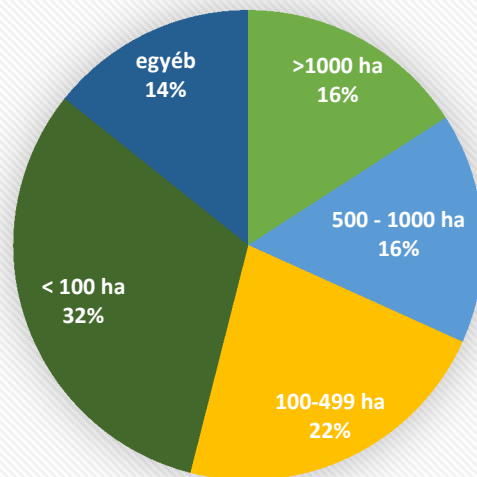


Based on the answers received about agricultural sectors of the respondents, 37% accounts for crop production, 23% for animal husbandry and 20% for horticulture. Surprisingly, only 4% of respondents deal with agricultural machinery services - sales, maintenance, and repairs. Other respondents included forestry, beekeeping and fishing

9. Area of managed land:

>1000 ha	10
500 - 1000 ha	10
100-499 ha	14
< 100 ha	20
egyéb	9
	63

9. Area of managed land



■ >1000 ha ■ 500 - 1000 ha ■ 100-499 ha ■ < 100 ha ■ egyéb

The answers to the introductory questions reveal that the vast majority of farmers are small businesses, which are relatively small with less than 100 hectares of agricultural land. Based on the answers, it is probable that family farms and SMEs dominate in Hungarian agricultural production. This must be taken into consideration when implementing the project.

B, ICTS IN AGRICULTURE

1. In which areas of your work related to agriculture do you use information communication tools and technologies (ICTs)?

E-government (subsidy claim, tax report, tax refund, etc.)	55
Official record keeping, data reports and planning (farmer logbook, nitrate report, soil nutrition plan, land utilization and crop rotation plan, etc.)	55
Complex enterprise resource planning system, farm management	10
Food traceability, processing and safety	10
Forecasts (weather, plant protection, pests), risk mitigation	28
Precision farming, cultivation, production technologies	20
Market access, e-commerce, input purchase, sale of products	20
Other(s):	4
None of the above	3

The smallest number of respondents selected the "none" option, most of them selected the first and second answers. More than 90% of respondents use ICT tools when submitting reports or requests. Some of the private farmers did not indicate the first two answers. The vast majority of farmers still use their IT system to report data only. However, it is a positive thing that many people use their IT systems to manage risk.

It is worth paying attention to this when we build the educational strategy of the application. One of the key tools of raising awareness among farmers is communicating with price-performance ratio sensitivity.

It should be emphasized that the use of agrarian ICT tools is by no means equivalent to the use of precision and agrotechnical solutions alone. Accordingly, the curriculum to be developed should take into account the answers given to this question to a certain extent in relation to current practice and corresponding needs.

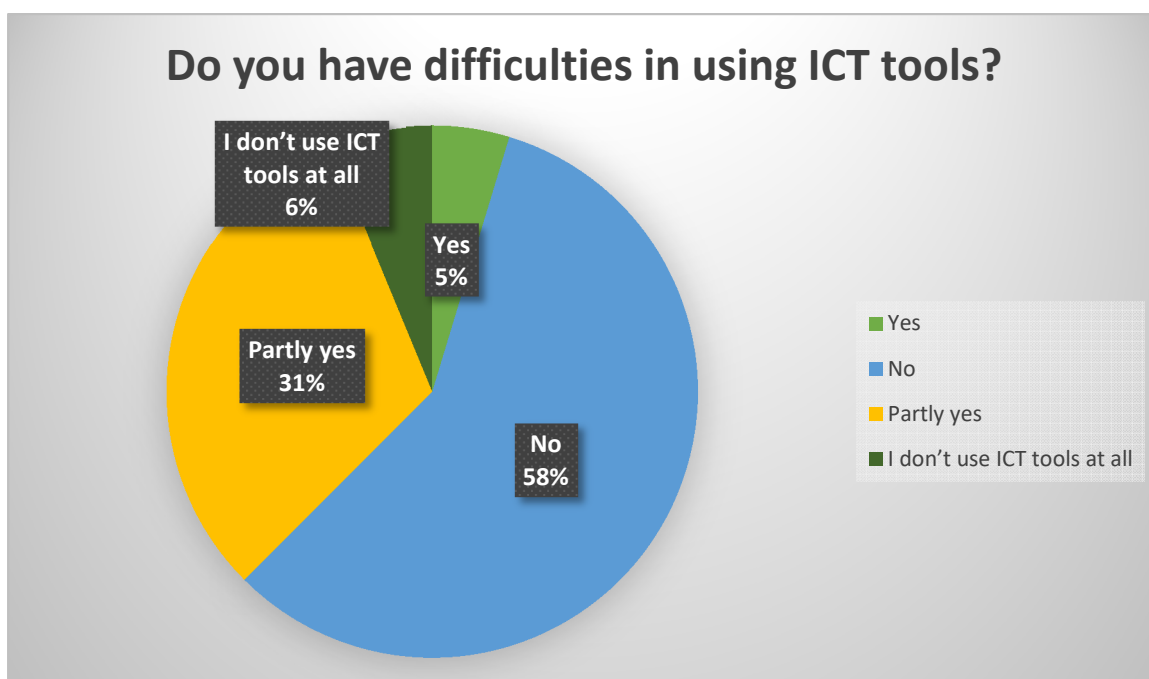
2. What is your opinion about ICTs from the perspective of managing and developing your organisation? Select which statement you agree with.

Makes daily work and administration easier	51
Cost reduction and revenue increase can be achieved by its use	36
Indispensable to manage and develop the organisation	35
Has small impact on the operation	7
Has no impact on the operation	1

In addition, the last two options were chosen the least in the question, 80% selected the first two options. Interestingly, only 30% of the respondents believe that ICT tools are essential for their operation. The previous problem is reinforced by the fact that many people point out more cost-effectiveness than the benefits of ICT tools. Reducing administration and cost-effectiveness may be a calling word with key issues to raise interest in agro-informatics technologies

3. Do you have difficulties in using ICT tools?

Yes	3
No	37
Partly yes	20
I don't use ICT tools at all	4



If yes, could you describe difficulties?

- There are many administrations
- Stock records
- Joining

Of the respondents to the questionnaire, there are very few problems with the use of ICT tools, but 30% acknowledge that they are partially unable to handle these tools. Overall, only 58% of respondents are concerned with the use of existing ICT tools. Based on the responses to the survey, it can be stated that farmers usually buy tools they are learning to handle, so they take advantage of tools.

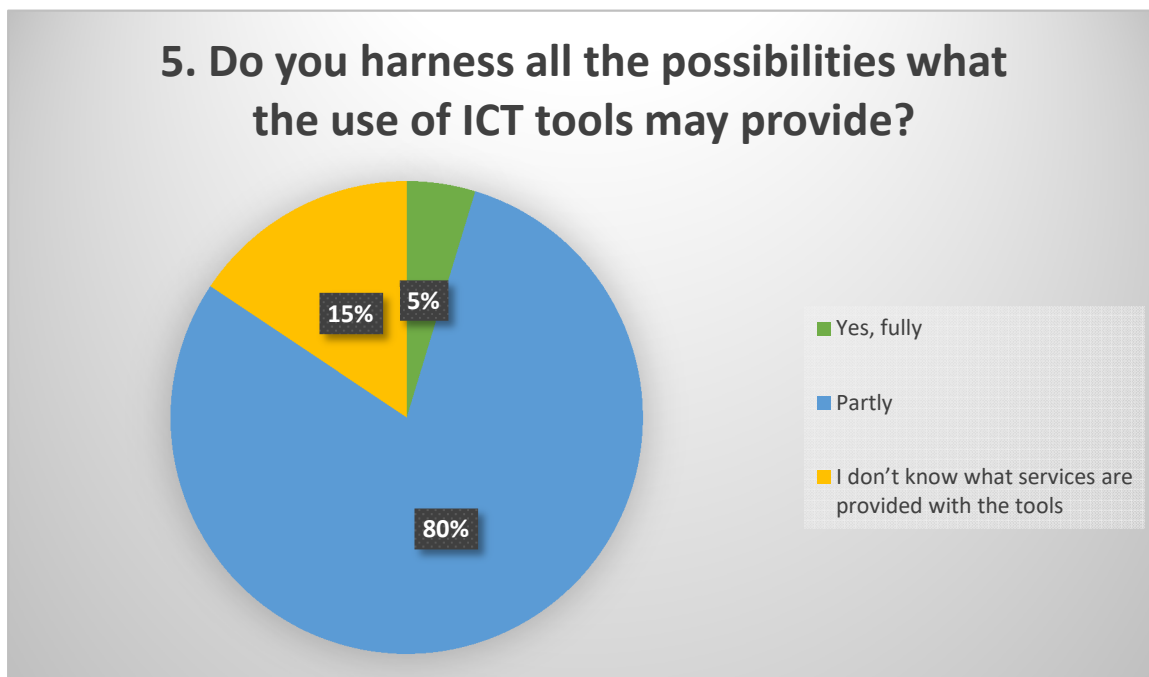
Answers to questions about existing ICT skills may also be due to the fact that the questionnaire was presumed to have been completed by individuals, mostly executives, who were most familiar with the ICT concepts, so they are better off in terms of application than, for example, some of their employees working in the production process.

4. How do you increase your education / competency in ICT?

Most of the respondents identified further training as a way of development. We can conclude with the previous question that respondents are developing their ICT tools and competencies along a well thought-out strategy. The acquisition of the devices to be purchased is often preceded by participation in further training.

5. Do you harness all the possibilities what the use of ICT tools may provide?

Yes, fully	3
Partly	51
I don't know what services are provided with the tools	10



80% of respondents acknowledge that they only partially use all the possible services known to them, and 15% replied that they were unaware of these services.

Based on the answers, the way of use and the quality of the application should be an important aspect when developing the curriculum so that students not only know what services can be related to a particular device, but also - include practical skills - how it can be most effectively used.

6. How does your organisation ensure information system administrator and other related tasks?

Full time employed information specialist	5
Part time employed information specialist	2
Employee also undertaking other tasks	16
Subcontractor on permanent base	8

Subcontractor on occasional base	18
Other:	9
Not ensured	13

This question was very divided between respondents, but typically 23% of them employ IT staff in the company to help with IT tasks. 25% use external subcontractors, occasionally, and 18% declare that they have no way of providing IT tasks in any way. In the vast majority of other options, the "myself" response was typical

Overall, it is typical that it is solved by an external expert or otherwise within the enterprise's own framework, and even more as a part-task, it is very rare to employ IT staff full time.

7. Would you employ information management expert or subcontract specialist enterprise which could assist you to exploit advantages of e-agriculture in your organisation?

Yes, full time employed	3
Yes, part time employed	4
Yes, full time subcontracted	32
No	25



61% of respondents would employ specialists who would help to exploit the potential of e-agriculture, but only 11% of them would employ their own workforce, either full-time or part-time, with others outsourcing it. And 39% of entrepreneurs do not think to get help from professionals

Typically, micro and small businesses are reluctant to expand their existing staff, while meeting new challenges, they rather prefer to work with well-established, experienced colleagues, also facing the problem of finding suitable new employees. Solving this situation, which probably constitutes to the response to this question, can be one of the main indirect goals and expected results of the project.

8. Having the means, would you support your colleague's participation at a special training which develops capacity in the use of information communication tools and technologies?

Yes	58
No	6



Contrary to the previous question, 91% of applicants would support one of their staff members with specialist training courses if they had the opportunity to do so, so their business would be given support for this task. To resolve the controversy over previous issues is important for the application.

Companies, which completed the questionnaire, would not like to spend their own resource training as they are uncertain about the outcome of the training.

Based on the answers to the questionnaire, it can be stated that entrepreneurs are informed and a free training can be a success in moving forward.

9. Please evaluate by importance the following professional skills, abilities and competencies what you would expect from an agro-information expert working in your enterprise (5: very important, 1: not important at all)

	1	2	3	4	5
Be acknowledged of the various software tools in e-agriculture, be capable to make suggestion for purchase, operation and maintenance.	2	3	7	12	40
Be acknowledged of the various hardware equipment in e-agriculture, be capable to make suggestion for purchase, operation and maintenance.	1	3	5	20	35

Especially be aware of the sensors used in agriculture, be capable to install, operate and maintain them.	1	4	8	20	31
Be capable to assist B2G (business to government) processes of the enterprise (claims, reports, refunds etc.)	4	6	10	7	37
Be capable to create and maintain the website of the enterprise, with basic content management and administration tasks.	7	13	15	13	16
Be capable to develop proprietary software according to the specific functional needs of the enterprise.	14	21	12	8	9
Be capable to follow the technological changes in e-agriculture and monitor newest trends.	1	3	10	20	30
Be aware of the basic rules and possibilities of e-commerce.	3	9	19	17	16
Be aware of the operation of data transmission equipment.	1	5	12	20	26
Be acknowledged of legal and ethical aspects of using ICT tools.	1	6	16	18	23
Know the processing methods of collecting data and be capable to select the needed information for decision making support.	1	2	6	19	36
Be capable to provide general information system administrator tasks for the enterprise.	6	13	13	14	18
Help the teamwork of the enterprise by his/her decisions.	2	5	8	19	30

The very important aspect of the question was less than 20%, so the following skills were not considered necessary:

- Being able to handle the business website, set up general content management and administration functions.
- Know how to program yourself,
- Learn the basic rules and opportunities of e-commerce
- Be able to perform the general administration tasks of your business

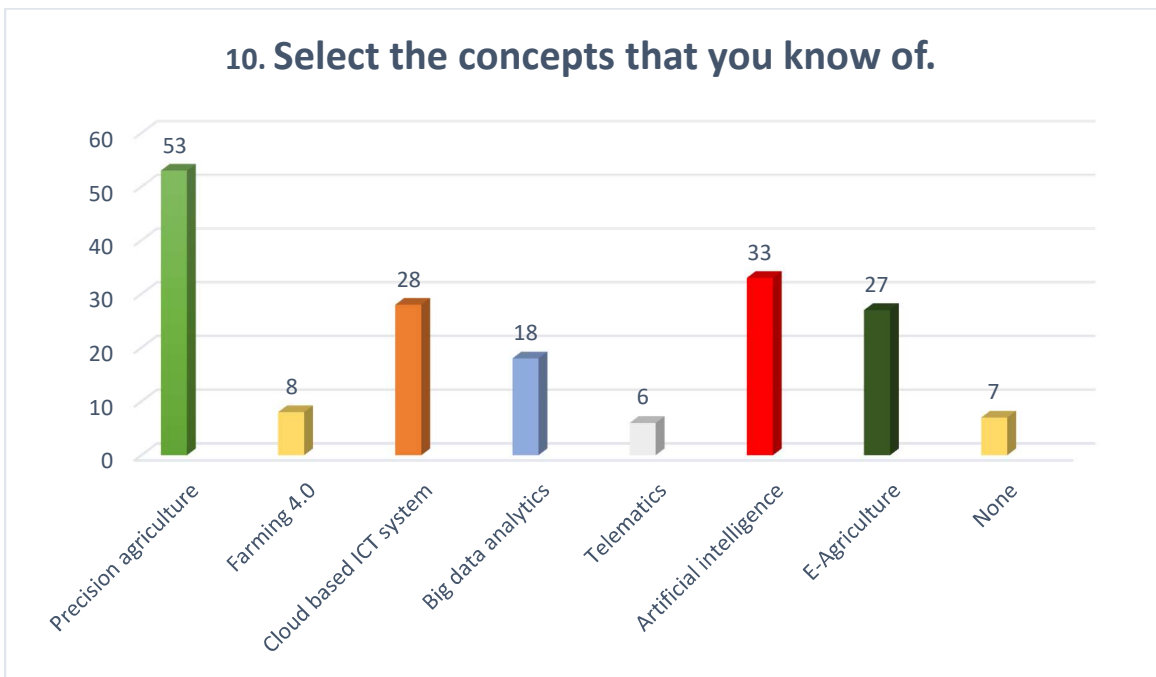
It is interesting to note these questions do not consider the programming and software development knowledge of any prospective employees. For the respondents, the most important knowledge for a prospective employee is to know about the operation of the different agronomic software and hardware and the way in which the data collected by the tools and software are processed.

You need to know how to make a decision on the collected data. It was also considered important to know the procedures for e-administration and to know the use of office client ports.

10. Select the concepts that you know of.

Precision agriculture	53
Farming 4.0	8
Cloud based ICT system	28

Big data analytics	18
Telematics	6
Artificial intelligence	33
E-Agriculture	27
None	7



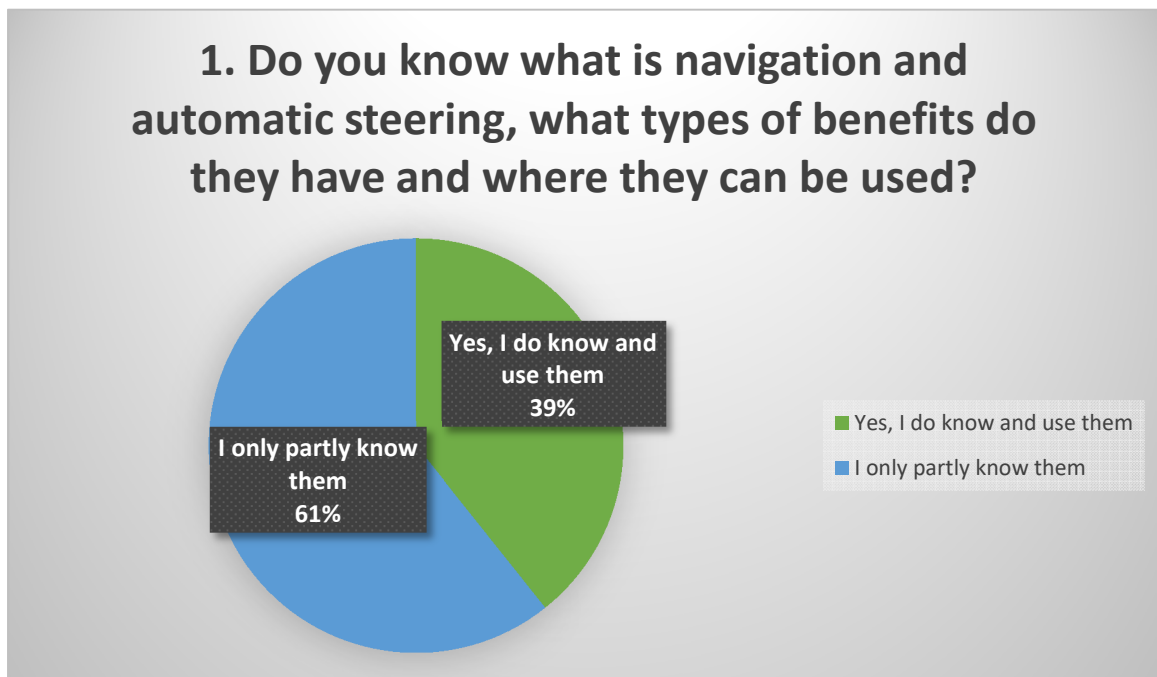
Not surprisingly, precision farming, e-agriculture, and cloud-based ICT systems have been completed in one of the first 4 places. What was surprising, however, was that artificial intelligence was considered the second best-known term for expression.

The following questions were optional, but the responses depth the knowledge given above. Knowing the answers to the questions below, we can say that the vast majority of entrepreneurs have heard of advanced technologies but have no idea or knowledge of it.

If you selected any of the first two points in the question above, please continue answering the below questions too!

1. Do you know what is navigation and automatic steering, what types of benefits do they have and where they can be used?

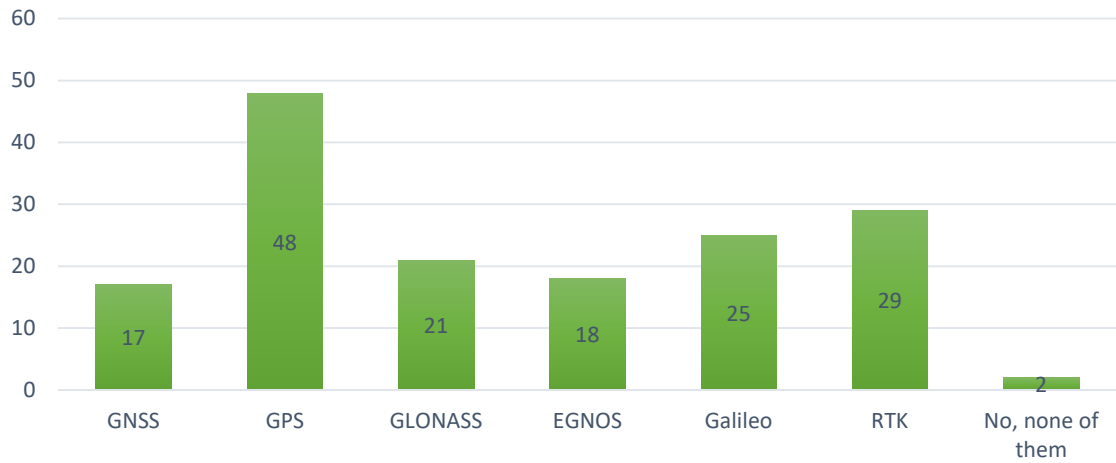
Yes, I do know and use them	22
I only partly know them	34
I don't know	3



2. 2. Do you know any of the following terms: GNSS, GPS, GLONASS, EGNOS, Galileo, RTK?

GNSS	17
GPS	48
GLONASS	21
EGNOS	18
Galileo	25
RTK	29
No, none of them	2

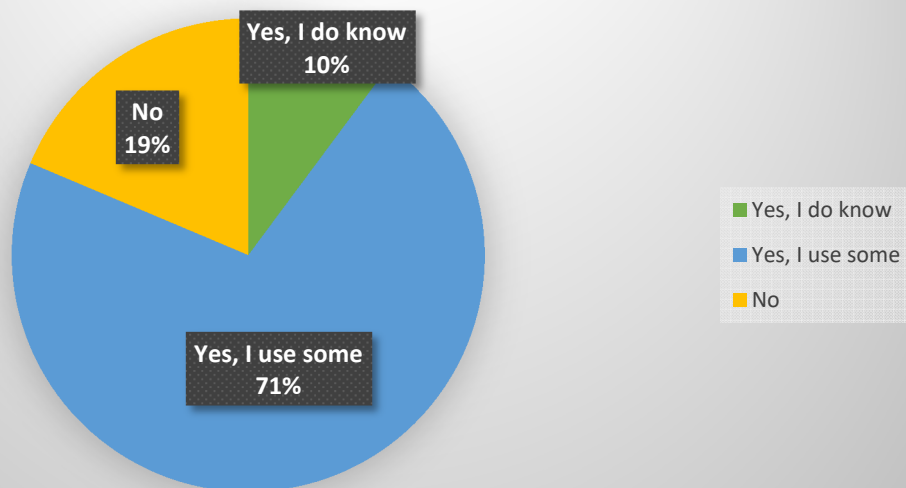
2. Do you know any of the following terms: GNSS, GPS, GLONASS, EGNOS, Galileo, RTK?



3. Do you know how various sensors can be used in precision agriculture?

Yes, I do know	6
Yes, I use some	42
No	11

3. Do you know how various sensors can be used in precision agriculture?

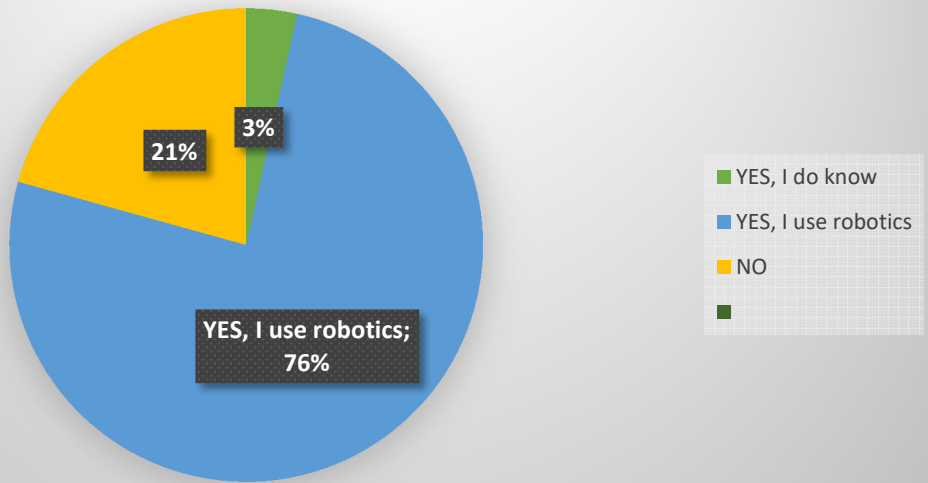


4. Do you know the potential utilization of robotics in agriculture

YES, I do know	2
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YES, I use robotics	44
NO	12

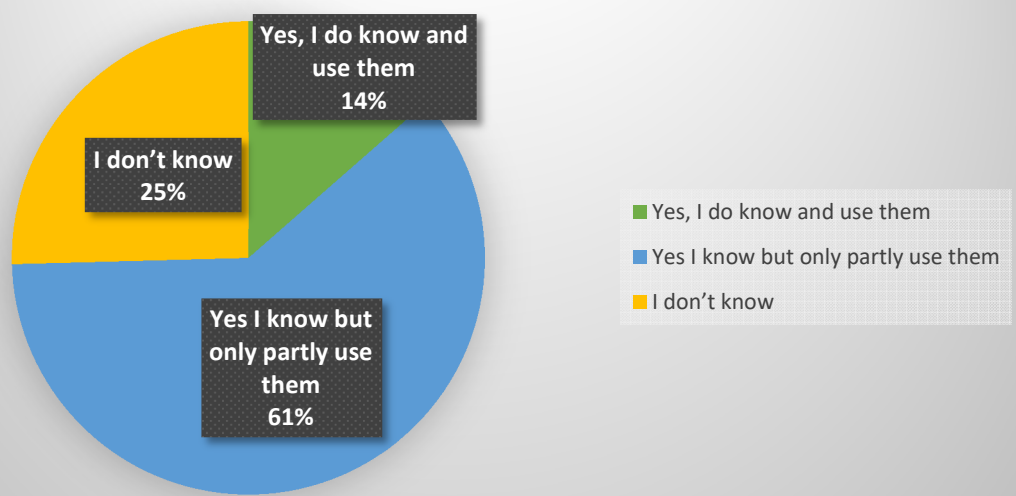
4. Do you know the potential utilization of robotics in agriculture?



5. Do you know how aerial and remote sensing can be used?

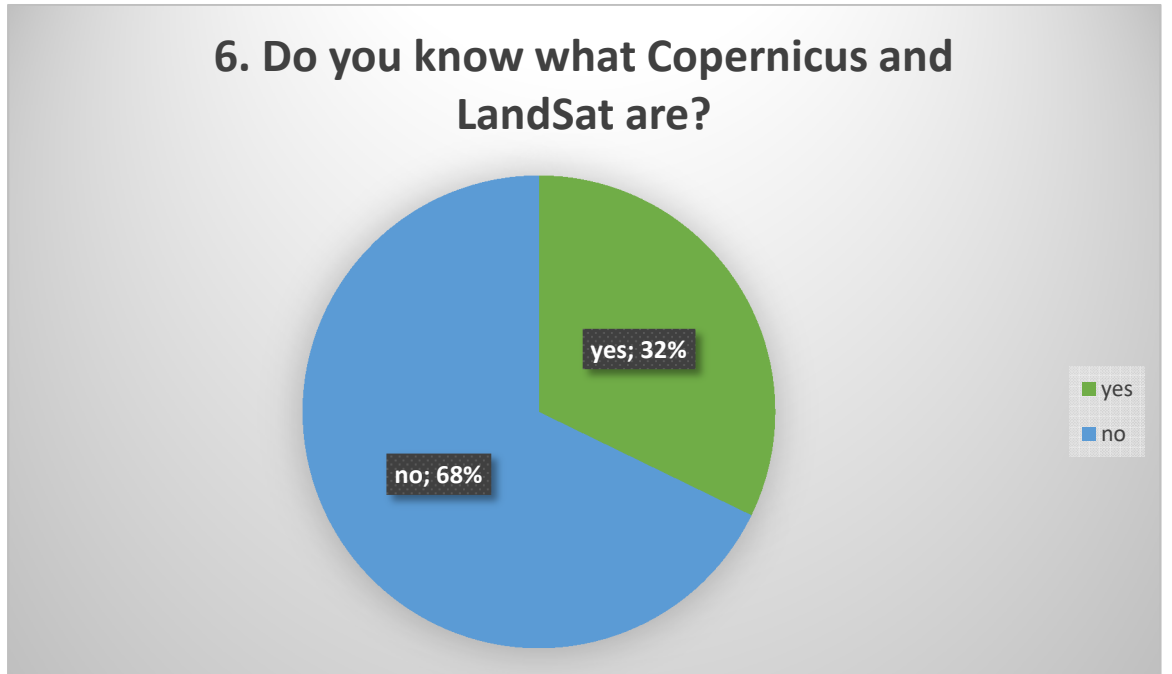
Yes, I do know and use them	8
Yes I know but only partly use them	36
I don't know	15

5. Do you know how aerial and remote sensing can be used?



6. Do you know what Copernicus and LandSat are?

Yes	19
No	40



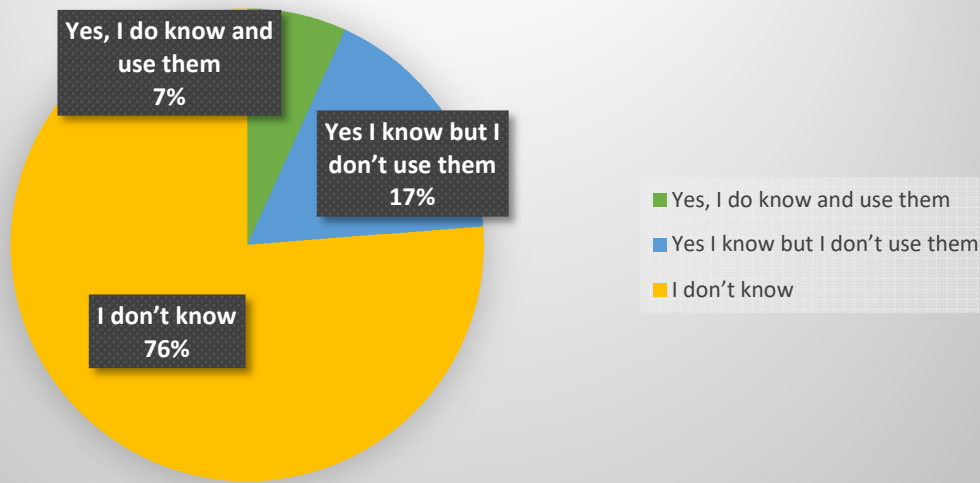
7. Do you use software for remote sensing data analysis?

Yes	6
No	53

8. Do you know, what Geographic Information Systems are for?

Yes, I do know and use them	4
Yes I know but I don't use them	10
I don't know	45

8. Do you know, what Geographic Information Systems are for?



SUMMARY

The result of the questionnaire fully supports the fact that the vast majority of agricultural producers currently have heard about precision technologies but are not using them. We believe that, as a result of the survey, it can be stated that uncertainty exists in the field of concepts. There are significant differences in the use of the English and Hungarian denominations of the device - many do not understand the same thing in English or Hungarian.

The survey supports the need for a system of concepts for precision farming and the concept of agro-informatics in the broader sense in Hungary. Fortunately, there are currently several initiatives to address this task. However, it is certainly a positive step forward that the Hungarian government is taking this task seriously and advocating the creation of central resources.

The result of the questionnaire highlights the fact that national agriculture is characterized by the size of the small and medium-sized farms, but the share of micro-farms is also significant.

The size of the businesses is somewhat parallel with the physical size of the farms, the number of farms with hundreds or thousands of hectares is lower, while the number of family farms of 50-100-200 hectare is growing, and it is worth noting that there are still a few thousand large farms in Hungary that handle a large proportion of agricultural land.

The EU's Common Agricultural Policy Support Scheme is crucial for the Hungarian agriculture, most of the farms encounter access to and use of ICT tools (land surveying, soil and leaf testing, use of eGovernment tools, reports, data submissions, registers, etc.) by the operation of CAP which occurs in all sizes, while the use of precision tools is more typical of larger farms, although it is expected to continue to spread in small and medium-sized farm categories. Most of the farmers are positive for ICT tools, they handle the benefits they have in the right place, open to new technologies, even through the use of new staff.

The responses also highlighted the functions that are most important and necessary for the use of ICT tools. As a result of the survey, we can summarize the features and needs of the potential user circle more accurately, which can both help to create the strategy for the training to be developed and the concrete curriculum development work.

The basic question for the strategy is that it is intended to serve just fewer large farms or the wider national agriculture sector as a whole, in the first case the dominance of precision farming knowledge can be justified. In the latter case, a broader set of knowledge, as indicated by this survey, should be processed and incorporated.