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The current state of the issue of information needs and dispositions among small Czech farms

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Abstract: The supply of fast, accessible and high-quality information to individual users is the key aspect of information assurances of the agricultural sector. This aspect is closely related to the so-called information need. The paper aims to evaluate the current state of the information needs and information support and their impacts on small farms in the Czech Republic. There is a strong necessity to improve the economic performance of farms in the Czech Republic. Moreover, the need for the introduction of new ICT in farming and farm management has rapidly increased at present. In farming, the ICT directly supports the operational agricultural activities and it can also serve as an interactive and flexible tool for monitoring the progress of the farm economic performance. The analysis of the current state of the issue of information needs and dispositions among Czech farms was based on the questionnaire survey. We obtained 165 correctly filled answers from agricultural enterprises. Survey results are analysed with descriptive statistics, frequency tables, the clustering analysis and the correlation analysis. The results show that with 95% probability: (1) The level of the information needs is related to the current state of the ICT and the decision support system at the farm, (2) The influence of the information need level to the level of new technologies usage was not confirmed, (3) Legislation issues represent a crucial part of the information needs of agricultural subjects, (4) Large enterprises with more than 500 ha have a much better level of the information support than the companies with fewer hectares, (5) Companies with less than three employees face problems with their information support, (6) Czech farms in average use advanced ICT and information systems, and (7) The farmer's decision-making is not strongly facilitated through the ICT.

Keywords: agriculture, Czech Republic, farms, farm information system, informatics evaluation, information support, ICT in agriculture, software in agriculture, survey

The farms in the European Union do not reach their full production potential and the level of technical efficiency of agriculture is diverse. The difference between the states with the highest and lowest technical efficiency is up to 40% (Nowak et al. 2015). The Czech Republic ranks among the countries with a low technical efficiency, as shown in some studies (Pechrová and Vlašicová 2013; Čechura 2014; Giannakis and Bruggeman 2015; Nowak et al. 2015). There is, therefore, a strong need to improve the economic performance of agricultural enterprises in the Czech Republic. The availability of high quality information for the individual agricultural entities could greatly help to improve this situation. High-quality information is a key aspect of the information support of the agricultural sector. This issue is closely related to the information needs of the business. The information need can be regarded as a basic social need for information in the quality and quantity level necessary to solve certain tasks and problems. The

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quality and quantity of information depends on the stage of development of the organization or company and the experience and abilities of people. Processes and activities in the agricultural sector require a high level of awareness and knowledge. Therefore, it is necessary to obtain not only the data but also their context or the equivalent knowledge. Specific information and data need exists in the area of Czech agriculture because:

– many of the development activities are affected by a significant lack of the available experts or other information sources,
– many of the problems that accompany these activities require a timely and qualified decision.

The research shows that the agricultural extension systems often fail due to the lack of knowledge of the information needs of farmers and the strategies for sharing (Babu et al. 2012). An information need of farmers reflects a desire to obtain information which meets their needs in the agricultural production. Access to information is the key to a successful development of agriculture, agricultural productivity increase and poverty mitigation (Mahant et al. 2012). The availability of reliable information tailored to the needs of farms plays a central role in the decision-making process within the framework of innovations in agriculture (Villamil 2012).

The recent development in the information and communication technology (ICT) offers new possibilities for the effective decision support in agriculture. Currently, many technology and application solutions are available that can enhance the agricultural processes. In order to establish priorities among the currently available applications of the IT, the identification of the information needs is essential (Rockart 1979). Investments should be in accordance with these information needs. Applications which support the needs of the greatest economic benefit and use fewer resources should be given the highest priority (Ward 1990). In conjunction with this information need, the issue of the so-called open data has been mentioned recently (Tyrychtr et al. 2015a; Vostrovský et al. 2015). These data may contribute to the satisfaction of this need. However, it is necessary to say that this can be achieved only with the open data which are in some way correct and this correctness should be a concern of all interested parties. The supposed savings in the agricultural sector can represent only the first step of the economic benefit of the open data. The prosperity of the economic subjects and the whole sector can be enhanced by activities started as a consequence of the efficient exchange of the open data. It is in the interest of the Ministry of Agriculture to make the data available to all parties with as low legal and licensing restrictions as possible and also in the highest possible technical quality.

One of the main issues in delivering information at the farm level is to determine their information needs. Our previous studies (Kubata et al. 2014; Tyrychtr et al. 2015b) evaluated of use of business informatics in agricultural enterprises in the Czech Republic. However, in all mentioned surveys, the relation between the information needs and the state of the ICT was omitted. There is a large number of problems and research questions (RQ) to solve:

RQ1: What is the level of information need between Czech farmers?
RQ2: Which field of agricultural production is affected the most by these information-related problems?
RQ3: Is the information need related to the technologic equipment used by the companies (ICT, mobile and special technology used in production)?
RQ4: On what basis make the Czech farmers their decisions?
RQ5: Is there a difference between small and large enterprises in the field of the information support?

This paper aims to assess the current state of the ICT equipment and information in the context of agriculture in the Czech Republic in connection with the needs of the information society.

MATERIALS AND METHODS

The survey

The analysis of current state of ICT and information needs among Czech farms was based on questionnaire survey conducted by the Department of Information Technologies and by the Department of Software Engineering at the Faculty of Economics and Management at Czech University of Life Sciences Prague in 2015. Czech farms were addressed through the Association of Private Farming of the Czech Republic (APF CR). The APF CR is a voluntary professional organization of private farmers in the Czech Republic. The APF CR is an association of legal entities, i.e. different regional associations of private farmers which are associations of natural persons – individual farmers. Each regional association has its own legal subjectivity. Nowadays, 38 regional as-

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Table 1. The structure of farms by agricultural land

Category	Frequency	Cumulative frequency	Relative frequency	Cumulative (rel. frequency)
Less than 50 ha	57	57	34.54545	34.5455
50–99 ha	34	91	20.60606	55.1516
100–499 ha	64	155	38.78788	93.9394
More than 500 ha	6	161	3.63636	97.5758
ChD	4	165	2.4242	100.0000

Source: Own calculations

Table 2. The structure of farms by employed people

Category	Frequency	Cumulative frequency	Relative frequency	Cumulative (rel.frequency)
Less 3 people	123	123	74.54545	74.5455
4–9 people	29	152	17.57576	92.1213
10–19 people	6	158	3.63636	95.7576
20–49 people	1	159	0.60606	96.3637
50–249 people	1	160	0.60606	96.9697
More than 250 people	2	162	1.21212	98.1819
ChD	3	165	1.8181	100.0000

Source: Own calculations

sociations form APF CR, covering almost the entire area of the Czech Republic. There were over 1000 respondents asked to fill the survey by e-mail or via online form at http://dotaznik.czu.cz. Some results of this investigation were published at the conference Agrarian Perspectives XXIV (Tyrychtr et al. 2015c).

We classified the farms in our survey according to the number of working persons, the area of farmed land, and according to the main focus of production. We obtained 165 correctly filled answers from agricultural enterprises that 94% out of them were maintaining land up to 500 hectares. Highest relative frequency was in the category 100–499 hectares. Only 4% of subjects operate at more than 500 hectares of land (Table 1). The main subject of this survey was group of privately run farms with mid-sized land. 92% of observed farms employed less than 9 people (Table 2). The most frequent were enterprises with less than 3 people (with frequency 123). Only 1% of subjects employed more than 250 people. Other findings are such as 82% of farms were in crop production, 66% in animal production and 14% in other types of production (Table 3).

Table 3. The structure of farms by type of production

The structure of farms by type of production	Count	Percent
Crop production	136	82.42
Livestock	110	66.67
Other	23	13.94

Source: Own calculations

Three districts had larger number of representatives in the survey: Benešov (5%), Strakonice (5%) and Náchod (4.6%). In total, respondents originated from sixty different districts from all around the Czech Republic. All of the respondents confirmed that they were recipients of any form of subsidy from the European Union funds or Czech government.

Survey respondents were asked to basic characteristic questions as to the location of farm, number of hectares, number of employed people and whether or not they are recipients of subsidies. The respondents were also asked to ICT equipment questions. There were 16 different software and 4 different hardware offered in the questionnaire. Four of software were specific for agriculture and the rest were general software for businesses. Respondents could fill the name of the software and hardware. There were 3 questions about current state of the information needs and dispositions (what types of information they used, whether farmers encounter in conducting its activities with serious problems and question where respondents could select the areas in which these issues relate). Last part of the questionnaire were questions about subjective level of informatics (usage ICT and software), new technologies (i.e. usage GPS, automated system, monitoring system etc.) and decision support system (i.e. usage analytical system, Microsoft Excel etc.) on the farm.

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Data analysis

The basic exploratory analysis brought out that the sample set was mainly consisting of small and middle-sized agricultural enterprises focusing on the plant and animal production on the land area up to 499 hectares and with up to 9 employees.

The research questions are addressed through descriptive statistics, methods of analysis of qualitative characteristics (Pearson's, M-V chi-square tests, Phi test and Cramér V&C) and cluster analysis (Hierarchical clustering). There was a survey among agricultural entrepreneurs from various regions in the Czech Republic conducted in the beginning of 2015 that provided relevant data sample. For the purpose of statistical analysis, data were transferred from a qualitative form (Yes/No; Likert scale) into a quantitative scale by substitution of ordinal scale by numbers to allow arithmetic operations. The level of ICT, new technologies and decision support system were assessed with an ordinal scale: do not know (0), none (1), below average (2), average (3), very good (4) and excellent (5). The level of information need was assessed with an ordinal scale: do not know (0), certainly yes (1), rather not (2), rather yes (3) and certainly yes (4). The data from question of types used information were transformed as yes (1) and no (0).

The hypotheses

To identify the relationships between the level of the information needs in the agriculture and informatics in the farms (ICT), new technologies or the Decision Support Systems and Analytical Systems (DSS-AS), we set the following working hypotheses (Table 4).

Methods of analysis of the qualitative characteristics

The presence of dependency between the qualitative characteristics was verified by the means of the Pearson's and M-V chi-square tests (Lancaster and Seneta 2005). The Pearson's χ^2 statistic is calculated based on the formula presented in Equation (1).

$$\chi^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

where:

χ^2 = the Pearson's cumulative test statistic, which asymptotically approaches a χ^2 distribution

O_i = an observed frequency

E_i = an expected (theoretical) frequency, asserted by the null hypothesis

n = the number of cells in the table

All associative tables must accomplish the condition that the size of the sample set is higher than 40 ($n > 40$). We tested the null hypothesis that assumes the statistical independence between the examined qualitative characteristics. To measure the strength of the relationship, the Phi test (for 2 × 2 tables) and the Cramér V&C (for larger than 2 × 2 tables) were used.

In the case of a 2 × 2 contingency table with cells a, b, c, d, the Phi coefficient is calculated according to the formula (Sheskin 2003; Sun et al. 2007):

$$\varphi = \frac{ad - bc}{\sqrt{(a+b)(c+d)(a+c)(b+d)}} \text{ or } \phi^2 = \frac{\chi^2}{n} \quad (2)$$

where n = the total number of observations

Hierarchical clustering

In the paper, the cluster analysis is used to analyse the similarity of enterprises in terms of the information support. The Joining method (Hierarchical Clustering) is chosen for clustering. The hierarchical clustering algorithm is based on the average linkage method (Sokal and Michener 1958), which was developed for clustering correlations. The aim of this algorithm is to calculate a dendrogram that assembles all the elements into a single tree. For each set of N enterprises, there is calculated an upper-diagonal similarity matrix that contains the similarity scores for all pairs of companies. The matrix identifies the highest value (representing the most similar companies). The second step contains $N - 1$ clusters because

Table 4. Working hypotheses about dependencies between ICT and selected factors

Variables	Working Hypothesis
Level of ICT and level of information need	H1: There is a statistically significant dependency between the level of information need and the level of the ICT.
New technologies and information needs	H2: There is a statistically significant dependency between the level of information need and the level of the new technologies.
DSS-AS and information need	H3: There is a statistically significant dependency between the level of information need and the level of the DSS-AS.

Source: Own compositions

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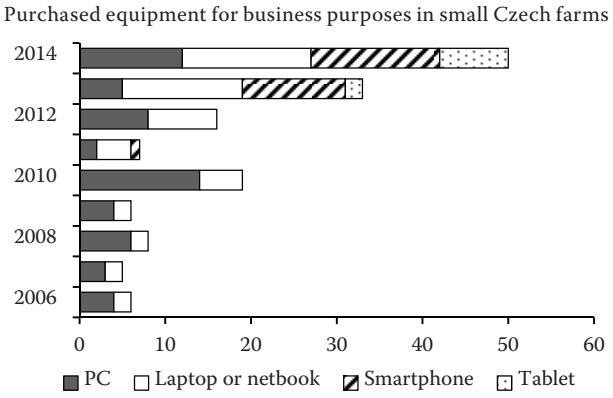

Figure 1. The structure of hardware purchases in the period 2006–2014

Source: Own calculations

one cluster is merged with another. The clusters that are joined together are those which have the smallest distance between them.

Statistical tool

Statistical analyses were done using the software Statistica 12, StatSoft. The variables were compared with the Pearson's and M-V chi-square tests. The Modules of Hierarchical Clustering and Analysis of Associative Tables were used. The contingency coefficient, the Phi and Cramér V tests were used to verify the correlation between the variables. There was generated the statistical outputs (boxplots, graphs of means and frequency tables). The confidence interval was set at 95% and the significance level at 5%.

RESULTS AND DISCUSSION

Firstly, the results of the evaluation of ICT are described as an important factor for development of business informatics in farms. Secondly, there is the analysis of the state of the ICT and the verification of the statistical hypothesis (Table 4).

Czech farms informatics evaluation

The current state of business informatics among Czech farmers was evaluated in terms of the hardware and software equipment. The impact of informatics on the activities of farmers was also evaluated. Regarding investments in the IT, there seem to be no obstacles for farmers. Most expenditure on hardware is now focused on mobile technologies (Figure 1). There is a positive evaluation of the level of the ICT equipment in companies during the last years (2006–2014).

Another important finding of this analysis is that in 60% of cases (75 respondents), the corporate informatics is considered as a necessary technological solution for the realization of business objectives, while 18% (22 respondents) said that informatics has a significant impact on the realization of business objectives, and only 22% (27 respondents) believe that informatics has no impact on the realization of their goals. This was due to the way the farm managers make decisions (see the survey results in Table 8), where their operational decisions are mainly based

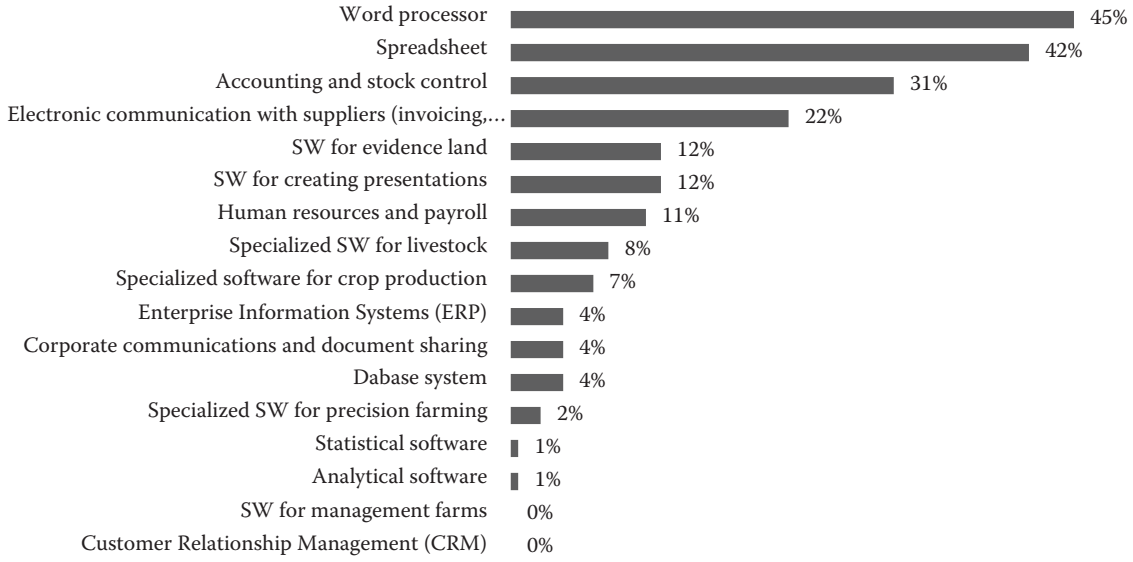

Figure 2. Types of software used for activities among small Czech farmers, 2015

Source: Own calculations

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on their subjective knowledge and the computer equipment is considered as uninspiring.

In another part of the survey, the usage of different software types was evaluated in the surveyed farms (Figure 2). The results show that the most commonly used type is the word processing software (45%), spreadsheets (42%), the accounting and inventory management (31%). The respondents also indicated the usage of other specialized information systems and software, such as the human resource management and the payroll (11%), the electronic communication with suppliers (22%), specialized software for the crop production (7%) and the software for livestock management (8%). The exploratory analysis show that the corporate information systems such as the ERP (which is very often used in businesses) are used only marginally (4%) among Czech farmers. Similar results were acquired for other software, such as the software for the precision farming (2%), database management systems (4%) and the statistical software (1%). These types of software are very rare among Czech farmers. No respondent uses the system for the customer relationship management (CRM) and the farm management system. Based on these results, it can be stated that the software equipment of Czech farmers is on average and there is a room for improvement.

Information needs and the ICT current state analysis

Information needs evaluation

The information needs must correspond with the specific state of ICT in the agricultural sector. Figure 3 indicates specific types of information in the agricultural sector. Basic graphical output is a range plots (multiple chart of means) which shows schematically the average value of the reference characters in all the samples (news from agriculture, reminders, invitation to meetings and events, tender offer, specialised

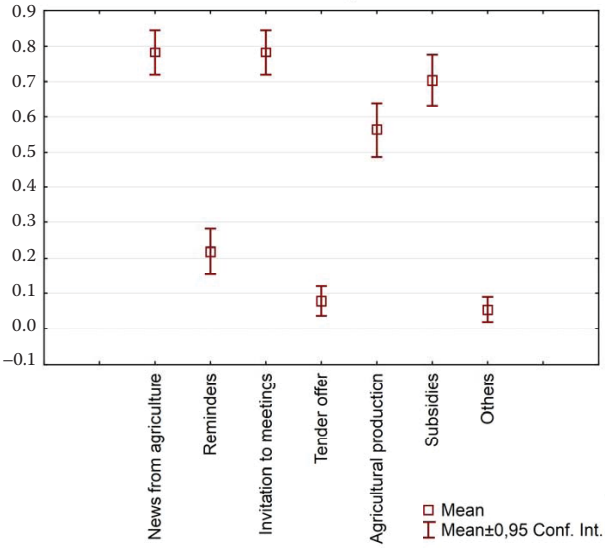

Figure 3. Range plot – types used information among small Czech farmers, 2015 (related with RQ1)

Source: Own calculations

information from agricultural production, information from the area of subsidies and resources from EU funds) and their variability and enables initial visual comparison of frequently acquired information types in agriculture. The values are from interval 0–1 (no – yes). The higher values are found, the greater is the importance of these kinds of information in terms of information needs, which include news from agriculture, invitations to expert meetings, information on agricultural production and in particular information on subsidies.

The high information need of the agricultural sector is a logical consequence of the variety of activities carried out in a typical agricultural company. This variety emerges from the principles of agriculture and from the effort to diversify the strategy of agricultural business to decrease the potential risk by splitting the activities to different domains. The increased information need of the agricultural sector is also influenced by:

Table 5. The level of information need between Czech farmers (related with RQ1)

Category	Frequency	Percent (rel. frequency)	Cumulative frequency	Cumulative (rel. frequency)
Do not know	4	2.4242	4	2.4242
Certainly not	4	2.4242	8	4.8485
Rather not	37	22.4242	45	27.2727
Rather yes	40	24.2424	85	51.5152
Certainly yes	57	34.5454	142	86.0606
ChD	23	13.9393	165	100.0000

Source: Own calculations

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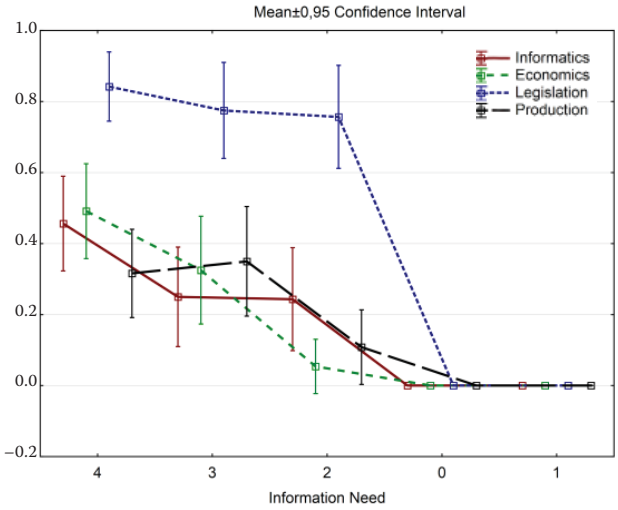

Figure 4. Multiple chart plots of means with deviations (related with RQ2)

Source: Own calculations

– the existence of a large amount of agricultural activities suffering from the lack of available specialists or other information sources;
– the existence of a large amount of problems accompanying these activities, which require a rapid and highly skilled solution.

Survey results showed that the farmers encounter in conducting their activities with serious problems (Table 5). The most claimed levels of the information needs in farms are 'certainly yes' (35%) and 'rather yes' (24%). Conversely, only 4 respondents (2%) had certainly no serious problems. Thus, 59% of the farmers encounter problems of a serious nature and a high-level information of need can be expected here.

These results were subjected to a further analysis. The situation, where the aforementioned information need is confronted to the areas in which these issues relate, was addressed. Figure 4 shows a chart of means of each group with the rendering of the confidence interval for the average. The dependent variable are the areas of informatics, economics, legislation and own production, the independent variable is the level of the needs. The figure has a major axis for 4 groups of the level of information need: 0 – farmers could not identify the information need, 1 – farmers have no problems of a more serious nature, 2 – rather have no problem, 3 – rather yes and 4 – definitely have problems of a more serious nature (i.e. a high level of information need of farmers). The minor axis contains the interval from 0 to 1, where 0 means that the information need does not concern these areas, while 1 means that it does. The figure shows the means and their confidence intervals for all combinations of groups. It can be seen that the problems in the fields of economics, informatics and own production during the interval overlap. The levels of information need vary, while the levels for the areas are almost the same. In this case, these areas do not affect the information need of farms. The situation is different in the course of the levels in the areas of legislation. Here, the course is separated from the others and we can thus conclude that the legislation issues are the essential components of the information needs of agricultural entities.

ICT, new technologies and decision support system evaluation

In the next part of the survey, the respondents answered the question: What is the level of informatics on their farm? The respondents selected from the scale: I do not know, none, below average, average, very good and excellent. The survey shows that only 4 respondents (2.42%) used some type of the ICT application on an excellent level (Table 6). Such a rate among Czech farms is negligible. The most stated level of the ICT in farms is 'average' (39%) and 'very good' (15%). Based on the results provided, the level of ICT in Czech farms is average.

Table 6. The frequency of the level of ICT in farms (related with RQ3)

Category	Frequency	Percent (rel. frequency)	Cumulative frequency	Cumulative (rel. frequency)
Do not know	3	1.8182	3	1.8182
None	4	2.4242	7	4.2424
Below average	22	13.3333	29	17.5758
Average	64	38.7879	93	56.3636
Very good	25	15.1515	118	71.5152
Excellent	4	2.4242	122	73.9394
ChD	43	26.0606	165	100.0000

Source: Own calculations

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Table 7. The frequency of the level of new technologies in farms (related with RQ3)

Category	Frequency	Percent (rel. frequency)	Cumulative frequency	Cumulative (rel. frequency)
Do not know	2	1.2422	2	1.2422
None	3	1.8633	5	3.1055
Below average	17	10.559	22	13.6646
Average	72	44.7205	94	58.3851
Very good	27	16.7702	121	75.1553
Excellent	5	3.1056	126	78.2609
ChD	39	21.7391	165	100.0000

Source: Own calculations

Table 8. The frequency of the level of DSS-AS in farms (related with RQ4)

Category	Frequency	Percent (rel. frequency)	Cumulative frequency	Cumulative (rel. frequency)
Do not know	7	4.2424	7	4.2424
None	33	20.0000	40	24.2424
Below average	12	7.2727	52	31.5152
Average	54	32.7272	106	64.2424
Very good	19	11.5151	125	75.7576
Excellent	0	0	125	75.7576
ChD	40	24.2424	165	100.0000

Source: Own calculations

The respondents in the survey were also asked the question: What is the level of new technologies usage on the farm? Nearly 45% of respondents assessed the level of new technologies usage as average (Table 7). It is interesting to note that 65% of the respondents assessed this level as average to excellent. It can therefore be concluded that the level of use of new technologies on farms in the Czech Republic is very good. The respondents were asked to indicate an excellent level only if they use the so-called precision agriculture. 3% of respondents answered this way. There is, therefore, a room for improvement.

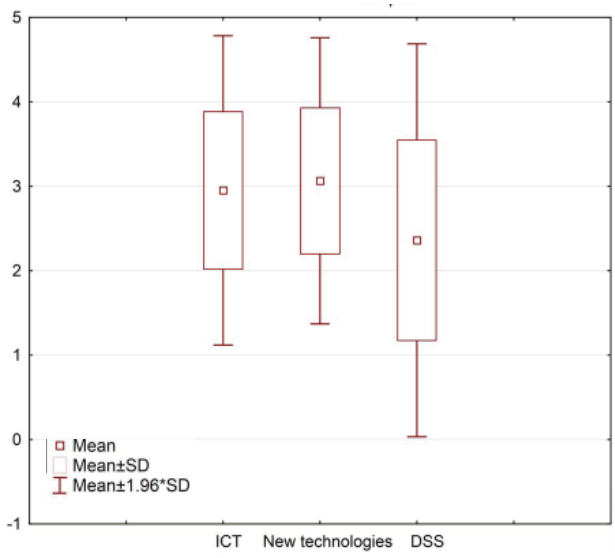

Figure 5. Boxplot – level of ICT, new technologies, and DSS-AS among Czech farms, 2015 (related with RQ3 and RQ4)

Source: Own calculations

The results of the survey also show that the farmers use the MS Excel for decision-making. The most frequent level of the DSS-AS in farms is 'average' (use Excel), (32%) and 'none' (make decisions on their own), (20%). None of the respondents evaluated the level of use of the decision support systems as 'excellent' (Table 8).

The boxplot (Figure 5) shows the comparison of averages of the particular levels of the information support in Czech farms. The value of 1 to the minor axis means none or bad level, while 5 indicates excellent. This initial graphical evaluation confirms a good level of the ICT and new technologies in the Czech agriculture.

Cluster analysis

The similarity of agricultural enterprises in the distribution of the level of the information need and ICT was analysed using these data. Using the cluster analysis, the set of farms was divided into four subsets (clusters). For the cluster analysis model, the variables "level of information needs", "level of ICT", "level of new technologies" and "level of DSS-

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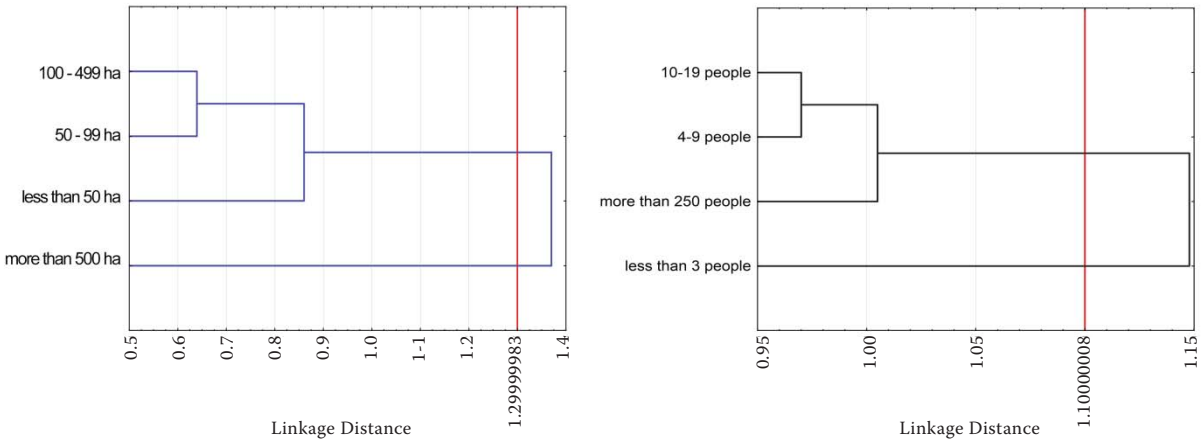

Figure 6. Horizontal hierarchical tree chart of clustering model (related with RQ5)

Source: Own calculations

AS" were defined. According to these variables, a cluster analysis was performed with respect to the company size. The dendrogram on the left hand side (Figure 6) shows that companies with the land area between 100 and 499 hectares and between 50 and 99 hectares have a similar distribution of the level of the information need and ICT. Conversely, the biggest distance is reported by the farms with more than 500 ha. The Conducted vertical incision split the sample into 2 clusters. Companies with more than 500 ha are included in cluster 1, other companies are in cluster 2. The variables in cluster 1 delimit these companies from the others. This confirms that large enterprises with more than 500 ha have a much better level of the information support than other businesses. The situation is different when the clustering is done with respect to the number of employees. Again, the file has been divided into two clusters (Figure 6 right). However, the greatest distance is shown by a company with less than three people. It confirms that those businesses have issues with their information support and are far from the others.

Table 9. Table of the statistics for the evaluation of dependency (related with RQ3)

	ICT(6) × Information Needs (5)		
	chi-square	degrees of freedom	*p*-value
Pearson's chi-square	32.70655	df = 20	0.03633
M-V chi-square	31.60692	df = 20	0.04767
Phi	0.5177706		
Contingency coefficient	0.4597937		
Cramér. V	0.2588853		

Source: Own calculations

Test hypotheses

To test the working hypothesis H1, the existence of dependence between the agricultural information needs and the level of ICT, new technologies and the DSS-AS were examined. The existence of dependence among qualitative variables is verified by the means of the chi-square test (the sample size is higher than 40). The null hypothesis was that there is a statistical independency between the examined qualitative variables. As first, the dependency between the level of information needs and the level of ICT in farms was tested. The Results with the chi-square test criteria and correlation characteristics are summarized in Table 9. The calculated level of significance p is lower than $\alpha = 0.05$for both types of the chi-square test. The null hypothesis is rejected in favour of alternative hypothesis which speaks of a statistically significant dependency. There is significant dependency between the level of information needs and level of ICT in farms.

Further statistical calculations for the verification of all hypotheses are presented in Table 10. There are the lowest values of p-values according to the Pearson's chi-square or M-V chi-square test in the table. The

Table 10. Statistically significant dependencies among factors and information needs, p-value and r-value (related with RQ3)

Hypothesis/Factors	*p*-value	*r*-value
H1: ICT and information needs	0.036	0.518
H2: New technologies and information needs	0.060	0.495
H3: DSS-AS and information needs	0.019	0.491

Source: Own calculations

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correlation index *r* is evaluated in the remaining three rows of the Table 5. There is a statistical dependence between the observed characters determined like direct (due to the positive values of the calculated coefficients), and the average dependency (due to the absolute value of the calculated correlation characteristics close to 0.5 value).

It was observed that with 95 % probability there is significant dependency between level information needs of farm and the use of ICT and DSS-AS. Contrary, the relationship between the level of farm information needs and the use of new technologies has not been confirmed (*p*-value is greater than 0.05, the null hypothesis is not rejected). We can conclude that if the information needed on farms is higher, it requires a higher level of ICT and expert analytical systems.

DISCUSSION

The results presented in this paper had been based on 165 respondents from Czech Republic. Given the way respondents were sampled the response rate it may be suggested the rates are zero for 19 districts (i.e. Beroun, Hodonín, Rakovník etc.), with rates at 0%, respectively. Given costs of data collection, it was expected that more respondents from each district will be useful for the analysis. It may be explained by poor propagation our survey at regional associations APF CR. It may be solved by expanded distribution of the questionnaire through the Agrarian Chamber of the Czech Republic. With focus on the representativeness of the survey respondents it is noted that there were not questions on age and education of respondents to the questionnaire. In the case of education it could be expected that middle age farmers with high educational background should be more attune to adopting new technologies, ICT and other disposition information need.

CONCLUSION

This paper presented the results of the information needs assessment among Czech farmers. In the first step, the overall state of business informatics at the Czech farms was evaluated. The results of the analysis show that the level of the ICT is positively evaluated. In the recent years, there is also a shift of investments towards mobile technologies and it can be stated that, in terms of the technical equipment, the Czech farmers are doing well. Also 60% of the farmers perceive informatics as a necessary technological solution for the implementation of its agricultural activities. In the area of the application equipment, the most commonly used software is the Microsoft Word (45%), the spreadsheet processor (42%), the accounting and the inventory management (31%). Farmers also use other specialized information systems and software to support their activities, namely the software for the crop production (7%) and livestock production (8%). The results showed that only 2.4% of Czech farmers use some type of applications at an excellent level. This exploratory analysis showed that the software equipment of Czech farmers is average to below average compared to other sectors of the economy.

The second part of this paper was the analysis of the information needs among Czech farmers. In the introduction, the problems and research questions have been identified and answered as follows:

RQ1: What is the level of the information need among Czech farmers?

The results of the analysis show that the farmers face serious problems when carrying out their activities. There is a high level of information needs.

RQ2: Which field of agricultural production is affected the most by these information-related problems?

The results show that the legislative problems constitute a crucial part of the information needs of Czech farmers. There is a great potential for creating new concepts, methods and systems to enhance the information support in this area.

RQ3: Is the information need related to the technologic equipment used by the companies (ICT, mobile and special technology used in production)?

The results of the information needs current state analysis show with 95% probability that the level of the information needs is related to the current state of the ICT and DSS-AS at the farm (the null hypotheses for H1 and H3 were rejected). The influence of the level of the information needs to the level of new technologies usage was not confirmed (the null hypothesis for H2 was not rejected).

RQ4: On what basis do the Czech farmers make their decisions?

The survey also showed that Czech farmers mostly use the Microsoft Excel software (32%) for their decisions and analyses. However, a large proportion of farmers act without the support of the ICT (20%).

RQ5: Is there a difference between small and large enterprises in the field of the information support?

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The results confirm that large enterprises with more than 500 ha have a much better level of the information support than companies with smaller land area. Similarly, farms with less than three people have more serious issues with their information support than larger farms employing more people.

The results of the evaluation of the state of the information needs and dispositions among farmers in the Czech Republic show that if the level of information needs is higher, it requires a higher level of information and communication technologies and decision support systems or systems for the analytical work. In this case, higher investments in the ICT in agriculture can be expected. A further research should focus on the ways and possibilities of achieving the highest level of the information support of farmers. Concepts for the implementation of the ICT and information systems with respect to the information needs of the individual farmers should be proposed so that these systems and technologies allow an efficient obtaining of the external information and management of the information flows at farms.

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