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## **DEVELOPMENT OPPORTUNITIES IN INFORMATION TECHNOLOGY FOR HUNGARIAN AGRICULTURAL ENTERPRISES**

### *MOŻLIWOŚCI ROZWOJU W ZAKRESIE TECHNOLOGII INFORMATYCZNYCH W WĘGIERSKIM PRZEDSIĘBIORSTWIE ROLNYM*

**Key words:** IT development, agricultural enterprises, ASP services

*Słowa kluczowe:* rozwój IT, przedsiębiorstwo rolne, serwis ASP

**Abstract.** The paper aims to analyze the opportunities of development of information technologies in the agricultural enterprises in Hungary. It uses extended questionnaire done among such enterprises as a basic research tool of data collection. The statistical analysis of collected data answered the questions regarded the ways of development.

### **Introduction**

Agricultural information system is a special are on the information technology. Such a development, the system enables the practical implementation of EU requirements [Kapronczai 2007]. Improvement of IT infrastructure has gained increased attention of Hungarian executives in order to enhance their competitiveness on the market. The basic problem with the cooperation between agricultural enterprises is the lack of information. They cannot react on macro-economic challenges on time, therefore they often do not know the answers to the questions „what, how and with whom” [Szalay, Györök 2001].

Another problem is the entrance to the market and keeping the market positions. In order to create jobs within the sector and to produce more efficiently and economically, it is inevitable to develop the information background through which the environmental challenges can be treated more easily [Szalay 2007].

During the implementation there was made a questionnaire survey among the agricultural enterprises, and after the evaluation the main task is to map and draft the current problems as well as to define the needs and the deficiencies concerning the infrastructure and equipment supply.

Exploring the current situation and the requirements in the frames of the project, the following recommendations were made for the IT development possibilities of the agricultural sector:

- infrastructural access for the people involved in agriculture (broadband-development, mobilnet, etc.),
- improvement of equipment supply (notebook, tablet, smart phone, etc.),
- defining the softwares to be used on the equipment (joint trading space, production/breeding recommendation system, etc.),
- agricultural ASP services.

Hypotheses of research:

- the supply of agricultural enterprises – especially the private farms – with information technology equipment is low,
- the agricultural enterprises finance their own information technology developments from own sources,
- most of the enterprises are able and willing to pay less than 0.5% of their annual net price income on information technology development,
- the agricultural enterprises do not or only occasionally use consultation services in IT questions,
- they are not able to pay regular wages to a permanently employed IT expert,
- most of them want to use the „Subsidy Management System” from the ASP services because it means extra funds for them.

### **Materials and methods**

The questionnaire survey (preparation, trial inquiries, distribution and evaluation) was made in October and November 2011, among agricultural enterprises. There were sent out 1405 questionnaires to 1012 corporate enterprises and 393 private entrepreneurs. In order to determine the ratio of private and corporate enterprises. Additionally there were made 5 deep interviews with 2 corporate and 2 private

entrepreneurs and one agricultural information technology expert. The interviewees came from different regions of the country.

Altogether 148 questionnaires were evaluated within the research. The survey was made among agricultural (private and corporate) enterprises. Excel and SPSS statistical program packages were used for processing the questionnaires. The questionnaire survey was preceded by a trial inquiry, the objective of which was to interpret and specify the questions as well as to finalize the order of questions. It is an important point in the construction of a questionnaire that the respondents would be willing to reply, therefore too many questions cannot be included in the questionnaire, thus there was made a „short” questionnaire of 15 questions for them. The questions can be divided into four big groups:

- 1 – general questions: sector, location, form of farming,
- 2 – ability and conditions of financing IT equipment and systems: how much and what sources are spent on IT development, does he hire permanent staff,
- 3 – what equipment and systems are used or would be used: how is the internet connection, what machines are used, what kind of IT systems are applied currently, what ASP services would be introduced,
- 4 – financial information: annual net income, own capital, profit after tax.

## Results

During the research there was faced the fact that the agricultural enterprises are registered in the Central Hungarian region because the administration and the information flow is quicker here, which is beneficial for the enterprises and they try to exploit it. 29.73% of the respondents declared that their activities are typically performed in Central Hungary, 19.59% in Northern Hungary and 18.24% in the Southern Great Plain. The least replies, only 6.08%, arrived from the Western and Central Transdanubia. 78.38% of the respondents are corporate enterprises, while 21.62% are private farms. The difference can be due to the fact that the corporate enterprises were in greater proportion in the sample because they used more IT equipment and they had more possibilities to make developments in this field. The reply to question – how much he is willing and able to spend on IT development from the annual net price income – was that the majority, 57.43%, was willing to spend 0-0.5% of the price income on IT development and 12.16% did not develop at all. It is interesting that a permanent decline can be seen by the growing of the ratio and it is even reduced to 0. Nobody chose the category between 5-10%, but 8.11% of the respondents marked the development above 10%. Those who spent more than 10% of the annual net revenue were all corporate enterprises.

The next question of the survey was: what sources are used for financing IT developments. Three possibilities were offered for the reply. 91.89% of the respondents rely on own sources. It is important to note that all the private enterprises indicated the use of own sources at this question. 20.27% of respondents utilize subsidies, while only 6,08% applies some external funds. It is inevitable in case of IT development projects to employ consultants who help the enterprises to find the most favourable solutions. 53 persons replied yes to this question, that is 35.81%, and 95 said no, which is 64.19% ratio. If we separately examine the private and corporate enterprises, we can see that there were a lot more private entrepreneurs among those who said no – it was 90.62% of them – while only 43. 1% of corporate enterprises indicated that they do not hire consultants for their IT developments and 56.9% replied with yes. I referred to the employment of consultants in the previous question, which is a very important aspect, but the next question – whether they need permanent staff – has the same significance. 68.24% of them replied that they employ IT experts occasionally for implementing and maintaining the systems, while 14,19% of them said that they permanently employ IT experts and 17.57% declared that they do not need any IT specialists. It often happens in case of private enterprises that only those systems are operated which are absolutely necessary and the IT devices belong to this category. 22.5% of respondents stated that they are permanently able to produce the wages of the IT expert, therefore they permanently employ IT staff, while 39.86% (59 persons) say that they are not able to earn enough money for IT staff wages but only occasionally and 37.84% (56 people) is not able to get the sources for wages at all. It is very important what the enterprise is able and willing to pay for. If we examine the two different forms of enterprising we can see that the private farmers marked only the 'no' and the 'occasionally' replies.

In case of applying IT equipment, it is inevitable to have internet connection which can have different forms. In our days, the IT devices and internet are used not only for keeping the archives, records or contacts but following the actual market trends comes into the foreground, too. 63.51% of respondents use ADSL, while 27.7% connects world wide web through mobilnet. 20.27% indicated cable connections and 18.24% uses some other form of connection. As regards the type of internet connection, there is not any significant difference between the two forms of enterprises. If an enterprise is connected to the internet, we can presume that it uses some kind of a computer. The question regarded the type of IT

equipment: 143 persons use desktop computers, 107 people have notebook. 68 have smart phones and only 9 people marked tablet (which is a technical novelty of our days, but it has not been too popular among enterprises yet according to the research). 8.11% of the respondents (12 people) use some other type of IT equipment for the everyday work. The enterprises use mostly recording softwares, first of all finance-accounting record systems. 104 out of the 148 examined enterprises use such a software. The ratio of those applying inventory management softwares is also very significant: 46.62% of the respondents marked this point. The finance-accounting recording softwares are also widely used because the statements and tax returns are forwarded to the competent authorities electronically, so the implementation of the software is not a question of choice, it is a must.

As regards ASP software services, the client uses the software as a rented service and pays monthly fees following the implementation fee. It is not unknown for the service providers because they offer basic and key services which are necessary for the existence of clients. In our days even the invoicing systems can be absolutely reliable. Thus the client gets rid of operation, updating legal regulations and some other grumpy tasks. 57.43% of respondents would use this „E-request submission modul” through ASP system, 43.92% would use the subsidy management system and 32.43% sees the possibility of utilizing ASP services in E-trade-space services. It is clear that 148 respondents indicated 361 possibilities which mean that they are interested in ASP services because they marked 2.5 services on average. The first two ranked „E request submission modul” and the „Subsidy management system” facilitates the administration of the enterprises, therefore it means advantage for them. We can conclude from this that electronic assistance is needed especially in these areas. Administration takes a lot of time of enterprises, especially the agricultural enterprises because they have to complete and handle a lot of documents connected with the applications for subsidies. Subsidies are considerable income sources of agricultural enterprises in Hungary and in other countries of the European Union. The highest item of EU budget is the agricultural and rural development funds. Within this question I have examined the private and corporate enterprises separately from the aspect of the chosen service and revealed that there are some differences between the form of enterprising and the ASP services to be applied. In case of private enterprises, the „E-request submission module” is on the first place, with significant majority: 72%, it is followed by the „Subsidy management system” by 66% and the third one is the „E trade space” with 50% value. In case of corporate enterprises, the sequence is similar, but the dispersion is greater among the applications. „E-request submission module” was ranked first chosen by 53% of the respondents, while the „Subsidy management system” was considered important by 38%. I have to note that only 13% of the private enterprises would use the „other” not specified applications while the corporate enterprises expressed much greater need for this type of services: 38% declared the importance of utilising these services. The „Business management” and „E trade modules” were chosen by the same ratio of respondents (28-28%). 23% considered the „Production/Breeding database” important, 20% would use „Distance education guide” (which would not be used at all by the private entrepreneurs) and only 10% are interested in „Seasonal labour hiring/employing system”. I have made the rankings of ASP services in order to evaluate the replies received from the different forms of enterprises. The same services were ranked the first and the second, but later there were differences.

Enterprises could indicate 5 categories between 1 and 1 billion HUF concerning the annual net revenues. The first category – the annual net revenue is between 1 and 1 million HUF – was marked by 10.14% of the respondents, the next category – range between 1 million and 10 million HUF – was chosen by 18.92%. 24.92 % estimated the net annual revenue between 10 million and 100 million HUF, while 69 enterprises put their revenues between 100 million and 1 billion HUF. The last, and highest, category (above 1 billion HUF) was not marked at all. It can be presumed, that the higher annual net revenue, as a result, can be due to the fact that the enterprises participating in the research work in corporate form therefore their turnover is higher and subsequently, their net income is higher, too. In case of corporate enterprises, the dispersion is bigger between the categories: nobody marked the category above 1 billion HUF, but 59.48% of corporate enterprises belong to the next category, that is between 100 million and 1 billion HUF and the smaller ranges were marked, too. The second was the net annual revenue range between 10 million and 100 million HUF chosen by 20.69% of the corporate enterprises. Only 5.17% of the enterprises declared that their net annual income is below 1 million HUF. Most of the private and corporate enterprises put the size of own capital between 10 million and 100 million HUF (34.46% of the respondents). The next category was the lowest one, marked by 27.13% and the remaining two categories were chosen by equal proportion of respondents: 18-20%. The situation is rather balanced among the inquired enterprises regarding the size of own capital, but analysing them by the form of business, we get a completely different picture. Examining the corporate enterprises, it can be stated that the enterprises with own capital above 100 million HUF make up 23.28% of all the corporate enterprises and 33.62% of the enterprises belong to the next category. 20.69% of the

corporate enterprises indicate an amount between 1 million and 10 million HUF as own capital and the enterprises with the lowest own capital represent 22.41% of the respondents.

The profit after tax is the money remaining at the enterprise which can be spent on the business either on IT development or paid to the owners in the form of dividend. 26.53% of the respondents declared that the profit after tax was not positive in 2010, which was a very high ratio. On the other side, however, the remaining 73.65% had smaller or greater positive profit. The same number of respondents – 39 people, 26.35% – indicated the range between 1 million and 10 million HUF as income after tax and the category of not-positive income. The next most popular category was the profit after tax between 100.000 and 1 million HUF chosen by 17.57% (26 people). 16.22% (24 respondents) chose the income after tax ranged between 10 million and 100 million HUF. The smallest was the proportion in the category between 1 and 100.000 HUF, 3.38% of the enterprises belong to this group.

I have examined the connections between the annual net revenues, the size of the own capital and the income after tax. There were two questions: „What percentage of annual net income are you willing to spend on IT development?” and „Does your enterprise hire consultant for IT development?”. I have analyzed the difference between the replies to these questions with the help of variance-quotient ( $H^2$ ) (Tab. 1). The variance quotient is for measuring the mixed relations.

**Table 1. Share of respondents' answers to the question: What percentage of annual net income are you willing to spend on IT development**

*Tabela 1. Udział odpowiedzi respondentów na pytanie: Jaki udział przychodów netto rocznych jesteś skłonny wydać na IT rozwoju*

Profit after tax in 2010/ <i>Zysk netto w 2010 r.</i>	Units/ <i>Jednostki</i>	Share of net income spent on IT development/ <i>Udział przychodów netto wydawanych na rozwój IT</i>				
		0% (no IT development)/brak <i>wydatków na rozwój IT*</i>	0-0.5%	0.5-1%	more than/ <i>więcej niż</i> 1%	total/ <i>razem</i>
No positive result/ <i>Brak wyniku pozytywnego</i>	number/ <i>liczba</i>	12	21	3	3	39
	%	30.8	53.8	7.7	7.7	100
1-100.000 HUF	number/ <i>liczba</i>	3	19	6	3	31
	%	9.7	61.3	19.4	9.7	100
1.000.000-10.000.000 HUF	number/ <i>liczba</i>	0	21	3	15	39
	%	0	53.8	7.7	38.5	100
10.000.000-100.000.000 HUF	number/ <i>liczba</i>	3	15	6	0	24
	%	12.5	62.5	25.0	0	100
More than/ <i>więcej niż</i> 100.000.000 HUF	number/ <i>liczba</i>	0	9	6	0	15
	%	0	60.0	40.0	0	100
Total/ <i>razem</i>	number/ <i>liczba</i>	18	85	24	21	148
	%	12.2	57.4	16.2	14.2	100

\* (0%) have expected count less than 5. the minimum expected count is 5.37/(0%) *oczekiwana wartość mniejsza niż 5. minimalna oczekiwana wartość 5.37*

Source: own study

*Źródło: opracowanie własne*

The variance quotient ( $H^2$ ) can be calculated with the help of the following formula:

$$H^2 = \frac{\sigma_k^2}{\sigma^2}$$

The results of the cross table are featured by the values of table 2. The most important among them is the result of Pearson Chi-Square ( $p = 0.038$ ), on the basis of which significant difference can be observed between the categories based on the size of annual net sales income regarding the employment of a consultant.

The enterprises which realized net price income above 1 million HUF in 2010 replied in greater proportion (47.8%) – compared to the other enterprises – that they hire consultant in the field of IT developments (Fig. 1).

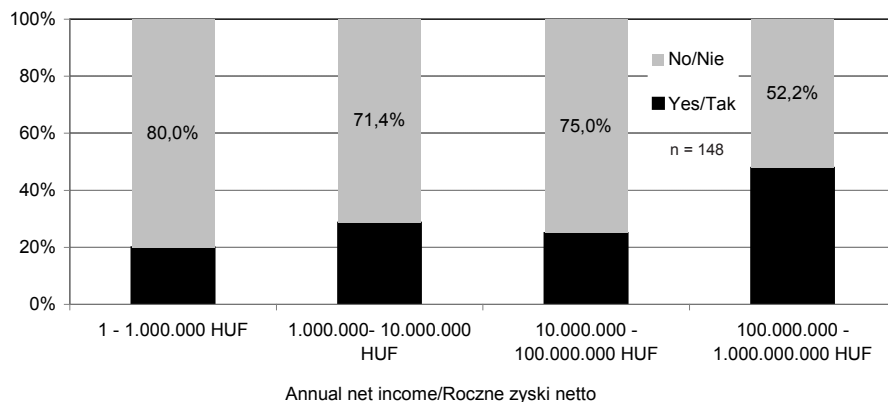
**Table 2. Results of crosstable**

*Tabela 2. Wyniki porównania krzyżowego*

Indicators/ <i>Współczynniki</i>	Value/ <i>Wartość</i>	df	Asymp. sig. <i>(2-sided)</i>
Pearson Chi-Square	8.434a	3	0.038
Likelihood Ratio	8.560	3	0.036
Linear-by-Linear Association	6.275	1	0.012
N of Valid Cases	148		

Source: own study

*Źródło: opracowanie własne*



**Figure 1. Distribution of answers between annual net income and “Does your enterprise hire consultant for IT development”**

*Rysunek 1. Rozkład odpowiedzi pomiędzy zyskiem netto a pytaniem, czy Państwa firma zatrudnia konsultanta od spraw IT*

Source: own study

*Zródło: opracowanie własne*

## Conclusions

The IT aspects of private and corporate enterprises are different: while the corporate enterprises are able to spend other sources – in addition to own funds – on IT development, there is no such possibility in case of private enterprises so it is worth offering some low-cost implementations to them. The feasibility of IT developments should be evaluated in connection with subsidies because they can stimulate agricultural enterprises. Although the GazdaNet program has not been started yet, but it is possible to purchase IT equipment in other fields of agricultural and rural development. It is not specifically for agricultural enterprises but they can utilize this possibility, too. The survey has revealed that most of the corporate agricultural enterprises are located in Central Hungary, which can be advantageous from the aspects of development and sales. Employing IT experts or consultants is not typical in case of agricultural enterprises, but it would be worth offering a service package for them with the help of which they can obtain quick information or help.

Most of the respondents have ADSL, cable net type internet connection and they also use mobilnet services. The questionnaire used in the research was too short to include a question „what does he use internet for” but during the preliminary survey many inquired people replied that they would install not only recording, subsidy management, etc. softwares but follow market trends through internet, too.

Cost efficiency is important, especially during this financial-economic crisis. The enterprises mostly spend less than 1% of their net price income on IT development, thus ASP services could be applied efficiently in their case.

Most of the respondents chose „E-request submission modul”, therefore more attention should be given to this in the future because both the private and corporate enterprises consider this modul the greatest help.

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## Streszczenie

*Celem artykułu była analiza możliwości rozwoju technologii informatycznych w przedsiębiorstwach rolnych na Węgrzech. Wykorzystano rozszerzony kwestionariusz wywiadu jako podstawowe narzędzie badawcze zbierania danych. Analiza statystyczna zebranych danych pozwoliła na wyznaczenie rekomendacji co do kierunków rozwoju.*

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