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Ph.D. thesis

E-business technologies in agricultural enterprises: Possibilities of application

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1. INTRODUCTION, OBJECTIVES OF RESEARCH

The wide-ranging application of information technology does not have a far reaching history. The rapid evolution started in the 80'-es affecting all aspects of economic life, resulting in significant changes of the society as well. Many times have we witnessed the process, when IT profoundly changes the main profile of enterprises and their every day routines. In other cases IT as innovative factor plays a less important role, it provides help for other developments only. The enterprises that can not keep up with the evolution get behind in the competition.

From the literature, one can draw the conclusion that the importance of the information technology based electronic commerce is, that by harnessing new technological possibilities and techniques based upon them – saving capital and other resources – it makes economic processes more efficient. However, the size of the advantage depends also on the size and the profile of the company.

My research seeks the answer to the question: To what extent was the introduction of information technology in the bunkered Hungarian agriculture advantageous? My main objectives were the following:

- To examine the system e-business and e-commerce models and their practical application.
- To analyze the trends and practice based on the experience of international application and on available databases.
- To analyze the set of conditions of e-business in Hungarian agriculture, especially in Hajdú-Bihar County.
- To assess existing systems, to analyse portals created to support the Hungarian and international commerce, with respect to various aspects.

2. SHORT HISTORY AND METHODS APPLIED

The principle providing basis for the Hungarian information society, the Information Society Strategy for Hungary, was published in 2003 only, which in an international context, is a significant delay. Although, the survey figures of targeting the IT endowment of the population and companies show moderate development, compared to developed countries the backwardness is sizeable.

E-business is not possible without legal regulation. Based on the EU principles defined in 2000, the Act. CVIII. of 2001, on '*Certain Issues Relating to Electronic Commercial Services and Services Concerning the Information Society'* was passed. The 2003 modification to the Act (XCVII. of 2003) is the governing law today.

The technological solution of inter- and intra-firm exchange of electronic data, the Electronic Data Interchange (EDI) developed in the 1980's facilitated the introduction of electronic business administration. Its application makes integrated systems possible. It is a problem however, that acquisition and upkeep are costly, which in most cases are not counterbalanced by the lower costs of the electronic administration. For this reason, a great share of the Hungarian SME-s can not introduce this appliance, not even if they are aware of the well defined advantages. These would be the inventory cost diminishing 'just-in-time' method, or the precise and up-to-date statements, analysis of commercial data, which are crucial to optimize the sales and manufacturing.

The high cost is the most important barrier for EDI to spread widely. To assess this problem, was Extensible Mark Language (XML) technology developed, having the advantage of easy access and programmability, being highly flexible and capable of communicating with EDI systems.

For the security of Internet based, inter-firm electronic data exchange, digital singnature (authentication) is vital. The conditions are now established, and by 2005 the regulation problem was also solved. Despite these facts, its spread in the Hungarian economic life is expected to be a slow process.

The Hungarian Central Statistical Office (HCSO) and the GKI Economic Research Co. (GKI) carried out representative, country-level and comparative surveys that cover both the individual county level and industry level data, including infrastructure. The survey executed

in 2003 and published in 2005 shows that Hajdú-Bihar County has the second largest agricultural area, and is therefore dominant in the industry. Concerning the information and communication technology endowment and the size of the firms, the County can be claimed to be of average, otherwise said, typical in country perspective.
Concerning Hajdú-Bihar County, based on 2004 data, in 2005 the Informatics Centre of the Hajdú Bihar County Local Government published a comprehensive paper titled the **„The Information Society Strategy of the North-Alföld Region"[1].** In this paper relatively few responses (65 p.) from firms involved in agricultural production were processed.
The low rate of reliable answers and the fast changing technological surrounding gave the reason and the initiative for me to conduct a survey with questionnaires of my own in Hajdú-Bihar County.

In 2003 the researchers of the Corvinus University of Budapest produced a paper ordered by the The Ministry of Informatics and Communications about the services offered by agriculture-related portals, examining individual cases in 12 countries. To assess problem in its entirety, an analysis based on a larger sample seemed necessary, which would represent the Hungarian situation also more fully.

The different parts of my research called for application of different methods.

To assess the e-business models I have chosen to give an overview of the Hungarian and international literature, because part of the theoretical models are accepted by international e-business experts. **When analysing the practical applications, besides the literature I have also used my own results published earlier.**

I analyzed the electronic commerce in developed countries based on EU EUROSTAT and OECD databases. Although, above institutions have no separate survey for the trade of agricultural or food industry products, their database allows for analysing individual countries and tendencies. **I have conducted my research concerning the electronic trade of food industry products in Europe based on the surveys of „e-business w@tch".**

[1] *Észak-Alföldi Régió Információs Társadalom Stratégia*

The first phase of the research that targets the conditions of the Hungarian agricultural e-business and situation concering the application of the models **consists of questionnaires employed at firms that represent typical linking points in the supply chain from producer to consumer.** The choice of instrument was determined by the goal, that via the managed but still informal interviews I get to information that may shape the direction of a more detailed analysis. The main aspect considered when choosing the interviewees is that they had to have full information and overview of the given activity within the firm. For better evaluation I chose to use structured questions when interviewing.

Based on the answers in the interviews have I assembled the questionnaires, which had to measure how the e-commerce infrastructure– of computer, Internet and special software – endowment and their use develop and how the openness, acceptance and the recognition of the need to use the systems evolves. To increase the propensity to answer the questionnaire was anonym. For the more effective evaluation 29 of the questions compiled, were closed and only 13 were open. Questions were arranged in following six groups:

1. The first two (open) questions targeted the general properties of the enterprise. I asked for the industry code, a number, which positions the firm within industry activity-based system (TEÁOR), employment statistics and turnover. As for the activity definitions I used the following classification: 1.1. – Cropping, 1.2. – Livestock, 1.3. – Mixed & other types, and 1.4. – Agricultural service
2. The third and fourth question aimed for the usage and endowment of computers.
3. The fifth and sixth question measured the user habits of those having Internet connection. The seventh aimed for the potential causes of not having Internet.
4. The eighth question assessed the overall familiarity with the subject, that is: ‘Have you heard about e-commerce?’
5. The next eighteen question were to explore the use of the electronic record keeping, the existence of website, the use of e-invoicing of online acquisition, and of sales through open questions leaving space to explicate reasons.
6. The twenty-seventh question measured the observations about the efficiency of the electronic systems.

After the twenty-eighth point of ‘Comments’, the last twenty-ninth question aims to specify the manufacture products in order to make the classification of the products within TEÁOR.

When it came to the choice of the type of the sampling, many aspects had to be taken into consideration, from which the experience of previous surveys and the specialties of the underlying activity were determinant.

From the interviews one can conclude that the use of info-communication tools depends on the type of the activity and the category given by the number of the employed at the firm. Therefore the sample composition had to be constructed in a way that it represents the enterprises of the County with respect to the two previous criteria. What also supports this choice of method, is that makes commensurability with HCSO nationwide surveys possible. (All economic statistics use the underlying criteria)

I conducted the survey among the agricultural enterprises operating in Hajdú-Bihar County.

Secondary information gave a precise picture about the composition of the statistical population. With the help of the quotient of standard deviations I have investigated the strength of the relationship between two criteria (headcount and TEÁOR).

Table 1. : The agricultural enteprises enterprises operating in Hajdú-Bihar County by TEÁOR and number of employed categories.

	Headcount categories (capita)										
TEÁOR	**-10**	**10-19**	**20-49**	**50-99**	**100-149**	**150-199**	**200-249**	**250-299**	**300-499**	**500-999**	**Total**
1.1	1,218	28	24	9	1	1	0	0	0	0	1,281
1.2	477	15	21	10	1	2	1	0	1	1	529
1.3.	346	2	0	1	1	2	1	0	1	1	355
1.4.	909	16	4	0	3	2	1	1	1	1	938
Total	2,950	61	49	20	6	7	3	1	3	3	3,103

Source: HCSO, 2003

The variance quotient can be calculated as:

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

The quotient of standard deviations: H= 0,003478.

The statistic shows a loose relationship, practically independence, that is why in the analysis the results of the survey are investigated separately by the two criteria. When preparing the sample I have used a mixed sampling strategy such that I involved all enterprises employing 10 people or more, and I used a 10% sampling limit at firms employing less than ten, due to the fact that this latter category involves relatively large number of firms, namely 2950. Taking advantage of the opportunity that the observation was carried out by experienced **'village managers'**, I let their expertise and knowledge of the locality decide which firms

should be involved in the sample, having the categories given by above criteria already stipulated. **The sample was thus determine by quota sampling.**

2. Table: The number of questionnaires sent out

	Employment categories				
Activity	**-10**	**10-19**	**20-49**	**49-**	**Total:**
1.1.	122	28	24	11	185
1.2.	48	15	21	22	106
1.3	34	2	1	6	43
1.4	91	16	4	0	111
Total:	295	61	50	39	**445**

Source: own-making, 2005

Taking HCSO classification into consideration, I created the following categories of statistical employment: below 10 employees, between 10-19, 20-49 and above 49 people being employed. From the 445 questionnaires sent out only 127 were returned and due to the personal questioning all of them were suitable for evaluation. As answering was voluntary, the 28% return rate matched previous expectations.

Table 3.: Response rate according to activities and employment categories(%)

	Employment categories				
Activity	**– 10**	**10 – 19**	**20–49**	**49–**	**Total:**
1.1.	37.7	32.1	54.2	36.4	38.9
1.2.	27.1	13.3	19.1	0.0	1.9
1.3.	50.0	100.0	100.0	100.0	60.5
1.4.	8.8	6.3	25.0	0.0	9.1
Total:	28.5	23.0	38.0	25.6	28.5

Source: own-making, 2005

The questionnaires were processes with Microsoft Excel, which by the data imput on the first working sheet, by the in-built functions and by the auxiliary programs written by myself facilitated the one-by-one and special query of the open questions.

To filter out the random effects, in case of every question, I have conducted an independence test, where the null-hypothesis stated independence of the two criteria. The test of the fit of the

estimation is right sided, thus we accept H_0 if the realized value of the test function falls in the acceptance interval of $\left[0;\ \chi^2_{1-\alpha(szf)}\right]$.In my investigation I have used 5% level of significance.

To analyze the already working systems (services) I have constructed the following typology:

1. The content of the site, which does not only detemine the possible users, but also the range of services.
2. Language option.
3. Targeted users.
4. Ownership structure.
5. The geographical territory served.
6. Portal's age.
7. Functional content (internal search, archives, newsletter, imprint).
8. Marketplace function.
9. Methods of keeping contact.

In this part of the research the primary goal was to analyse the available solutions in the EU member countries compared to the ones in Hungary. It was practical to focus on countries that more or less share similar parameters (information society – like the development of e-business and structure of the agricultural sector), but for the sake of completeness, systems from overseas countries and from Asia have also been included and been investigated in the sample. 55 websites were recorded fully. The vast is operated (41) in Europe – including 18 in Hungary -, 4 in Asia, 3 in the USA, 1 in Canada and 1 in New-Zealand.

I have also conducted a wide-ranging research of the literature, the results that I have obtained during my own research were regularly checked against survey results published in the same subject in Hungary.

3. THE MAIN STATEMENTS OF THE THESIS

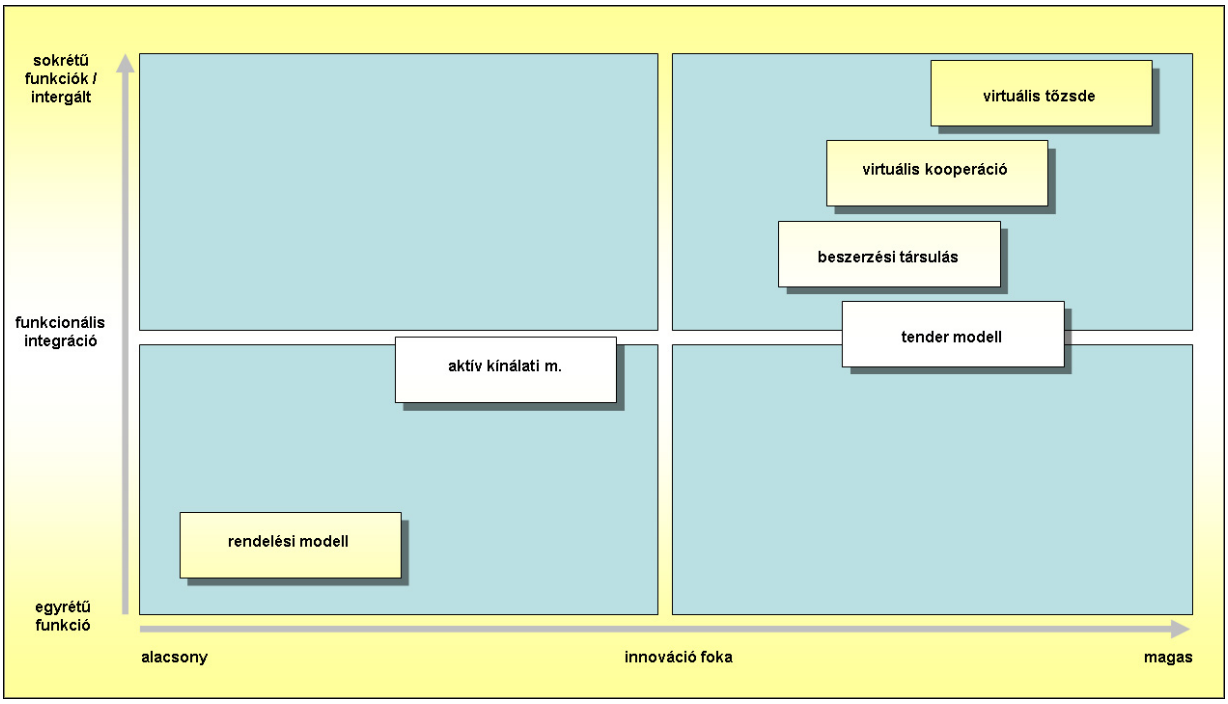
3.1. The results of the research on the system of e-business models and on their application

The electronic commerce can basically be categorised along two lines: according to the type of relationship of the parties and according to specialties and anticipated advantages of the relationship. One can clearly see that while the first category is undoubtedly a theoretical one, the second was constructed based on empirical observations, to systemize the organic development. Therefore, while concerning the classification of the quality of the parties involved in the electronic commerce there are no major clash of opinions amongst the experts – only the process of sophistication and elaboration of the system may end up in serious debates –, but when it comes to the quality classification of the system of relationships one may find many diverse models. These models are fundamentally different, but the variegation that can be pointed in the literature needs to be mentioned by all means.

As a result, having the theoretical models analyzed, one can infer that while in the flow of trade of the Hungarian agricultural enterprises the Business to Consumer (B2C) is peculiar, in the food industry the application of Business to Business B2B model is more common.

After having relationships of the parties involved in e-business analysed, we can distinguish several practical models, that the literature has named after the task they actually perform. Besides the functional ones, other differences come from the different degree of innovation in their execution and from their extent of the functional integration. All these do not affect the efficiency as different tasks require different models. I have sorted models found in practice according to the classification elaborated by Timmers (Timmers, 1999)

Figure 1.: The classification of the theoretical models by degree of innovation and functional integration



Source: Own-survey, 2005

The other crucial question when it comes to the choice between the models is the nature of the product, which determines primarily, how the product is handled on the market and how it should be traded. The literature concerning this feature of the product groups suggests the extent to which the type of product are suitable, and also under what condition can they be made suitable for e-commerce. **Surprisingly agriculture has been completely left out from all classifications,** and has not been considered as potential subject of e-business, whereas there are products that could potentially participate in one of these business models. In some developed countries selling livestock via e-commerce is common practice.

3.2. Effects concerning rural development

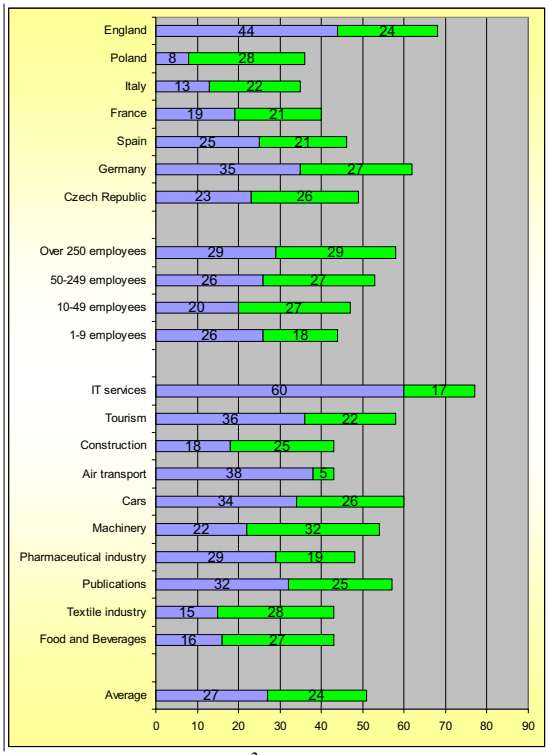
Electronic commerce may play vital role in rural development as well. **When the infrastructural conditions are met, possibilities arise for enterprises with new scope of business to emerge**, i.e. in tourism (ecotourism, agritourism, rural tourism), **and the resulting job creation effect keeps population sedentary and as well as it improves their living standards.**

Informatics, infiltrating everyday life may cause fundamental changes both to the life of the individual to the firm as well. Firstly, individuals can join labour market with telework, which may counterbalance – even if pursued as "supplementary line of production" – the dependence of the rural firms, mainly engaged in agricultrure from production. Secondly, by the IT based distance education, people may acquire knowledge, i.e. trade, new qualifications, which largely improve their chances of occupation. **Whereas, the operation of the enterprises might become more effective by acquiring information and knowledge.**

3.3. Analysis of international application, practice and trends

Having the OECD database analysed I have drawn the conclusion, that in developed economies, e-business represents larger and larger share of the trade volume. Denmark, Germany and Portugal are ahead of the others as the corresponding figures have doubled between 2002 and 2004. At the same time, one has to note that there is a significant discrepancy between developed and backward countries concerning the volume of e-business and the pace of its development. This might entail the growth of the existing differences.

Figure 2.: The online purchase and sales of the firms



Source : based on data from e-business w@tch*, 2005*[2]

[2] Blue: purchase >5%-a, green <5% is online.

The 2005 e-business w@tch survey recorded sectoral data from the EU member countries. Based on these data, my analysis points out, that e-commerce is taking a larger share in the food industry as well, which in this respects is positioned in the second half of the sectors analyzed. The agricultural enterprises use the IT given possibilities to an even smaller extent in their sales activities, which performance forces them to the bottom of the list.
From IT point of view, in the undeveloped countries B2C type of commerce appears first, while B2B evolves at a slower pace. Therefore it follows, that despite the continuous increase of the share of e-business in the trade, the volume compared to GDP still remains infinitesimal.

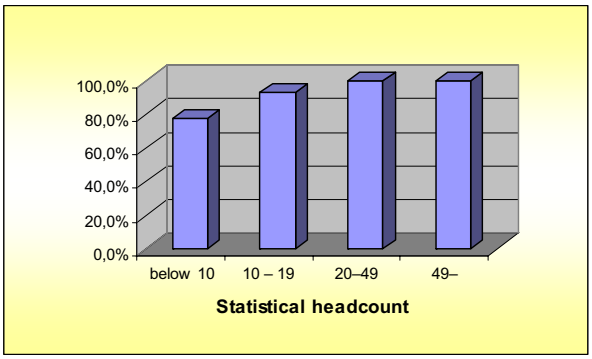
3.4. The evolution of e-business conditions in the Hungarian agriculture, in it Hajú-Bihar county

Basic Infrastructure

According to the 2003 national survey the rate of PC and workstation endowment in Hajdú-Bihar County was 84.4%. In 2005, according to my investigations this has not changed, the rate is still representative.
It is worth examining, whether this rate, which is generally good and is also the best among the counties of east Hungary depends on the size of the enterprises or on their type of business. While only the **77.4%** of the enterprises that employ below 10 people have computers, that is 7 percentage points lower than county average in my results (84.3%), at the same time in case of enterprises employing between 10-19 or more the figure of **97.7%** exceeds both the county average and the 2003 country level figure of 84.4% published by HCSO. The considerable poor endowment of the enterprises with less than 10 employees has primarily economic causes, as the majority of this category includes the 1-2 people employing "Agricultural primary producers, self-employed, family farms, whose turnover is far less than that of the enterprises employing more than 10.
The average computer endowment (84.3%) of the enterprises can be said to be favourable. Not only compared to within-industry, territorial distribution figures presented in detail in my research, but also in international comparison being this figure 91% by OECD data for the EU-25. Whereas, with respect to the Hungarian national sectors, it is situated in

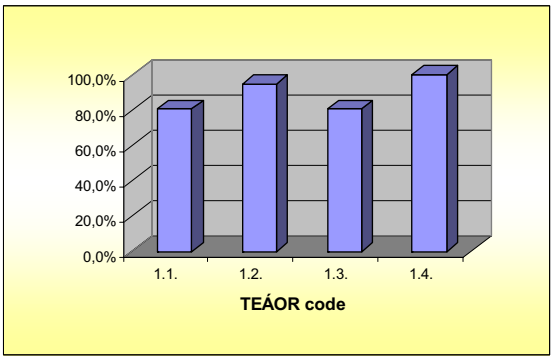
the last third, being before ‘Hotels and Restaurants’ and ‘Other community, social and. personal service activities’ in the ranking.

Figure 3.: Computer Availability by headcount categories (as % of respondents)



Source: Own survey, 2005

Figure 4.: Computer Availability by activity categories (as % of respondents)

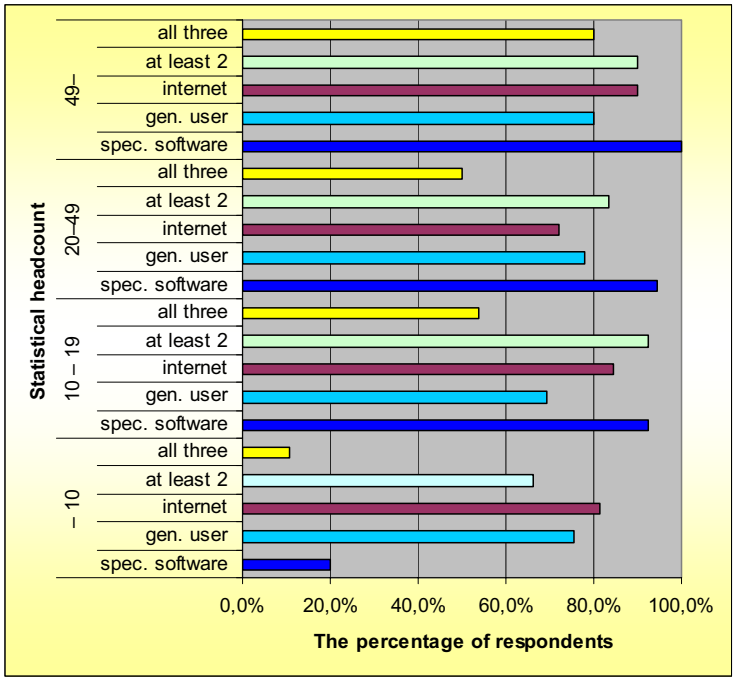


Source: Own survey, 2005

The activity pursued by the enterprises may be crucial from IT endowment point of view. We may assume, i.e. that computer is vital for service providers. However, HCSO did not investigate relationships of this direction; my own survey results do support this entirely. While in case of the four activities the computer availability is relatively high, differences can be still pointed out. In cropping, and in mixed type business compared to the national average, the ratio was 80.6 and 80.8%, respectively. In case of livestock, I have obtained the considerably higher value of 94.7%. The cause of which might come from the different sales routines of the products. In case of services, the superb availability of computers was as expected, however the obtained result of 100% might be the result of the small sample size.

According to the 2003 HCSO survey, in 2002 51.2%, in 2003 61.0% of the enterprises used the Internet in Hajdú-Bihar County. This share in the agricultural sector was 32.9% in 2002, 49.0% in 2003, and 67.7% in present study, which is more than the double of the 2002 figure. The possibilities given by the net are used by two-third of the enterprises in this sector of the economy as well. This is a very important factor from e-commerce point of view, as openness toward internet is an elementary condition.

Figure 5.: Utilisation areas of computers (groupped by statistical headcount,% of respondents)



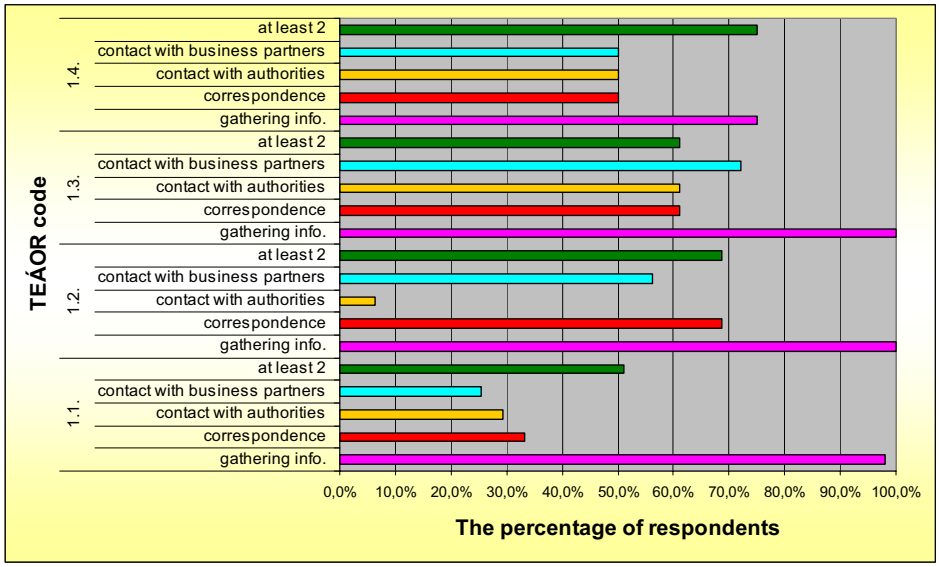
Source: Own Survey, 2005

The use of internet among PC owners shows an exceptionally high ratio of 81.1% on average. Neither the according to statistical headcount nor to activity is there significant difference in the various groups, that is neither of the factors have substantial effect on internet use.

The internet availability is the part of the basic infrastructure that is indispensable for electronic managing to spread. In this respect, with its 49% of the enterprises, agriculture is the last amongst the national sectors. In the matter of internet use, compared to EU members, where 75-98% of the firms are online, Hungarian enterprises are very much lagging behind with their 67%, whereas in 2002 in Canada this figure was 10 percentage points higher.

Based on the computer availability of the enterprises of the county, the percentage of Internet users could be higher, however its spread is much set back – as the responses clearly show – on one hand by the relatively high operation costs that firms with low turnover cannot cope with, and by the lack of technical conditions and possibilities of access, on the other.

Figure 6.: Use of Internet, according to TEÁOR code, % of respondents.



Source: Own Survey, 2005

Practically all Internet users marked that they use the world-wide-web to obtain information, thus this is the most significant area of utilisation. This has a high significance from the e-commerce point of view, because the culture, which is one of the basic conditions of economic utilisation, develops widely. If they gain enough expertise in various information searches, they can harness it easily when it comes to business relations. Furthermore, recognizing the wide ranging possibilities of utilisation, enterprises may feel the need to represent themselves on the net. The electronic transfer of data contrasting the national ratio of 67.4% in the case of agricultural enterprises is 48.8%. The spread of this type of use of the internet is fundamentally (77%) limited by the concern, that of most companies share about jeopardizing confidential information. The is no great difference in judging all the other possible limiting factors, 19-23 percent of the enterprises see them significant.

For the survey, it was crucial to understand whether the enterprises have knowledge about e-commerce. Depending on the answer one can decide the order of magnitude of the information-providing and persuasion work needed to guide the enterprises towards this area. The interest towards the subject is best proven by the fact that all interviewee answered this question. Independent of the activity or the headcount category of the enterprise all, without exception have heard about this new form of commerce.

The next topic of the survey covers the electronic recordkeeping, invoicing, online sales, acquisition and use of web-page.

70.9% of the respondents had no electronic recordkeeping system of any kind. From business activity aspect, only negligible differences can be experienced, and as almost all had in common a very small (30%) utilisation ratio. Livestock farming is the only one not fitting into the picture with its 41.2% of share. However, if grouped according to headcount categories, the analysis shows a more interesting picture. While only 11.9% of the firms employing less than 10 had electronic recordkeeping in active use, in the case of enterprises employing 10-19 people this ratio is 71.4%. Surprisingly, in case of larger enterprises this ratio was smaller, 57.9% in case of 20- 49, and 30% in case of over 49 employees. This can be explained by the inflexible nature of larger companies, that is, they have a existing structure to address traditional issues and a change would jeopardize the jobs of certain individuals. In rural areas, where the job market is quite narrow, the change would enforce tough HR decisions. Furthermore, the new type of jobs require skilled and qualified people, who are rather hard to convince about working in the countryside. The system of trainings is yet not that sophisticated so that enterprises could introduce it within their organisations.

Only a small fraction of the respondents, 11.5% have a web page. Implicitly, the share of enterprises with less than 10 employees is the smallest, 10.1%, while in case of firms employing 10 or more, the figure is only 20%. These figures are very depressing, though reflect reality. Its is rather costly for the low-profit agricultural enterprises to develop a web site, the have no coverage for that. At the same time, the majority does not realise the advantages of web pages, and articulate no need to develop their own. By their size, market position and special product structure they believe the traditional commercial form to be the only one applicable. They do not have enough information about the possibilities that web pages provide, it only appears as medium of information to them, and as such, its use is not considered particularly important. Frequently they share the idea, that web page can only be a tool for enterprises with prominently large and wide product structure.

The share of enterprises applying on-line acquisition and sales is negligible. This is absolutely natural from the answers given to the previous questions, it follows from them. At firms with less than 10 employee none, and even at firms with more than 49 employee only 28.6 % deals with online acquisition and sales. They have used internet for business contact in the largest share. To them, online acquisition means electronic call for offers and orders only. Nevertheless, they report favourable experience. This type of business is considered faster and safer. More complex business models are not used. Partly, because they do not know its

essence in depth, and they can not insure personal conditions and the proper infrastructural background, furthermore partners are not prepared to receive. Agricultural enterprises still believe the personal contact to be the most effective way of commerce. They have expressed their lack of confidence in electronic systems.

Despite the fact that, the survey responses draw the picture that there is little or no readiness to adopt the ideas of online acquisition, sales, the share of the interested ones was surprisingly high. More than 40% of the respondents noted being interested in online acquisition and sales. Thus, a non negligible part of the agricultural enterprises mentally accepts the new system. Assumably, they do not have enough information, which would be crucial to support the decision to change.

To the question whether the enterprises have integrated information system, except for the negligible 5 positive answers, enterprises gave unequivocally the answer 'no'. Based on the previous findings this result is not surprising. Application requires the satisfaction of even more conditions, which even in the much simpler case of online acquisition and sales were not met.

Resources

The capital shortage of the small- and medium size enterprises (SME) is a general phenomenon in Hungary. This is increasingly present in the agriculture, where the majority is individual producer, who face hardships financing even their primary activity. **As information technology does not belong to the means of production directly and the advantage of its use is not yet recognised, appears on the list of projects to be financed.**

Recognising economic advantages, ability to adopt

The majority of the small sized enterprises is not aware of the advantages provided by the IT, or has no clear idea of the favourable effects emerging from the use of electronic commerce. **The traditional, personal contact based commerce is held appropriate only. This is explained by the nature of the product and that market is not forcing to abandon the methods employed in well-tried commerce procedure.** This also true for the enterprises that are abundant in capital and possess proper infrastructure. A change of approach is required to make a substantive change in the electronic commerce situation.

3.5. Analysing the existing systems, Hungarian and international agriculture related internet marketplaces and portals from various aspects

I have investigated 55 agricultural portals in 19 countries; the diversity of languages made the analysis difficult, which is quite surprising in the world of internet, as one would think English to be exclusively dominant both in business life and both on the 'World-wide-web'. On 50% of the analysed pages (28 portals) was the English version available. From this 4 was naturally in English, being English the official language of the provider country, and only in ten cases, in the Italian, in the Turkish, in the Spanish, in the Malaysian, in the Danish, in the Dutch and in the French was English a second language. The Hungarian portals share the same proportion (8 portals), which can be said joyful, as providers exhibit geographical openness.

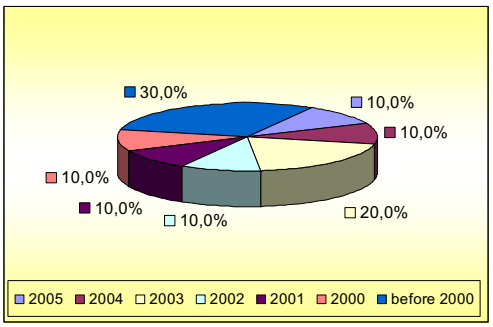
The lack of lingual transferability – i.e. introducing English as medium – **divides the users of the portals,** obstructing the internet based trade becoming geographically independent.

During the analysis according to target groups, 27 of the portals proved to reach a wide range of atypical consumers, besides the typical targeted ones. **This ratio of 50% can be regarded good, it indicates the openness of the providers of the portals to increase number of costumers and the participants of the involved in electronic commerce with it. As for the Hungarian sites,** 40% of them targets atypical users, **which shows the effort to get closer to international practice.**

Amongst the Hungarian portals only one stated the presence on international markets as a goal.

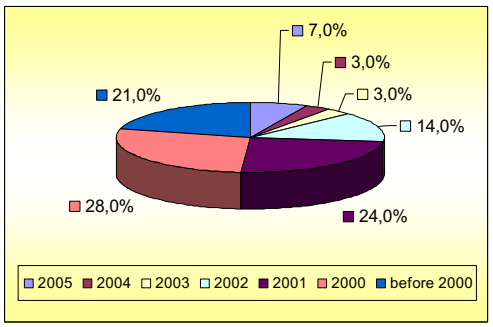
In establishing electronic commercial channels the first, but enormous step is the appearance on the Hungarian electronic market. When applying one has to consider also, that carrying out within country transactions has its own, safety promoting advantages: geographical proximity, the possibility of using more communication channels, lack of language difficulties, identical economics environment. Amongst the examples from the EU member states, from overseas and from Asia, however, many already show international level participation, their experience also guide the direction of development.

Figure 7.: The distribution of Hungarian portal according to age in the ratio of the analysed pages



Source: Own survey, 2005

Figure 8.: The distribution of Hungarian portal according to age in the ratio of the analysed pages



Source: Own survey, 2005

21 percent of the examined portals were constructed before the crisis of 2000, which was caused by the overheated expectations towards e-business, and the ratio of sites introduced in the following two years (2000-2001) is considerably high.

The share of Hungarian sites started in the nineties is higher the foreign figure, which is 30%. The development has gone smoothly, a ratio of new portals emerging shows on average an annual 10%. Year 2002 is exceptional, as the number of new portals in the sample doubles.

As the empirics suggest, after the crises the fluctuation in the number of the electronic marketplaces mitigated. Their economic efficiency justified their existence, in the recent years the number of entrants to the online market increased gradually.

Having the functionality of the portals examined, one can conclude that Hungarian portals offer a smaller number of services than the foreign ones. The websites reaching the international level, where the provider wanted to publish brokerage type site, are not directly connected to production, their activity is explicitly commercial.

3.6. Factors determining the development of electronic commerce

Based on the analysis of personal interviews, questionnaires and on the examination of operating portals in the following table I have summarized the main factors that promote and that hamper the spread and development of e-business applications in the agricultural industry

Table 4.: Factors the promote and hamper the evolution of e-business in the agriculture

Promoting Factors	Hampering Factors
• Shared computer network, which is a leading force for adopting e-business solutions.	• the lack of IT consciousness and use in many Small and Medium Sized Enterprises (SME)
• Leading multinational presence in the IT introduction, e-business development	• SME's frequently have no coverage for IT costs
• The ability of the enterprises to offer local specialties, that are also popular abroad	• Segmented supply chain in many countries
• The presence of high level IT infrastructure	• Cultural barriers
•IT education is organised widely at large enterprises	• The nature of the products and services of the enterprises does not make online sales possible
• The increase in the number of portals, marketplaces and online sales.	• The uncertainty of cash payments and the barriers due to the small number costumers
	• Traditional personal contact based commerce is more trusted

In the previous two years no significant change has occurred in the list of hampering factors of electronic commerce. **The first of the most significant barriers named by the enterprises is that, that the nature of the products and services of the enterprises does not make online sales possible and that traditional personal contact based commerce is trusted more.** They are followed by the uncertainty of cash payments and the barriers due to the small number costumers. Besides the above listed hampering factors, primarily the contract conditions, delivery deadlines, guarantees and the costs of setting up and operating an electronic commerce are mentioned as main barriers.

State intervention may help development significantly. The role of the state has to be threefold. Firstly, it should insure the financial resources for the meeting the material conditions. Secondly, by education and widespread information provision it should create readiness and ability to adopt. Thirdly, by regulation – enforcing electronic supply of data requirements (application of Business to Administration (B2A)) – should the SME's electronic data transfer made practice, which may support wide acceptance of e-business.

Some headway may be taking place in the field, if commercial corporations at the other end of the supply chain switch to application of B2B. Propagating through the chain, it would create such a coercive force to apply e-business, which even the enterprises in the agricultural sector can not evade.

In 2003 in Hungary, the net turnover in e-business, through the computer networks was HUF 602 billion, which makes 1.6% of the total net turnover of the enterprises employing more than 10 people. Firms pursuing e-commerce with turnover over HUF 3,323 billion, realised 18% of their turnover from sales via computer networks, 33% of which came through on Internet and 67% of which through other computer networks.

All in all, the Hungarian development fits the observable international tendencies, which can be characterized by the an annually increasing, but - relative to the total commercial volume - currently small share of e-business.

4. THE NOVEL RESULTS OF THE THESIS

1. Based on the analysis of the e-business models and their agricultural applicability I have concluded that a great portion of the Hungarian agricultural enterprises use the B2C model most frequently in acquisition and sales, and B2B is seldom present in practice. Its reasons are to be found in the size distribution of the enterprises, which can be described by the majority of small firms and consumer contacts. In the food industry the use of B2B is more widespread. It is crucial however, that primarily, in case of both activities; the main profile determines the applicable model.

2. Based on my research work, I have determined the most important factors helping the development of electronic commerce, these are the following:
    - The ability of the enterprises to offer local specialties also popular abroad.
    - Concerning the IT technological background, the having a high level of IT infrastructure at the disposal – especially the shared network - is a favourable condition, which leads the adoption of e-business solutions, and the managing of an experienced multinational firm in IT introduction, in e-business development.
    - The pace of introduction and development is quickened by the wide-ranging IT education within the enterprise.
    - The increase in the amount of online sales, number of marketplaces, portals also provides more space, ensures the possibility for the agricultural enterprises to change their method of commerce.

3. Based on my investigation, amongst the agricultural enterprises, the main factors hampering the widespread use of electronic commerce are:
    - The nature of the products and services of the enterprises does not make online sales possible
    - Traditional personal contact based commerce is more trusted
    - The uncertainty of cash payments and the barriers due to the small number costumers
    - the lack of IT consciousness and use in the majority of Small and Medium Sized Enterprises.

- The high costs of introducing and operating an e-commerce system.
- The lack of segmented supply chain in many countries
- Cultural barriers

A significant change is expected only as an effect of 'outer pressure' or of 'incentives/subsidies', which can be on one hand the commerce on the other end of the sales channel, or state regulation on the other.

4. The effect of development and evolution of electronic commerce on rural development might be also significant. Based upon its infrastructure,
   - Possibilities arise for enterprises with new scope of business to emerge, i.e. in tourism (ecotourism, agritourism, rural tourism) and the resulting job creation effect keeps poplulation sedentary and also improves their living standards
   - Individuals can join labour market with telework, which may counterbalance – even if pursued as "supplementary line of production" – the dependence of the rural firms mainly engaged in agriculture from production.
   - by the IT based distance education, people may acquire knowledge, i.e. trade, new qualifications, which largely improves their chances of getting a job. Whereas, the operation of the enterprises might become more effective by acquiring information and knowledge**.**
   - Naturally, IT and e-business has to most important effect on rural development if it improves business activity and efficiency of the Small and Medium-Sized Enterprises of the countryside.

5. APPLICABILITY OF THE RESULTS

- The survey conducted among the agricultural enterprises of Hajdú-Bihar County as for the number of respondents gives a more complete view of the IT endowment of the county enterprises, than previous studies of the subject. A repeated survey of the data is not necessary, as this is from December, 2005.
- Gives a guideline for the government, for the local governments and craft unions about what kind of information and knowledge concerning advantages of application of the IT instruments should be provided for the enterprises of different headcount and activity categories.
- Pointing out the effect of the further possibilities based on the technological background of e-business on rural development, and also on the tendering conditions that would help its realisation.

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