USE AND IMPACT OF THE INTERNET IN THE GREEK AGRICULTURAL SECTOR: FINAL RESULTS OF A SURVEY OF WEB SITE OWNERS

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Abstract: This paper discusses final results of a survey that was conducted to identify the use and impact of Internet in the Greek agricultural sector. A number of agricultural organisations and enterprises, having an Internet presence through a web site, responded to our survey that was carried out electronically using e-mail. Results of the survey indicate that the Internet is utilised and applied in non-professional way and has not yet satisfied many key expectations. For example, 72.6% are not satisfied by the results of their web presence in comparison to their initial expectations, only 7.3% of the total respondents are fully satisfied in relation to attracting new customers and 62.3% of them answered that they experienced a total failure in selling products or services through their web site. Non-professional approach in developing and marketing their web presence and not well-focused efforts are probably two of the main reasons for these poor results. For instance, 81.9% admit their web presence needs qualitative improvement and only 12% makes weekly updates. Generally, the results of the survey indicate that the Internet has not yet influenced decisively the agricultural business in Greece. Probably, more support is required from governmental organisations and programs to increase adoption of ICT and thus achieve larger influence in agricultural business.

1. Introduction & Methodology

Before any ICT adoption program could be planned, without any doubt, there is a great need to identify the current use of the Internet in the agricultural sector as well as to identify the foreseen expectations compelling this use and to estimate the impact. It is clear-cut that the great expansion of the Internet and communication technologies could have an effect on the agricultural sector in developed countries in various application settings (e.g. direct marketing, Ball & Duval, 2001; Business to Business e-commerce, Offer, 2001; managing input supplies, Fritz et al., 2001; market monitoring, Kreuder et al., 2001). It is also clear-cut from recent reports that a large number of farmers have access to modern PC equipment and is connected to the Internet (Ross & Waksman, 2001). However, the level of Internet use by Greek agricultural enterprises that adopt ICT to manage their everyday business more efficiently is not well studied.

In this paper we present final results of a research effort that conducted a survey based on a questionnaire to determine the use and impact of the Internet in the Greek agricultural sector. Initial indicative results of the survey (based on 40 responses) were presented in the first HAICTA conference (Salampasis et al., 2002). Now, we present results that can be consider more conclusive since the larger number of responses allows better cross-examination of the results. Additionally, in this paper we employ categorical regression to analyse the data collected, in an effort to identify the effect of basic classification/independent variables of agricultural enterprises into the adoption, use and impact of Internet.

The methodology used to conduct the survey is described in detail in Salampasis et al. (2002) and can be summarised as follows. By crawling the ".gr" domain enterprises and organizations that are somehow involved in the agricultural sector and have a presence in the World Wide (WWW) through an enterprise or organizational web site were randomly selected. This decision (i.e. to select web site owners as our target group) was driven by our need to investigate the use and the impact of Internet in the agricultural sector. Therefore, this particular group was selected because they have demonstrated some use

of the Internet, and we also wished to determine what was the impact of the Internet in their business. Because it was anticipated that most of our subjects would have some familiarity in using e-mail, we have selected to run our survey based on e-mail and finally collected 78 responses.

The survey consists of 45 questions and was divided into 4 sections. The first section collects general information about the enterprise/organization such as type, main activities, date of establishment, number and type of employees etc. The second section collects data about the use of ICT such as personal computers, mobile phones, Internet and training of the personnel in new technologies. The third section makes questions regarding the presence of the enterprise/organization in the WWW. Several parameters are questioned such as cost of development, cost of ownership, size of the web site, services and information provided through the web site, actions to implement Internet-based market strategies, self-evaluation of the web site, web-site update issues. The final section of the survey retrieves data about the impact of the web site in the way subjects run their business. Subjects are questioned about several expectations they had when they built their web presence and to what extend these expectations were fulfilled. The questionnaire used in the survey can be found in the following URL address: *http://aetos.it.teithe.gr/~cs1msa/ efita2003/agrosurvey.html*

The rest of this paper is structured as follows. Section 2 presents and discusses the results of the answers taken from the various sections of the questionnaire (basic information, use of ICT, details about presence in the Internet, expectations & results). Section 3 presents the results of a statistical method (categorical regression) that was employed to make forecasts of the values of two selected dependent variables. Finally, section 4 attempts to draw conclusions based on the survey findings.

2. Results & Discussion

2.1 Part I - General information and classification variables

The first part of the survey collects general information about the respondents and identifies basic variables that can be used to classify results (type of business, date of establishment, number of employees and level of turnover). The analysis of the data collected reveals that there is a good distribution of respondents in different agricultural activities. Most of them (75%) are in the crop production sector. The 30.6% of the total respondents are involved in the animal production, while 9.7% are involved in the aquaculture sector. Finally, a small percentage (5.6%) of the total respondents are involved in the forestry sector.

In respect to their main activities, 36 % of the total respondents replied that the production of agricultural products is one of their main activities, while 45.3% answered that commerce of agricultural products is one of their main activities. 16% makes input supplies business and 12% trading agricultural machinery. Finally, the majority of the total respondents (53.3%) provide services.

In terms of the geographical area they are making business, 33.8% responded that they make business only locally. A percentage of 46.8% of the respondents have national capacity, while 24.7% make business with other E.U. countries. Finally, 48.1% of the total respondents answered they have developed some activities at international level.

In respect to the date of establishment, 31.9% of the respondents declared year of establishment from 1995 to 2002, 60.9% before 1995, whereas 7.2% was related to organizations or they did not answer. Most of the respondents (43.1%) are family business, while 50% are non-family type of business and 6.9% are organizations. In terms of number of employees, 24.2% of the respondents have a number of employees from 1 to 5, 31.8% from 6 to 20, 18.2% from 21 to 50, whereas 16.7% more than 50 employees. 9.1% of the respondents have not any employee except of family members. Finally, in respect to annual turnover, 22.4% of the respondents declared a turnover less than € 100,000, 19.4% from € 100,001 to € 500,000, 52.4% more than € 500,000, while 6% did not answer or they were non-profit organizations.

2.2 Part II – Use of ICT

Number of Computers in the Organisation/Enterprise

The mean number of computers possessed by the respondents is 15.7±31.3 (Mean±Standard Deviation) with the median value being equal to 7 (50% of the respondents' posses more than 7 computers), first quartile 2 (25% less than 2 computers), third quartile 20 (75% less than 20 computers), while the mode value is 2 (the most frequent number of computers). Additionally, the

mean number of computers purchased in the last two years is equal to 8.5±23.4, while the median value is 3, first quartile 1, third quartile 9 and mode value 0.

Personnel Computer Literacy - Knowledge & Training about Internet Technologies

The average number of employees in the establishments responded is 31.04±48.63 (Mean±SD) with the median value being 13, first quartile 4 (25% less than 4 employees) and third quartile 33 (75% less than 33 employees).

A high percentage of the respondents (56.7%) have one or more persons in their establishment that has good knowledge about computer technologies.

The mean number of people with practical experience about computers is 8.05±15.88, while the median value is 2. The mean number of people having some professional education was 2.26±6.62, while those with higher education formal studies were only 1.43±2.13.

The mean number of personnel which attended short seminars about the Internet were 2.07±3.49, while 2.75±8.10 persons attended seminars longer than 50 hours.

The results of the last two sections of this second part of the questionnaire (number of computers & computer literacy & training) show a better condition in comparison to results that are taken from a larger study which was conducted by the *Go-Online* national program (www.go-online.gr) having Greek small-medium enterprises (SMEs) as their target group under examination. Of course, the two studies are not directly comparable, but they were undertaken in the same period with quite similar goals. Our study was more biased since our criterion to select enterprises having a web presence introduces a bias towards better ICT adoption.

Use of Mobiles

Only a small percentage (7.7%) answered they use mobile phones to access to information or services about the agricultural sector. A small percentage (6.4%) use mobile phone to retrieve information or to have access to services, but they believe it is not very usable, while 9.0% regard these types of services very expensive. A small percentage (7.7%) responded that they do not know this service, while the majority (69.2 %) simply declare that they are not using this type of services.

Frequency of using Internet and e-mail services

A high percentage of the respondents (94.9%) use the Internet on a daily basis, while the rest use the Internet one to three times per week (3.8%) or seldom (1.3%). 80.8% of the respondents send at least one e-mail every day, 12.8% send and e-mail one to three times per week, while 3.8% one to three times per month and 2.6% seldom.

A short comment about this second part of the survey is the good condition the respondents portray in regard to the use of ICT and the Internet. Many respondents (50%) have at least 7 computers with many of them purchased in the last two years. Of course, as it was already said, the composition of the target group (web site owners) introduces a bias towards good situation in terms of use of ICT. However, respondents present some qualitative results that, in our opinion, cannot be justified simply by the group characteristics. For example, it is very encouraging that most of the respondents use a basic Internet service (i.e. e-mail) daily. This is a very good sign of computer literacy. It is also encouraging that most of the respondents have at least one computer literate person. This finding is quite promising because experience from using agricultural computerised applications indicates that people possessing good computing skills are very important (Kalentzi et al., 2002).

On the other side, it is quite disappointed that most people are not using mobile phones for accessing information. However, it is quite encouraging that only a small percentage does not know this capability. We believe that mobile phone technology will play a very important role in the near future when the cost of using WAP decreases and value-added services will be offered to the agriculturists (e.g. price monitoring).

2.3 Part III – Presence in the WWW

Cost of web site development, size and WWW presence period

Few respondents (3.9%) have a presence in the Internet equal or less than a year, while a high percentage (41.6%) has a presence from two to three years. 48.0% of the respondents have a longer presence (four to six years) and a small percentage (6.5%) before 1997.

A significant percentage (19.1%) of the respondents answered that a specialised person developed the web site of their establishment internally. On the other side, the majority (58.8%) assigned the task of developing the web site in an external partner or the web site was developed in collaboration of an internal employee with an external specialised company or person (22.1%).

For the 50.0% of the respondents the cost of developing their web site was less than 775 € (median value). The mean cost of developing a web site is 1,310.0±2,023.7 €, while the mode value is 1,000 €.

The web sites of the respondents are relatively small (less than 10 pages) for the 42.1% of the respondents, while 39.5% have larger web sites (11- 50 web pages). Only a relatively smaller percentage of respondents (18.4%) have large web sites (more than 50 web pages).

A qualitative analysis of the results presented in this section of the survey reveals useful issues. Firstly, we believe that the most striking result is the small budget for developing the web site. Clearly, the investment made is small and cannot justify high expectations. However, our experience says this is a general problem in small and medium enterprises, i.e. the importance of investing in a well-designed, highly professional web site is not yet widely recognized. This result should be considered in line with the fact that most web sites (about 57.9%) have a quite large size. The question that easily arises is the quality of these large web sites built using a small amount of money. Another result that probably indicates a less professional approach is the quite high percentage of web sites (19.1%) that were developed internally, without the use of any external partner. Certainly, the design and development of web site requires specialised computer professionals with high skills and experience in this particular area (web design). A final comment, which illustrates the increasing effect of Internet in the agricultural sector, is that constantly more establishments are getting into the "Internet revolution".

Qualitative self-evaluation, web hosting & maintenance cost

A relatively small percentage (18.2%) answered that their web site does not require any further development. However, a high percentage (49.4%) of the respondents believe that their web site needs some further development and maintenance. Finally, 32.5% answered that their web site needs substantial development. 10.5% of the respondents answered that their web site is not maintained, while 40.8% of the establishments use a specialised employee to update the web sites. A significant percentage (48.7%) use an external company to update their web site.

The mean web hosting & maintenance cost is calculated at 603.4±858.4 €. For the 50.0% of the respondents the mean maintenance cost is less than 300 € (median value), while fist quartile is 100 € and third quartile is 595 €.

The results in this section are more or less in line with the results in the previous section. A high percentage (81.9%) believes that their web site needs further development. This result confirms the opinion we expressed before, that a very small budget is given in the initial development of the web site, therefore the need for upgrade is recognised. Probably, the reason explaining small investment from web site owners is that the Internet has not yet been adopted by Greek farmers. Use of Internet in Greece is 30% and it is estimated that it is quite smaller among Greek farmers.

The web-hosting and maintenance costs declared are significantly high in comparison to the cost of initial development. Again, this result reflects a reality in the Internet world. Usually maintenance costs are much larger than the initial investment. Web hosting cost is the one that increases the total amount. Ministry of Agriculture may provide some help if it takes initiatives that could cover expenses for web hosting. In fact, the national program *go-online* is in progress supporting SME to develop their web presence (www.go-online.gr), but this is a general-purpose program not targeting the agricultural sector in particular.

Web site content & web marketing

For a high percentage (92.2%) of the total respondents, the presentation (profile) of the establishment is one of the basic content, and for a higher percentage (97.4%) is the presentation of products or services. A high percentage (89.5%) of the total respondents have contact information in their web site, while only 13% of the respondents answered they have job offers. The 36.4% of the web sites have news and press releases, while 25% have e-commerce capabilities. Finally, 22.1% of the respondents answered that their web site has a search mechanism.

In respect to methods used to advertise the existence of the web site, a high percentage (69.7%) of the respondents use business cards and 72.4% search engines to declare the existence and

promote their web site. A smaller percentage (52.6%) use printed advertisements and 55.3% use business letters. A very small percentage is using radio (2.7%) or television (2.6%) advertisements to promote their web sites. A very short comment that can be made here is that a very low percentage uses modern web marketing techniques to promote the web site. Web marketing techniques is a recent addition to the marketing science and is specialised in maximizing the benefits of web sites.

Decision about WWW presence & update of the web site

The media and articles in newspapers have influenced strongly 9.5% of the respondents in their decision to develop a web site, 17.6% were influenced quite a lot. The influence was very small for the 48.6%, while for the 24.3% it didn't have any effect. Also, 49.1% answered that the technology developments and explosion of Internet was a reason for developing a web site. At the same time, 29.8% answered that they haven't influenced by a particular reason for developing their web site, it was simply a personal/business decision.

The 12% of the respondents answered that they update their web sites every week, 16% every month, 12% once in three months, while 49.3% update the web site occasionally. A quite important percentage (6.7%) say that they never updated their web pages, while 4% consider that their web pages do not need any maintenance.

2.4 Part IV – Expectations, target groups & Results

Expectations & target groups

To study the decision of creating a web site, it is useful to examine the basic reasons for creating a web site as respondents declare these. *Table 1* presents the factors that according to the respondents determined the creation of the web site.

Table 1: Factors and their importance in deciding the creation of a web site (%)

Factor	*Very important*	*Important*	*Not important*
Present company/organization	63.5	35.1	1.4
Increase prestige of company	53.4	39.7	6.9
Attract new customers	39.4	33.8	26.8
Supply information	47.9	35.6	16.5
Advertise products/company	42.3	29.6	28.1
Sale products or services on-line	18.5	29.2	52.3
Existence of a web site from competitors	9.0	25.4	65.6

In respect to the target group of the web sites, 77.8% of the respondents answered that their web site aims in finding new customers. A percentage of 66.2% responded that they aim in existing customers, while 78.1% for finding business partners. 43.7% of the respondents answered that they expect to attract customers from competitive enterprises, while 38.9% aims in finding suppliers.

Results in comparison to expectations

Despite WWW presence, 34.7% of the respondents do not know how many hits (visits) they have. 33.3% answered that they are requesting visits often and 31.9% rarely. In general terms, the mean number of visits per month is equal to 1.15±3.14 (Mean±SD), while the first quartile value is 37, the median is 100 and the third quartile is 500.

In respect to their expectations about their web presence and the results they actually experienced, 4.1% of the respondents answered that their expectations were very much fulfilled. 23.3% answered that they are much satisfied about their success, while 39.7% of the respondents are little satisfied about the success of their web site. Finally, 32.9% answered the results of their web site didn't meet any of their expectations. *Table 2* presents the opinion of the respondents about the success of various factors that were initially driven the development of the web site.

The results of web presence should be evaluated in parallel with the expectations as the respondents express these. Without any doubt, the results are very poor in terms of e-commerce. For example, only 7.3% of the total respondents are fully satisfied in relation to the expectation of

attracting new customers and 62.3% of them declare total failure to sell products or services through their web site. These results are especially disappointing if we consider that attracting new customers, sell products and advertise company were the largest reasons driving the creation of a web site.

A large percentage, however, answers that they succeed in presenting the company (94.1%) and increasing its prestige (89.4%). This view can be interpreted if we bring to mind that probably most respondents regard the web as an extension or a new paradigm of traditional media (e.g. booklets, printed advertisements). Of course this is a very simplistic view, which underestimates the power of the Internet, but it is widespread. These simplistic views should be expected in the early stages of Internet development, and our opinion is that they should be seen as a necessity before more elaborate views could be developed.

Table 2: Self-evaluation of the success rate in respect to factors for creating a web site (%)

Factors	*Success*	*Partial success*	*Partial failure*	*Total failure*
Present company/profile	42.6	51.5	1.5	4.4
Increase prestige	40.9	48.5	6.1	4.5
Attract new customers	7.3	52.7	20.0	20.0
Supply information	27.4	56.5	9.7	6.4
Advertise	22.2	50.0	16.7	11.1
On-line sale products	2.2	22.2	13.3	62.3

3. Further analysis of factors for web presence and success self-evaluation

The survey incorporated two key questions, one regarding 'the basic factors underlying the decision for creating a web site' (question 37, results shown in *Table 1*) and one about their 'self-evaluation of the success rate for various expectations related to the web presence' (question 45, results shown in *Table 2*). The first key question basically comprises a multi-thematic variable that expresses basic reasons-criteria for taking the decision of creating a web site. More specifically, subjects were asked to declare the level of importance they give to the following themes/factors: 'present company/organization', 'increase prestige of company', 'attract new customers', 'supply information', 'advertise products', 'on-line product sales', and 'existence of a web site from competitors'. Three levels of importance were used and the respective scores were attributed: not important=1, important=2 and very important=3.

Regarding the second key question ('self-evaluation of the success rate from the web presence'), the following themes/factors were available: 'presentation of company/organization', 'increase prestige of company', 'attract new customers', 'supply information', 'advertise products, and "on-line products sale'. Four levels of success rate were used and the respective scores were attributed: total failure=1, partial failure=2, partial success=3 and success=4.

Data were statistically analysed using the categorical regression method and addressing independent/classification variables such as 'date of establishment', 'type of business', 'number of employees' and 'turnover'. More particularly, regarding the date of establishment, data coded in two groups: 1=from 1995 to 2002 and 2=before 1995. In respect to the type of business, data was also split into two groups: 1=family type of business and 2=non-family business. Furthermore, in respect to the number of employees, data was split into four groups: 1=1-5, 2=6-20, 3=21-50 and 4=more than 50 employees. Finally, data was split into three groups according to the level of annual turnover: 1= ≤ €100,000, 2= € 100,001-500,000 and 3=> € 500,000.

The categorical regression method with optimal scaling constitutes an improvement and extension of the classic linear regression method. As a multivariate statistical method it quantifies data of categorical variables by attributing numerical values to the categories, resulting to an optimal linear regression equation of converted variables. Thus, it is possible to make forecasts of the values of a dependent variable for any combination of a set of independent (classification) variables (Siardos, 2000). For handling the multi-thematic variables, a reliability analysis of the subjects/themes involved in each of them was first conducted. Reliability analysis refers to the property of a measurement instrument that causes it to give similar results for similar inputs. Cronbach's alpha coefficients is a measure of

reliability, which is defined as the proportion of variability in the responses to the survey that is the result of differences in the respondents.

Results of the categorical regression method

The internal reliabilities measured by Cronbach's alpha coefficient, for the key questions 37 and 45 are quite high signifying a strong internal consistency (0.78 and 0.77, respectively). Moreover, the statistical indices, calculated for the overall evaluation and validity of the categorical regression models applied, resulted to quite high values of multiple R (0.39 and 0.64) and to significant F values of the ANOVA tests (4.061 and 9.162), for the models of the key questions 37 and 45, respectively (level of significance: α=0.05). *Table 3* presents the most important outcomes of the methodology applied.

Table 3: Results of the categorical regression model

	Question 37: factors determining the creation of web site				Question 45: self-evaluation of success for various factors			
Independent variables	Standardized coefficients		F values	**Importance**	Standardized coefficients		F values	**Importance**
	Beta	S.E.			Beta	S.E.		
Family or not	0.190	0.139	1.871	**0.143**	-0.365	0.123	8.831	**0.296**
Labor level	0.378	0.139	7.429	**0.857**	0.552	0.126	19.302	**0.653**
Turnover	-	-	-	**-**	-0.222	0.126	3.123	**0.051**

The results of the categorical model for the key question 37 show that labour level and type of business are the independent variables with the highest significant beta values and with the largest importance to the model's predictability (85.7% and 14.3%, respectively). From the quantitative categorical values of the independent variables and beta values it is concluded that the family businesses are more sensitive to the key question 37 than the non-family businesses. Also, enterprises with more than 21 employees are more sensitive than those with less than 20 employees (*Figure 1*).

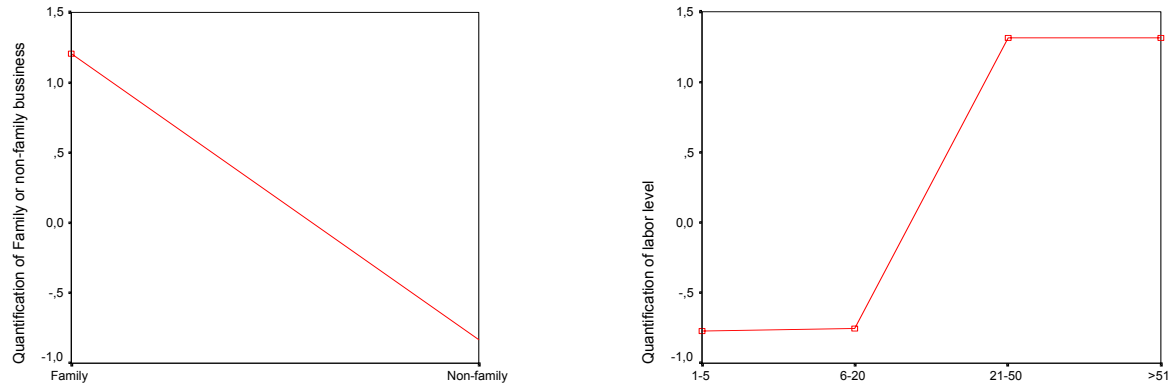

Figure 1: Category quantification plots of the key question 37: "factors determining the creation of web site" against the independent variables of business type and number of personnel

The categorical regression model for the key question 45 show that labor level, type of business and turnover are the independent variables with the highest significant beta values (*Table 3*) and with the greatest importance to the model's predictability (65.3%, 29.6 and 5.1%, respectively). From the quantitative categorical values of the independent variables and the beta values it is concluded that the enterprises having personnel more than 51 are more sensitive than those having fewer personnel. Also, family businesses with low turnover are more sensitive than the non-family type of business with higher annual turnover (*Figure 2*).

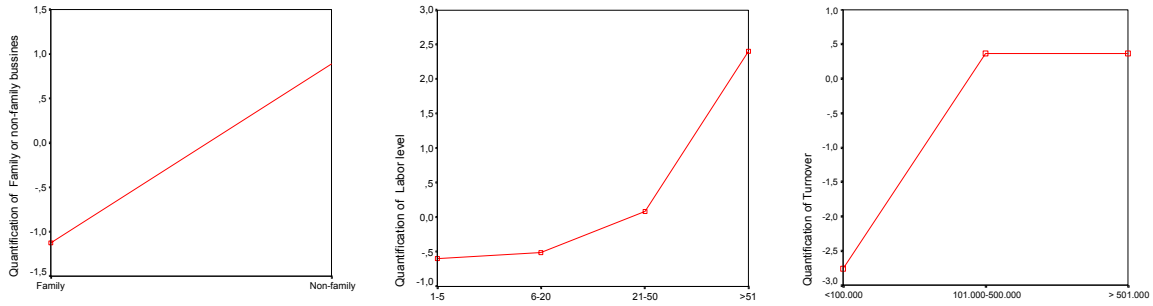

Figure 2: Category quantification plots of the key question 45: "self-evaluation of success for various factors" against the independent variables of business type, number of personnel and turnover.

4. Limitations, Conclusions & Future Work

Someone may consider as a limitation the fact that our target group was biased since enterprises already have a web presence which may be an indication on good ICT adoption. Using this target group we do not consider farmers and other "players" in the agricultural sector not having a web site. We believe that a larger study is required to examine potential use of Internet and ICT in the Greek agricultural sector. In the study presented in this paper we wished to determine impact, expectations and results from the use of the Internet, therefore we had to choose a target population, which already used the Internet and has developed some expectations and finally could express an informed opinion about possible impact based on their personal experience.

In general, we consider this study as a first important step towards identifying the use and the impact of the Internet in the Greek Agricultural Sector. The results of this study can be summarised as follows:

- For the target group we examined adoption of ICT in general and Internet in particular is very good. Investment in human and IT resources seems to be in a good priority. However, if we consider the small enterprises (1-5 personnel) only, the statistics in respect to adoption of ICT are not equally good (2.15±1.66 computers with 1.22±1.00 of them purchased in the last two years). Probably, more support is required from the governmental organisations to increase ICT adoption in small enterprises.
- Investment in developing a professional web presence is still small. Most of the efforts could be characterised as moderate and need further development and require maintenance. Maintaining a successful web presence requires a continuous effort and that is a fact which is ignored by most of the respondents.
- Most of the enterprises use applications such as accounting and office automation software, but few of them are using specialised software for managing their business.
- E-mail is the most used service amongst all the Internet services and probably is the best reason explaining the frequent use of Internet (94.9% on a daily basis).
- The Internet (and the WWW in particular) is not yet seen as an entirely new concept that could change dramatically the way of making business. Probably, it is considered and used as a more prestigious extension of more traditional media. In our survey 53.4% of the respondents replied that the factor of 'increase prestige of company' was 'very important' and it was actually rated as the second 'very important' factor determining the creation of the web site.
- Mobile phone technology is not widely used probably because the lack of "killer" applications-services. For example, for the development of the Internet the WWW was the "killer" application that finally caused the Internet explosion. Recently, new mobile phones and technologies appeared in the market offering more capabilities and easier interaction. We expect these new capabilities will allow mobile phone technology to play an increasingly significant role. If we consider that about 70% of the general population in Greece is using mobile phones while only 25% uses the Internet, application and services should be expected that utilise more the mobile phone technology.
- Web marketing techniques to promote the web site and increase visit statistics are not widely applied. More traditional methods (e.g. business cards) are preferred. This is another approach

of a non-professional approach. It is widely recognised that without applying web-marketing techniques a web site is like "an isolated island in a large ocean", difficult to be purposefully found.

- In terms of the number of factors influencing the creation of a web site, the size of an enterprise seems to be the most decisive aspect. That means larger enterprises develop more expectations and have multiple goals when decide to develop a web site. This finding is in line with the other finding that again the size of the enterprise is the aspect determining most the disappointment from the results in comparison to their initial expectations.
- Most expectations about web site are not fulfilled, especially those connected with selling products on-line or increasing the number of customers.

In conclusion, results illustrate that the impact of the Internet is quite small and further initiatives and support from authorities are required. We could say that the Internet in the agricultural sector is still in its infancy, but we expect that progress will be made very soon. From our point of view, we believe that before more professional efforts can be undertaken the Internet and ICT in general has to be adopted by the Greek farmers and the agricultural sector in a large capacity. This will provide the critical mass allowing larger investments. In terms of future work, we intent to continue and expand this study to incorporate other parts of the agricultural sector (e.g. cooperatives, biological products). From a technology perspective, we aim to investigate further the application of mobile phone technology. We strongly believe that this technology may provide an efficient and easily applied underlying platform for future developing services for the agricultural sector.

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REFERENCES

Ball T. & Duval Y. (2001). Direct Marketing of Farm Products via the Internet: A survey of Smallfarms.com Members. In Proceedings of the Third European Conference of EFITA, Montpellier, France, pp. 415-420.

Costopoulou C. & Karetsos S. (2001). The Broker Role in Agricultural Electronic Commerce. In Proceedings of the Third European Conference of EFITA, Montpellier, France, pp. 421-426.

Duval Y. (2001). Emerging Business Models in the E-grocery Industry. In Proceedings of the Third European Conference of EFITA, Montpellier, France, pp. 427-432.

Fritz M., Helbig R. & Shiefer G. (2001). Electronic Marketing Channels and Marketing Platforms in Food Chains: The Grain Sector. In Proceedings of the Third European Conference of EFITA, Montpellier, France, pp. 433-439.

Führer J. & Ackmann R. (2001). Hessen-markt – the Rural Marketplace on the Web. In Proceedings of the Third European Conference of EFITA, Montpellier, France, pp. 439-444.

Kalentzi E., Batzios C. & Salampasis M. (2002). Scenario Based Decision Making in the Broiler Industry Using the *BRODESSYS* Decision Support System. In Proceedings of the First HAICTA Conference.

Offer A. (2001). E-commerce in Agriculture. In Proceedings of the Third European Conference of EFITA, Montpellier, France, pp. 485-490.

Ross B. & Waksman G. (2001). How Developments in Internet and E-commerce Use Are Changing the Agricultural Industry in Europe. In Proceedings of the Third European Conference of EFITA, Montpellier, France, pp. 463-468.

Thyssen I., Boll P. & Jensen A. (1999). Web-based Information Chains in Agriculture – an Example from Pl@nteInfo. In Proceedings of the Second European Conference of EFITA/99 (Role and Potential of IT, Intranet and Internet for Advisory Services), Bonn, Germany, pp. 187-192.

Salampasis M., Batzios Ch., Samathrakis V. & Adroulidakis S. Identifying Use and Impact of the Internet in the Greek Agricultural Sector: Preliminary Results of a Survey of Web Site Owners. In Proceedings of the First HAICTA Conference, Athens 21-22 June, 2002.

Siardos G. 2000. Methods of Multivariate Statistical Analysis. ISBN 960-91293-0-07, Thessaloniki 2000. 640 p (in Greek).