

EVALUATION OF ELECTRONIC PUBLIC SERVICES IN AGRICULTURE IN THE CZECH REPUBLIC

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Abstract

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The goals of the paper are to analyze the uptake and to evaluate the quality of electronic public services among Czech agricultural enterprises. A sample of 119 entrepreneurs in the agriculture from different regions in the Czech Republic was chosen. This research is based on the application of scientific analysis, synthesis and deduction. Descriptive statistics were calculated from the data obtained in the questionnaire survey. There were fifteen different electronic services examined in the survey. Respondents made a plain ordinal-scaled evaluation of all used services in terms of the frequency of use, usefulness, importance and quality. Working hypotheses about dependencies among rates of use of particular services and five factors (plant production, animal raising, hectares of land, number of employees, subsidies) were examined with regression analysis. Eleven statistically significant dependencies were proved between the number of hectares and electronic services, which means that with growing number of hectares of land the rate of use of particular electronic services increases. Electronic services provided at eAGRI Portal run by Czech Ministry of Agriculture were utilized the most among agricultural enterprises (each by more than 50%) and electronic mail (79%). eAGRI Portal services were assessed the best in terms of importance, usefulness and quality. Farmers and agricultural businesses in the Czech Republic are currently not obliged by any law to use any electronic service, and they can still opt for traditional paper mail or personal visit.

eGovernment, agriculture, Czech Republic, electronic public services, evaluation of quality, eAGRI Portal

According to the study developed for the European Commission (Capgemini *et al.*, 2010), there are eight major electronic public services that must be monitored and measured such as: social contribution for employees, corporate tax, value-added tax, submission of data to the statistical office, custom declaration, registration of a new company, public procurement, and environment-related permits.

Czech authorities offer several more specific online services for entrepreneurs than the EC study settles such as: Information system of data boxes that is compulsory for public authorities and corporates do deliver official electronic documents towards official bodies, and Czech POINT which is

a network of one-stop places to submit or retrieve output from different public registries. In 2009, 44% of respondents claimed that they used at least once the Czech POINT service, and 64% used data box to receive a digital message from a public authority and only 28% used the data box to send a message to an authority (CZSO, 2011a). There are also services such as electronic communication and submission to courts, and many information systems for state and EU funds that are omitted from the official surveys by the Czech Statistical Office. In July 2012, a new information system of basic registries was launched that would serve for public administration back office with indirect impact on citizens and businesses.

However, in all mentioned surveys, agriculture, forestry, fishing and some other industries were omitted, so that the information about the number of enterprises interacting with public authorities in an electronic way is unknown. There was a census in the Czech agriculture in year 2010 (CZSO, 2011b) that brought only the information about the total number of computers and rate of computers connected to Internet in agricultural enterprises. But one enterprise could declare more than one computer in the survey, so the total amount of enterprises connected to the Internet cannot be detected. Another survey conducted by authors from Department of Information Technologies FEM CULS in Prague (Vaněk *et al.*, 2011) found that 70.5 % of enterprises with 100 or more hectares of land had broadband internet connectivity 256 kb/s or higher. Based on the figures we can assume that the Internet connectivity is not an obstacle for Czech agricultural enterprises and farmers to use electronic public services.

The offer of electronic services for the agricultural enterprises and farmers is very various among countries. Good examples regarding eGovernment services focused on the agricultural sector may be seen at the French Ministry of Agriculture (www.agriculture.gouv.fr), the Australian Department of Agriculture, Fisheries and Forestry (www.affa.gov.au), the Department of Agriculture of Taiwan, and the United States Department of Agriculture (www.usda.gov) (West, 2007) and (Lee *et al.*, 2008). Increasing number of initiatives around the world have been undertaken to provide eGovernment services for agriculture. Such as AgroGOV portal in Greece that was established due to lack of a well organised agricultural portal in Greece (Bournaris *et al.*, 2011). However, each of them follows different models which either have been adopted by rather generic eGovernment or eCommerce models, or have been developed ad hoc, and differ from country to country. The presence of such models shows the lack of a common framework of reference (Ntaliani *et al.*, 2011).

The model of establishing eGovernment in the Czech Republic draws on strong heritage of the Austro-Hungarian Monarchy in the field of very good statistics, organisation of national databases and high number of well-educated specialists. Citizens and small producers (including farmers) expect a leading role of government in promoting and assistance (Havlíček *et al.*, 2003).

Since late 1990s the Czech Ministry of Agriculture has been building the Portal for farmers and agriculture enterprises to promote electronic communication between agriculture public bodies and private agricultural companies and farmers (www.eagri.cz) which is conforming the effort to join different range of government roles and functions into one-stop place rather than establishing new departments or agencies (Havlíček *et al.*, 2003). The portal provides single access point to twelve subareas such as Ministry of

Agriculture, Land offices, Subsidies, National Rural Network, Consultancy and Research, Food Industry, Agriculture, Animal Welfare, Water Management, Environment, and Forest Management.

Objectives of the paper are to analyze the use and to evaluate the quality of electronic public services among agricultural enterprises.

MATERIALS AND METHODS

This research was conducted as application of scientific analysis, synthesis and deduction. We used the method of interview with eGovernment portal developers and we searched government websites to set up a list of most important electronic services for agricultural enterprises and farmers. With regard to the effort of the Czech Ministry of Agriculture, we focused on all services provided at the eAGRI Portal run by the Ministry of Agriculture. There are 21 registries or applications for agriculture enterprises and farmers at the portal. After consultations with portal developers and agricultural professionals we selected five key services and registries to evaluate their use and quality by the users. Among selected there were services such as: public website of the portal, registry of land (LPIS), registry of animals, evidence of plant protection products and fertilizers, and eAGRI Portal for subsidies.

The current state of use and the evaluation of the quality of electronic services in the agriculture was researched through questionnaire survey and gathered data were analysed with descriptive statistics and regression analysis.

There were over 500 respondents that were asked to fill the questionnaire either by e-mail, paper, or online (<http://dotaznik.czu.cz/index.php?sid=86944&lang=cs>). We received 221 filled questionnaires where only 119 out of them were usable because after initial statistic calculations there were also results that seemed to be erroneous or ambiguous. That is why almost a half of filled responses were excluded such as on-line questionnaires that were filled in less than three minutes and that were incomplete.

According to Commission Regulation No. 1242/2008 of 8 December 2008 establishing a Community typology for agricultural holdings within the Community (EC, 2008), the classification of agricultural entities is segmented according to the type of their production focus, economic size, and, newly, also according to the significance of other gainful activities. In the Czech Republic, the typology of farms is handled by the Institute of Agricultural Economics and Information (ÚZEI) and enables the sharing and processing of data within the international agricultural accounting and data network (FADN). The new typology of farms was utilized within the last structural survey of agriculture in the Czech Republic Agroczensus 2010 (CZSO, 2011b). A fundamental change as compared to the previous typology is the principle of defining the economic size of the business on the basis

of overall standard production and defining the production focus of businesses by way of a three-level classification, from more general types to more specialized ones (CZSO, 2012).

Our study focuses on the utilization and assessment of the quality of electronic services in state administration among farmers, and not on structural analysis of agricultural production. Therefore, we decided to classify the businesses in our survey according to the number of working persons, the area of farmed land, and according to the main focus of production, similarly as, for example in (Vaněk *et al.*, 2011).

The respondents were asked basic characteristic questions as to the location of farm, number of hectares, number of employed people and whether or not they are recipients of subsidies.

There were 13 different electronic services offered in the questionnaire plus electronic mail and electronic signature. Five of them were specific for agriculture (at eAGRI Portal) and the rest were general online services for businesses. All thirteen services were then evaluated with focus on their

frequency of use, importance, usefulness and quality.

To identify the barriers for agricultural enterprises and farmers to use electronic services we examined several possible relationships between particular services. The working hypotheses were formulated in Tab. II.

All the above stated working hypotheses were statistically tested for each particular service.

In the second part of the questionnaire, the respondents evaluated the frequency of utilization of individual services, their quality and importance. For such characteristics, descriptive statistics and regression analysis was calculated, which served for the verification of the above working hypotheses.

RESULTS AND DISCUSSION

Basic statistical characteristics of the group of respondents are described further. It was observed that the largest group of respondents in the survey were farmers with less than 100 hectares and employing less than 10 people (51 %), the other were farmers with land between 100 and 500 hectares (33 %). Only 8 % of respondents were farmers engaging from 10 to 49 people and with more than 500 hectares of land.

Farmers running plant production were represented in 92 % of cases while the animal raising claimed 60 % of them. About one half of respondents (54 %) were running both types of production.

Three districts had larger number of representatives in the survey: Litoměřice (14), Benešov (11) and Strakonice (7). In total, respondents originated from sixty different districts from all around the Czech Republic.

Almost all of the respondents confirmed that they were recipients of any form of subsidy from the Czech government or European Union funds. Only six replied that they did not receive any subsidy, and all of them belonged to smaller farmers with less than 10 people. Four other did not respond to the question.

The Tab. III presents the rate of use of electronic services for enterprises among agricultural enterprises and farmers according to our survey. The survey among agricultural enterprises and

I: List of evaluated electronic services for communication towards public administration

No.	Electronic service
1	E-mail
2	Electronic signature
3	eAGRI – public website of the portal
4	eAGRI – registry of land
5	eAGRI – registry of animals
6	eAGRI – registry of plant protection products and fertilizers
7	eAGRI – portal for subsidies
8	Environment related submissions
9	Submission to Czech Statistical Office
10	Data box
11	Portal of public administration
12	Tax portal
13	E-procurement
14	E-customs
15	Registration of a new company

II: Working hypotheses about dependencies between electronic services and selected factors

Factor	Hypothesis
Plant production	H1: There is a statistically significant independency between the use of electronic services and plant production.
Animal raising	H2: There is a statistically significant independency between the use of electronic services and animal raising.
Hectares of land	H3: There is a statistically significant independency between the use of electronic services and number of hectares of used land.
Number of employees	H4: There is a statistically significant independency between the use of electronic services and number of employed people in the enterprise.
Subsidies	H5: There is a statistically significant dependency between enterprises that receive subsidies and those that do not in the use of electronic services

III: The rate of use of electronic services among agricultural enterprises in the Czech Republic

No. of service*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Less than 10 people	80	12	60	87	52	65	71	5	26	10	15	17	4	17	1
10–49 people	13	7	9	15	9	13	12	7	10	7	6	6	1	3	0
50–249 people	2	1	1	2	1	1	1	2	1	2	1	1	0	1	0
Total	95	20	70	104	62	79	84	14	37	19	22	24	5	21	1
Total in %	79.8	16.8	58.8	87.4	52.1	66.4	70.6	11.8	31.1	16.0	18.5	20.2	4.2	17.6	0.8

*Number of service refers to the list of services in Tab. I.

their use of electronic agriculture specific services brought the very first and unique results. Five major agriculture specific electronic services were examined. All of them are provided for registered users at eAGRI Portal. Users might obtain their registration by application at one of the Agencies for Agriculture and Countryside that are located in almost all of districts around the Czech Republic. It is the fact that none of agricultural businesses or farmers is obliged to use any of electronic service either at eAGRI Portal or any other one, which could have impact on the overall uptake of electronic services. Thus, the subject may use alternative ways to deliver forms to authorities, such as to deliver in person to the local Agency for Agriculture and Countryside representative, or to send by post.

The highest rate of use was observed at the eAGRI – Registry of Land (87 %). The registry serves mainly as a tool for subsidy payments and control of subsidies. Moreover, it could be used to check the ownership of land through the connection to the national cadastre, or as a tool to record the crop rotations, and for several other functions. The liability to keep records on the land is given by the Act No. 252/1997 Coll. on agriculture.

According to a discussion with the developers and administrators of the eAGRI Portal system, the activity of users in agricultural businesses in the LPIS Registry of Land is approximately 1.5 times higher than the activity of officials of the Ministry of Agriculture. The application is necessary for all recipients of subsidies and provides further functions for the administration of farmed land.

The second most frequent form of communication with authorities for farmers is electronic mail (79 % of cases). In verbal commentaries by respondents, there were opinions that when electronic filing is not mandatory, they send documents by electronic or classic mail.

Portal of subsidies is a remarkable application within eAGRI portal, as it was confirmed in the survey where most of respondents claimed that they were recipients of any form of subsidies.

Evidence of plant protection products and fertilizers is an application for farmers focused on plant production. The registry of animals is visited by those involved in animal raising. The legal provision is given by the Act No. 154/200 Coll. on breeding and by the Order No. 136/2004 Coll. The rate of use is on similar level between them, which corresponds to the almost equal representation

of plant production and animal raising in the respondents cohort.

Secured means of electronic communication were utilized for communication with state administration by only a small share of agricultural businesses: electronic signature (16 %), data box (16 %).

At this point, we must emphasize the difference between our study and the study of the Czech Statistical Office, which does not conduct surveys among farmers in regard to the utilization of information and communication technologies toward state administration. The survey of the Czech Statistics Office on the utilization of information and communication technologies in the business sector, for example (CZSO, 2011a), covers only businesses outside of the sector of agriculture and forestry and the survey is only conducted among businesses with 10 or more employees. Our survey contained only 17 businesses with 10 or more employees, while the other 102 businesses had fewer than 10 employees (Tab. II). In view of the predominance of very small businesses (< 10 employees) in our survey and different categorization, we cannot compare the obtained results with the results of the survey of the Czech Statistical Office.

The assessment of the working hypotheses was done by way of the statistical testing of the dependence between the analyzed indicators. The calculations were conducted with the same set of 119 observations. The results of the testing of the hypotheses include statistically significant values, i.e. with a value of $p < 0.05$ at a level of significance of $\alpha = 0.05$. The value of the Pearson chi-square was selected as the test criterion.

Below, we set out cases in which the zero hypothesis was rejected and an alternative hypothesis was accepted. If the hypothesis was rejected for particular service, the statistically significant dependence was declared with the correlation coefficient (r value). If the r value is not present, the zero hypothesis was not rejected (Tab. IV).

Second goal of the research was to identify barriers to using electronic communication between agricultural enterprises and public authorities, and to explain the possible purposes.

The frequency of use was measured as: daily (2), 1x per week (1), 1x per month (0), less often (–1) and not used by me (–2). The purpose of such characterization is to ascertain the approximate

IV: Statistically significant dependencies among factors and electronic services, R-values

Hypothesis / No. of service	1	2	3	4	5	6	7	8	9	10	11	12
H1: Plant production						0.2						
H2: Animal production				0.26	0.77		0.19		0.2			
H3: Hectares of land	0.27	0.36	0.23	0.31		0.43	0.32	0.70	0.39	0.58	0.39	0.36
H4: Number of employees	0.33							0.55	0.29	0.44	0.24	
H5: Subsidies				0.68	0.25	0.34	0.37					

V: Frequency of utilization, importance, usefulness and quality evaluation of electronic services

Service no.	FREQUENCY OF USE				IMPORTANCE				USEFULNESS				QUALITY			
	N	Avg	Min	Max	N	Avg	Min	Max	N	Avg	Min	Max	N	Avg	Min	Max
1	92	0.07	-2	2	78	0.83	-1	2	77	0.83	-1	2	76	1.01	-1	2
2	108	0.32	-2	2	100	1.37	-1	2	99	1.38	-2	2	100	1.37	-1	2
3	95	-0.39	-2	2	60	1.58	-1	2	62	1.51	0	2	59	1.33	0	2
4	95	-0.13	-2	2	81	1.24	-1	2	81	1.20	-1	2	80	1.17	0	2
5	98	-0.52	-2	2	86	1.11	-1	2	87	1.13	-1	2	87	1	-1	2
6	78	-1.29	-2	2	23	0.78	-2	2	23	0.78	-2	2	23	0.82	-2	2
7	-	-	-	-	27	1.37	-1	2	27	1.25	0	2	27	1.11	-1	2
8	79	-1.33	-2	2	26	1	-1	2	26	0.92	-1	2	26	0.96	0	2
9	76	-1.39	-2	1	8	0.75	-1	2	8	0.62	-1	2	8	0.5	-1	1
10	69	-1.75	-2	1	50	-0.42	-2	2	47	-0.23	-2	2	47	0.25	-2	2
11	73	-1.70	-2	1	15	0.73	-2	2	15	0.60	-2	2	15	0.73	-2	2
12	75	-1.56	-2	1	21	0.85	-1	2	21	0.85	-1	2	21	0.71	0	2
13	71	-1.87	-2	1	3	2	2	2	3	2	2	2	3	1.33	1	2

frequency of utilization of individual services by respondents. In cases where a respondent stated that the respondent does not utilize a given service, the respondent could specify the reason for not using such service.

Importance, usefulness and quality were assessed with an ordinal scale: definitely yes (2), rather yes (1), neutral (0), rather not (-1), definitely not (-2). Importance is to show the weight of the given service for the business of the respondent. Usefulness means whether the given service brings the user the expected benefit, such as a savings of time, money, faster work, etc. Respondents assessed the overall quality of the execution of the given service from their personal viewpoint. At the same time, they could express their further commentary in regard to the level of fulfilment of their needs through the use of the relevant electronic service. The overall figures are in Tab. V.

In all of the assessed aspects from the viewpoint of users, the LPIS Registry of Land (No. 4) on the eAGRI Portal was assessed as better than average.

It is necessary to note that the above results of the assessment of frequency, importance, usefulness and quality were not conducted in accordance with ISO standards for software quality assessment (such as ISO/IEC 25010:2011 Systems and Software Engineering – Systems and Software Quality Requirements and Evaluation (SQuaRE) – System and Software Quality Models, 2011). The output of this part of the study was supposed to provide

additional information about the overall opinion of users of electronic services in agriculture.

In the survey, respondents could also express their opinion on electronic services in public administration. Most often, there were comments in regard to the registry of plant protection products and fertilizers, in regard to the registry of animals and the LPIS land registry on the eAGRI Portal. Further, respondents expressed the wish for the eAGRI Portal to be available on mobile devices, which would enable the entry of data directly in the field; they commented on the occasional overloading of the State Agricultural Intervention Fund eAGRI Portal when filing applications for subsidies; and further, they pointed out certain problems in electronic filings to public administration authorities and the need for training in regard to working with the eAGRI Portal at secondary schools. Some expressed satisfaction with electronic services and some expressed their absolute disagreement with the concept of electronic communication.

CONCLUSIONS

The goal of the article was to show the current offer and level of utilization of electronic services for the communication of agricultural businesses with bodies of public administration in the Czech Republic. The article provides a comprehensive overview of the state of utilization of individual

electronic means of communication toward public administration and their assessment by users.

Among agricultural businesses, electronic services on the eAGRI Portal of the Ministry of Agriculture are utilized the most. At the same time, these services are assessed the best in terms of importance, usefulness and quality. Services of electronic reporting to the Ministry of the Environment and electronic filing of statements to the Czech Statistical Office appear to be the most problematic from the perspective of users.

In view of the above findings, we believe that the following questions should be verified in a further study. What is the quality in use of individual services of the eAGRI Portal and what is preventing their greater utilization from the perspective of users? What is the association between the use of a data box and an electronic signature? Is there a substitution effect between them? If so, what are the causes? Can a data box fully replace an electronic signature in all cases of communication with public administration? The authors of the study propose the following measures that should contribute to the growth of use of existing electronic services in the

agricultural sector. It is needed to analyze the main processes of communication between farmers and bodies of state and regional administration and to identify duplicities in communication. Assessment of the quality in use of electronic services in agriculture should be conducted by means of one of the reputable software quality models, such as ISO 25010 – SQUARE, which specifies use quality as: “A quality in use model composed of five characteristics (some of which are further subdivided into subcharacteristics) that relate to the outcome of interaction when a product is used in a particular context of use (ISO/IEC 25010:2011).”

On the basis of the proposed analyses, the relevant information systems should be adjusted with the goal of increasing their performance, user friendliness and effectiveness in filing electronic reports. The main purpose is the provision of friendly and effective electronic services by public administration that will bring savings and greater productivity of labour, both on the part of state officials, as well as on the part of agricultural businesses.

SUMMARY

The paper presents unique and the very first figures about the agriculture uptake and quality evaluation of public administration electronic services in the Czech Republic. Results were gathered from 119 respondents, where almost 85 % of them were farming at the land up to 500 hectares and with less than 10 employed people. The utilization and the quality of fifteen electronic services for communication towards public administration were analyzed. Five out of thirteen services are located at the eAGRI Portal (Portal for farmers) that is maintained by the Czech Ministry of Agriculture. Among analysed portal services were: public website for farmers, registry of land, registry of animals, registry of plant protection products and fertilizers and portal for subsidies. Dependencies among rates of use of particular services and five different factors (plant production, animal raising, hectares of land, number of employees, subsidies) were examined with regression analysis. The most closely relating factor influencing the use of e-services was the number of hectares (11 services), then number of employees (5 services) and then equally animal production and subsidies (4 services). Only one service showed some remarkable relationship with farms that do plant production. It means that the general assumption that with growing size of the company (as to the number of hectares of land and number of employed people), the use of electronic services rises, which was proved to be valid also among agricultural enterprises. Similar phenomenon is observed at larger companies outside agriculture and forestry that use the electronic communication towards public administration more than small and middle companies (CZSO, 2011), (Eurostat, 2011). The services provided at eAGRI Portal were utilized the most among agricultural enterprises (each by more than 50%) and electronic mail (79 %). Electronic services at eAGRI Portal were assessed the best in terms of importance, usefulness and quality. Farmers and agricultural businesses are not obliged by any law to use any of electronic services, and they can still opt for traditional paper mail or personal visit. Further research of the quality in use of electronic services is needed with more detailed analysis of substitution effects among particular services.

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