

## The Evaluation of Use and Quality of Public E-services among Enterprises

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### Anotace

Článek se zabývá metodou hodnocení kvality elektronických služeb české státní správy. V článku je popsáno měření eGovernmentu provedené pro Evropskou komisi v roce 2010 a je porovnána současná úroveň využití elektronických služeb mezi zeměmi evropské sedmadvacítky a Českou republikou. Nejvíce využívané elektronické služby v České republice byly ohodnoceny v průzkumu mezi 452 podniky. Hodnocení bylo provedeno na základě metody CBG (Communication between Business and Government), která byla vyvinuta na Katedře informačních technologií na Provozně ekonomické fakultě České zemědělské univerzity v Praze. Výsledky šetření jsou srovnány s předchozími průzkumy a s průzkumy Českého statistického úřadu a Eurostatu.

### Klíčová slova

Hodnocení kvality, státní správa, veřejná správa, metoda CBG, elektronická služba.

### Abstract

The paper deals with the quality evaluation of electronic services. The European Commission eGovernment benchmarking effort is reviewed and the current level of use of basic electronic services for enterprises is compared between EU 27 member countries and the Czech Republic. Then, the most frequently used services are evaluated among 452 enterprises in the Czech Republic. The evaluation was based on a method CBG (Communication between Business and Government) that has been developed at the Department of information technologies at the Faculty of Economic and Management at Czech University of Life Sciences (CULS) in Prague. Results of the survey are compared to prior surveys, Czech Statistical Office and Eurostat surveys. Pieces of knowledge introduced in this paper resulted from solution of an institutional research intention MSMT 6046070906 „Economics of resources of Czech agriculture and their efficient use in frame of multifunctional agri-food systems“.

### Key words

Evaluation of quality, state authorities, public administration, CBG method, electronic service.

### Introduction

Quality benchmarking and evaluation in eGovernment is highly researched area. The beginning stage of sheer excitement about implementing electronic services for citizens and companies by governments was transformed then into the stage of critical reviews of real benefits of eGovernment.

Lacks of financial resources in governmental budgets all around Europe and in other parts of world puts pressure to also eGovernment projects. The real usage and demand of users of public

e-services are weighted and become major factors of eGovernment benchmarking and evaluation efforts. There is a need for evaluation efforts that assess effectiveness of eGovernment systems (Wang and Liao, 2007). Such evaluation efforts can enable government agencies to determine if they are capable of doing the required task and delivering services as expected (Gupta and Jana, 2003). However, while information systems (IS) success models have been widely investigated, the factors which best measure the success of eGovernment IS need further investigation (Floropoulos et al., 2010).

Despite more than ten years of research on eGovernment, some authors claim that there is a need for new models to meet the contemporary and future challenges of eGovernment. It must better understand the relation between technology, organization and government values (Grönlund, 2010).

Czech government has been methodically coordinating quality management in public administration (Špaček and Nunvářová, 2009) through several strategic initiatives such as Bill on Standardization of Selected Public Services (2002), Strategy for support of public services availability and quality (2004) where 69 public services are suggested for standardization and the latest is Efficient Public Administration and Friendly Public Services – Strategy on Realization of Smart Administration in the Period 2007 – 2015 (“Smart Administration strategy” approved in 2007). However, the use of quality instruments such as CAF, Balanced Scorecard, model of excellence and other, are voluntarily and the Czech government is not directive in that.

The number of enterprises in the Czech Republic that used at least once the Internet for interaction with public authorities is quite high – 95 % of enterprises in 2010 (CZSO, 2011), which was 19 % higher than in EU-27 countries where the rate was 76 % (Eurostat, 2011). In 2009, 82 % of enterprises in the Czech Republic used the internet to search for information on public administration web sites and 79 % to download form from the website. Sending forms by e-mail was conducted in 61 % of enterprises and full electronic treatment of procedure was used at almost half of enterprises (48 %) (CZSO, 2011). While in EU-27 countries, there was an average of 68 % of enterprises obtaining information from public authorities’ websites, 68 % enterprises downloading forms from public authorities’ websites, 60 % of enterprises using the Internet to return completed forms, and 13% using the Internet for e-procurement with public authorities (Eurostat, 2011). Overall use of e-services by enterprises in the Czech Republic is close to the top, but the lower uptake of particular applications must be investigated and increased.

The connectivity to the Internet with the fixed broadband access is also important factor influencing the usage of eGovernment on-line services and their supply and quality (Arduini et al., 2011). In 2011, CZSO (2011) claimed that almost 89 % of Czech enterprises accessed the Internet with the fixed broadband connection, and 25 % of mobile broadband users among enterprises. The EU-27

average in broadband (mobile or fixed) was 89 % of enterprises (Eurostat, 2011). In both surveys, the cohort of enterprises included enterprises with 10 or more employees, but the NACE categories 01-03 (agriculture, forestry and fishing) and 05-09 (mining and quarrying) are omitted. Some other minor categories, such as education, human health and social work activities, other activities and arts, entertainment and recreation are not represented in these surveys as well. The Czech survey included financial and insurance firms (NACE 64-66), but Eurostat did not.

The first objective of this paper is to review the CBG method in compliance with EU benchmarking framework for basic e-services for enterprises. The second objective is to examine the current level of use and quality of basic e-services for businesses in the Czech Republic. Possible solutions of issues and future research activities are also proposed here.

## **Material and methods**

The use and quality evaluation of electronic services among Czech enterprises and public authorities is run by the group of authors from the Department of Information Technologies at the Faculty of Economics and Management of the Czech University of Life Sciences (CULS) in Prague since October 2010.

The original form of the evaluation was focused on the quality of the selected set of electronic services for communication of state agencies of the Czech Republic with privately owned companies and among agencies themselves (Ulman et al., 2011) and (Ulman and Kubata, 2011). The evaluation was made from the user’s point of view. The respondents evaluated seventeen electronic services in the questionnaire survey. The selection of services included only those services that were provided by the state authorities (ministries and courts), not online services served by local authorities and self government agencies. The evaluation criteria were set by the CBG method that utilized a simple quality model based on ISO standard and evaluated given characteristics of quality of electronic services. Data gathered in the survey were processed with the basic statistical procedures.

The first round of survey was conducted in fall 2010 and answers from 253 respondents were obtained (Ulman et al., 2011). The second round of evaluation was done in the period February 2011 and March 2011 and 177 answers were got (Ulman and Kubata, 2011). The third round was

taken between October 2011 and January 2012 and 848 respondents were involved. In all surveys, both public authorities and enterprises were asked.

Between the second and third survey, the list of electronic services for B2G communication was evaluated and revised. For those services that were found as the most frequently used by users the evaluation of given quality characteristics indicators was done here.

**Design of the quality indicators model of e-services**

There are many models for the software quality assessment. The most frequently used approach is according to the ISO 9126 software quality model and the ISO 9000 standard that defines the quality in general: “The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs”(ISO, 2000).

ISO/IEC 9126 classifies software quality into four categories (see Figure 1):

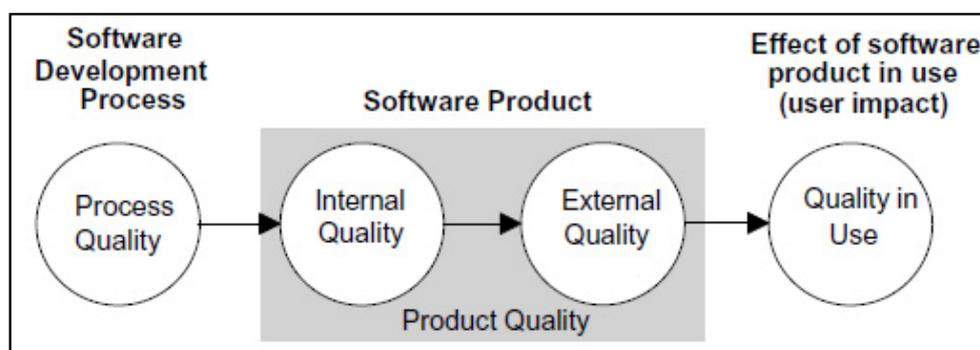
- Process quality: quality of software lifecycle processes.
- Internal quality: quality of intermediate products, including static and dynamic models, documentation and source code.
- External quality: quality of the final system as assessed by its external behaviour.
- Quality in use: effect of the system in use—the extent to which users can achieve their goals using the system (ISO/IEC, 2001).

The eGovernment evaluation comprises the quality among standard public sector indicators (Flynn, 2002), (Heeks, 2006). The CBG method is designed to evaluate the quality of use of electronic services (that are in fact software artefacts), which means

that it is focused on the effect of services from the user’s point of view. The user requirements for the quality of use are represented as attributes in the ISO 9126 model. Each attribute belongs to at least one group of quality characteristics. Each characteristic is rendered with one or more attributes (ISO/IEC, 2001). The ISO 9126 is taken as the most comprehensive (Behkamal et al.,2008), even though some authors (Vaniček, 2008) reproach that the model is not well-arranged, that some attributes are inappropriately measured and that it is oriented towards agenda data processing. Despite above mentioned facts, the ISO 9126 model proves to be the most suitable as a foundation for the quality evaluation of electronic services. Some models and eGovernment benchmarking frameworks operate with so-called indicators (eGep, 2006). The indicator will be understood equal as the characteristics of the quality of use. The CBG method evaluates the quality of electronic services in compliance with characteristics of the quality of use that is mentioned by Vaniček (2008). The name of the fourth quality characteristics was modified:

1. Effectiveness: an ability of the system to ensure achievement of goals in precise and full manner.
2. Productivity: an ability of the system to ensure effectiveness with an adequate use of resources.
3. Safety: an ability of the system to permit only an adequate degree of risk of threat to people, environment, property or business interests under the use of system in the given context.
4. Satisfaction: of a user with the use of the system.

The model of evaluation of quality characteristics attributes by the ISO standard is applied on six services. Five of them were evaluated as most frequently used by users. There was one new service added in the list – public procurement. Because it was supposed that the service was also frequently



Source: Behkamal et al., 2008.

Figure 1 ISO 9126 software quality model.

Quality attribute/ e-service	Information system of data boxes	Electronic sub- mission of social security and insurance <sup>1</sup>	Electronic sub- mission of taxes (Tax Authority Portal)	Excerpts from public registries and submissi- ons at Czech POINT <sup>2</sup>	Electronic com- munication with courts (Justice.cz)	Electronic pub- lic procurement (isvzus.cz)
How many data messages/submi- ssions are sent or received via the service in your organization in a month?				< 1 message <10 messages <100 messages >100 messages		
Is sending or receiving of data messages time- -saving for you?				yes no		
Is the service useful for your organization?				yes no		

<sup>1</sup> Three types of submissions at Public administration portal are included: Records on pension insurance, Registration and unregistration of employees for health insurance, Survey of income and expenses of the self-employed persons.

<sup>2</sup> Extracts from Trade Register and Commercial Register, extracts from the insolvency register, extracts from the List of Qualified Suppliers, extracts from the Land Registry, submissions according to the Trade Licensing Act (§ 72), extracts from the drivers' score, extract from the Criminal Records and submissions to the registry participants of the module of car wrecks.

Table 1 The list of attributes and characteristics quality and their measurement for selected services.

used and was of high importance for its users, especially private companies and public authorities. Finally, there were six electronic services in total to be evaluated in this survey.

To accomplish the quality evaluation of service, the key quality attributes for each service were identified. Each quality attribute belongs to one quality characteristics. Attributes were chosen by the author on the basis of previous surveys of quality evaluation by the CBG method (Ulman et al, 2011), (Ulman and Kubata, 2011), and according to recommendations of other authors (Heeks, 2006), (eGep, 2006).

### Measurement

Responses to questions were gathered through on-line survey and stored in the database. Respondents replied to three categories of questions: classification figures about the organization, evaluation of basic eGovernment services (importance of service, expected level of implementation, actual level of implementation) and evaluation of quality attributes of selected services (effectiveness, productivity, safety and satisfaction). Each respondent assessed only those services that were actually used in the organization. Their answers were analysed in the worksheet processor.

### Dissemination of results

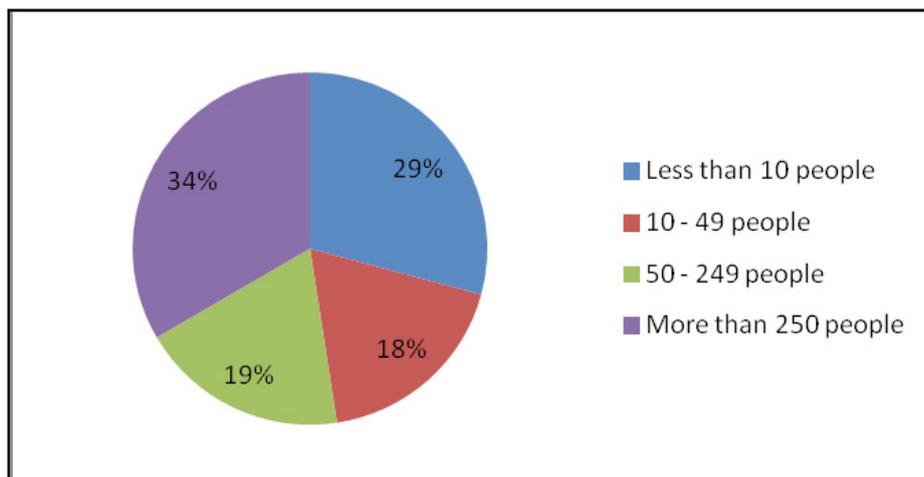
The electronic services quality evaluation regarding the user's effect could be recognized as a repeated

analysis of user's requirements in the software engineering. It is worthy to observe the evolution trend of these requirements in time. The objective of the quality evaluation of eGovernment services by CBG method is to contribute to matching electronic public services demand and supply. One of technical provisions that could help to maintain collected data is to build a data base that would be periodically updated and would provide current overview of quality of the most used services. It will require to design and develop a web application capable to present results of surveys on a website. The web application would serve as an information source for other researchers, eGovernment software developers, administrators and for professionals in public services.

### Results and discussion

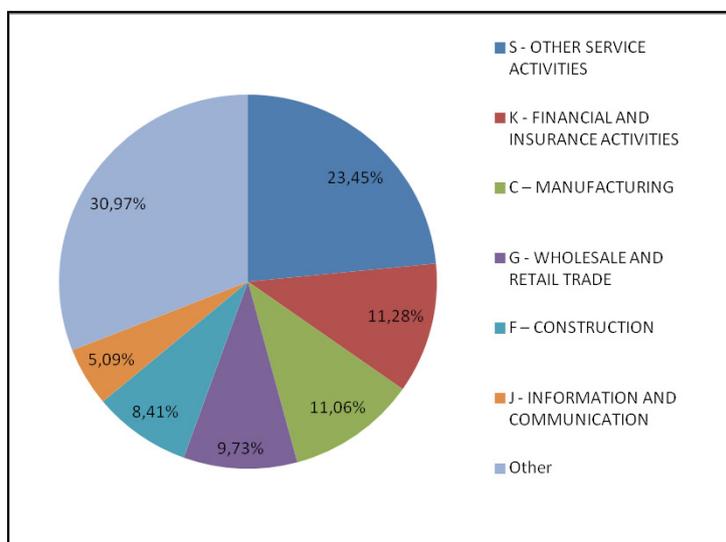
There were represented in total 452 enterprises in the survey. More than a third of the respondents (34 %) came from large enterprises with more than 250 people, but the second biggest group (29 %) were small enterprises with less than 10 people. This distribution of respondents is rather different than in the last survey by the Czech Statistical Office (CZSO, 2011), where the small enterprises possessed the overwhelming majority.

Enterprises by the classification of economic activities were represented as follows: other service activities (23,45 %), financial and insurance activities (11,28 %), manufacturing (11,06 %) and



Source: own elaboration, 2012

Figure 2 Enterprises by the number of employees.



Source: own elaboration, 2012

Figure 3 Enterprises by the type of economic activities (NACE) - shortened.

wholesale and retail trade (9,73 %). Activities represented with less than 5% were grouped into the category other (30,97 %). The cohort of respondents also covered the NACE categories 01-03 agriculture, forestry and fishing (2,88 %), and NACE 05-09 mining and quarrying (0,44 %) which in final turn did not participated much in results. But NACE 64-66 financial and insurance firms took a significant amount (11,28 %) of respondents in the survey which could be seen in Figure 3.

### Quality of use of e-services among enterprises in the Czech Republic

With respect to results of survey conducted in years 2010 and 2011 and to eGovernment evaluation made for European Commission (CAPGEMINI ET

AL., 2010), the list of evaluated electronic services was revised.

The European Commission inspected eight basic electronic services for businesses in its study (CAPGEMINI ET AL., 2010), while the authors' previous survey assessed seventeen services. Basic services suggested in the survey for European Commission are also included in the CBG study, excepting public eProcurement and eTaxes. EC assessed separately corporate tax and its declaration and notification, and value added tax (VAT), including its declaration and notification. Both taxes were summarized in CBG survey under the service no. 3 – Electronic submission of taxes (Tax portal by the Ministry of Finance).

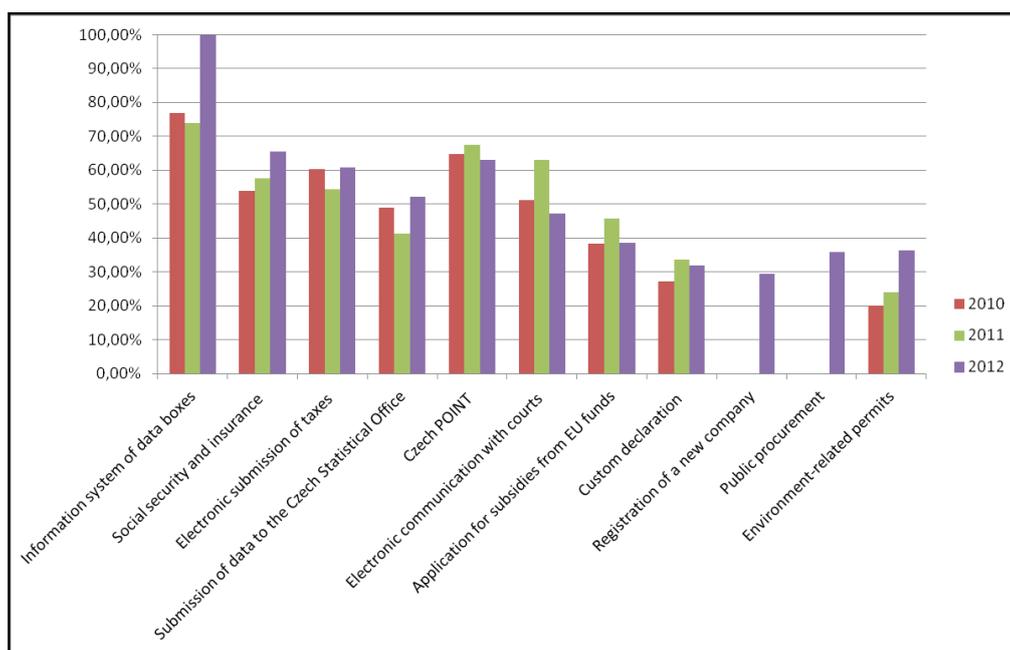
Electronic service by CBG method (2010-2011)	Electronic service by European Commission benchmarking (2010)
Information system of data boxes	-
Transactions at Public Administration Portal (electronic submission of social security and insurance)	Social contribution for employees
Tax authority portal Ministry of Finance (electronic submission of taxes)	Corporate Tax
	VAT
Submission of data to Czech Statistical Office	Submission of data to the statistical office
Excerpts from public registries and submissions at Czech POINT (Trade Register, Business Register, Real Estate Register)	-
Electronic communication with courts (www.justice.cz)	-
Electronic application for subsidies from EU funds (various ministries)	-
Electronic customs declarations (www.celnisprava.cz)	Custom declaration
Registration of a new corporate (http://www.businessinfo.cz)	Registration of a new company
Official site of public contracts (www.centralniadresa.cz or http://www.isvzus.cz/usisvz)	Public procurement
Environment-related permits (www.mzp.cz)	Environment-related permits

Source: own elaboration and Capgemini et al. (2010), modified.

Table 2 The list of electronic services in CBG method and European Commission's benchmarking.

To unify the CBG method with the EC's framework, services with the highest evaluation were selected. This criterion was met by seven services. There were three other services with the frequency of use between 24 – 45 %. These services were no. 11 - E-justice, no. 13 - The electronic submission of EU funds application, and no. 14 – Electronic customs in the previous survey (Ulman and Kubata, 2011). Other missing services on the list of EC were: registration of a new company, public procurement and environment-related permits, including reporting. The first two were added for new evaluation to the list of CBG method. The original service of reporting and environment-related permits in the Integrated Pollution Register were replaced with all environment-related permits and reporting through the website of the Ministry of Environment of the Czech Republic (www.mzp.cz). Another change was joining different kinds of outputs from registries at Czech POINT one-stop place into one single service called Czech POINT. The services that were included in Czech POINT in this survey were: Extracts from Trade Register and Commercial Register, Extracts from the insolvency register, Extracts from the List of Qualified Suppliers, Extracts from the Land Registry, Submissions according to the Trade Licensing Act (§ 72), Extracts from the drivers' score, Extract from the Criminal Records and Submissions to the registry participants of the module of car wrecks.

The newly adjusted list of electronic services for quality evaluation included eleven items. Services list matched list of eight services benchmarked by the European Commission plus three other services that are specific for the Czech eGovernment and that appeared to be frequently used in previous surveys. Figure 4 summarizes data from three different observations made between 2010 and 2012. The rate of use of e-services was measured. The substantial growth in use could be seen at electronic services such as data boxes (99,78 % in 2012), electronic submission of social security and insurance (65,49 %), submission of taxes (60,84 %), submission to the Czech Statistical Office (52,21 %), and Czech POINT (63,05 %, but in 2012 it was measured as a single item for multiple services). The very high rate of use of information system of data boxes is given by the Czech legislation requirements that force all private companies to use data boxes in communication with public administration. In past survey, there was probably less notion of respondents about it. In further survey, it will be vital to explore how many companies use data boxes for sending messages to public authorities, and not only for receiving. By CZSO (2011), 51 % of all enterprises used the data box system to send a message to public authorities in 2010. In other EU countries, there are also implementations of registered and reliable e-mail (OREM) system for delivery of documents



Source: (Ulman, et al, 2011), (Ulman and Kubata, 2011), and own figures from 2012, modified.

Figure 4 Comparison of the rate of use of e-services among enterprises in the Czech Republic between 2010 and 2012.

between companies and public authorities in Italy (Posta Elettronica Certificata — PEC), Switzerland (Incmail), Germany (De-mail) and a few others.

Two new services in the list, registration of a new company and the public procurement were evaluated for the first time in 2012, and they reached expected results. Registration of a new company with 29,42 % is rather an one-time service for most of entrepreneurs, but public procurement reached 35,84 % because there were probably higher interest of companies in attaining public contracts.

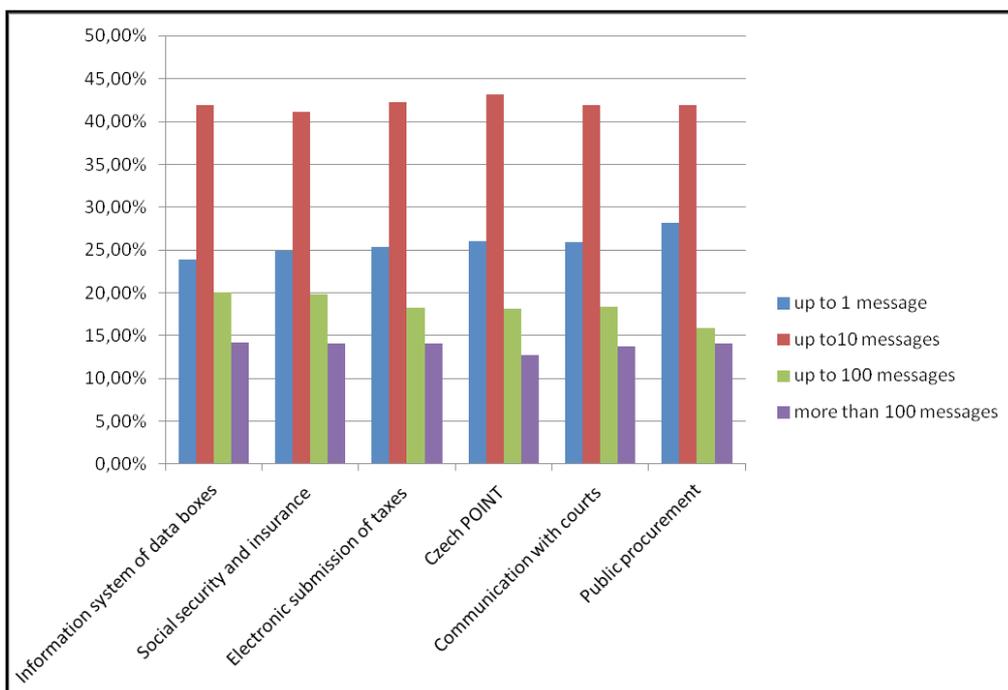
We could observe that the uptake of e-services did not exceed 40 % of enterprises at five particular e-services: Electronic application for subsidies from EU funds, Environment-related permits, Public procurement, Registration of a new company, and Electronic customs declarations. Authors consider that these services are used randomly or only once a time by most of enterprises. There was probably a smaller number of businesses that operated with foreign companies or they did not use the e-service, which pushed down the rate of use of electronic customs declarations. The lower rate of use of public procurement website (35,48 %) might have various reasons. There could be companies that did not apply for public procurements, or they might not have more information about it or any other reason.

The factors limiting electronic communication between businesses and government should be investigated more in depth, similarly to the Czech Statistical Office survey, where 53 % of all enterprises claimed that to complete transaction with a public authority still needed to use post office or to do so with personal contact. 46 % of enterprises stated that electronic transactions are too complex and time-demanding (CZSO, 2011).

Six services from the list were inspected more in details in the questionnaire and figures are presented here.

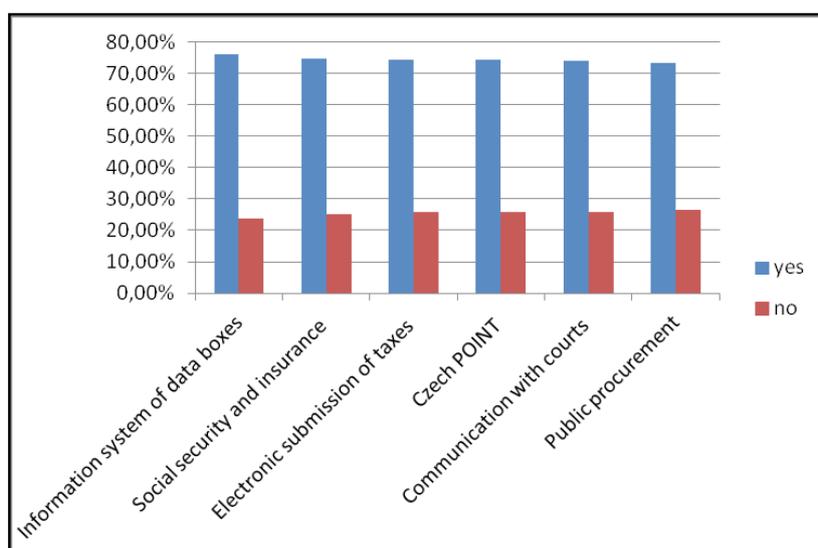
The first question was: “How many data messages/submissions are sent or received via the service in your organization in a month?” In Figure 5 we can see that all services are used at least once to ten times a month which is a quite frequent use. Data were gathered for all enterprises without any difference in their size or number of employees.

Next question was: “Is sending or receiving of data messages time-saving for you?” All of evaluated services were perceived as useful by their enterprise users with more than 72 % of respondents (see Figure 6). It is supposed that if one stated that he or she used the service than it is perceived as useful by that person.



Source: own elaboration, 2012

Figure 5 The volume of messages sent or received monthly via e-services by enterprises in the Czech Republic (2012)



Source: own elaboration, 2012

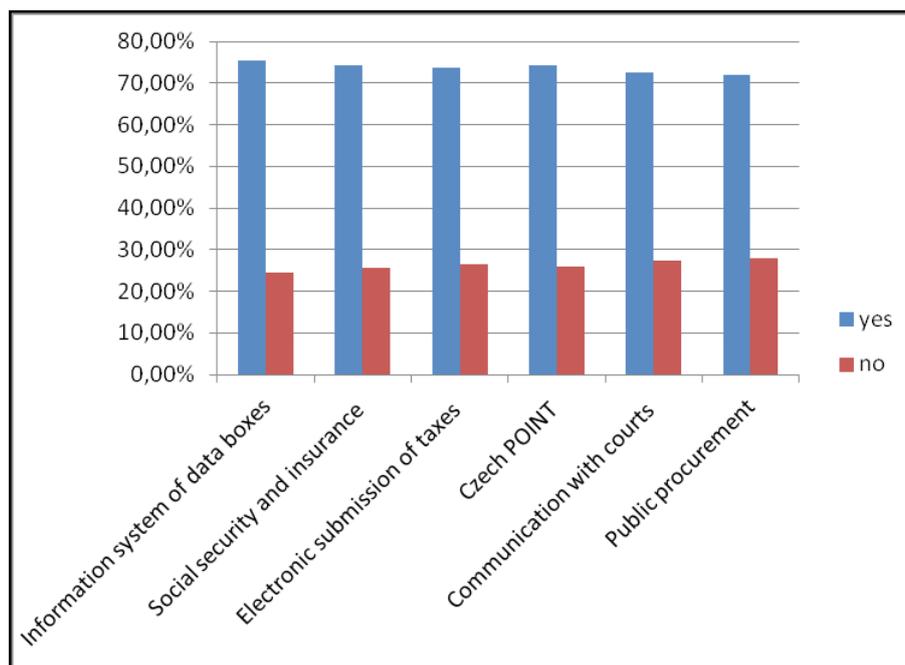
Figure 6 Time savings through public services perceived by enterprises in the Czech Republic (2012)

Final question was: “*Is the service useful for your organization?*” General assumption that if one uses electronic service then it is perceived as a time-saving was verified by responses to the question (see the Figure 7).

In general, we can confirm that Czech enterprises currently have perceived electronic services provided by Czech government as useful and time-saving, they also have used them between one to ten

times a month and six out of eleven services have been used by more than 40 % of asked enterprises.

The enterprises in agriculture in the Czech Republic have been growing significantly, as to their access to the Internet and the usage of public administration e-services. The survey conducted among Czech agricultural enterprises with more than one hundred of hectares of land in 2009 (Vaněk et al., 2010) was intended to bring the information about ICT use



Source: own elaboration, 2012

Figure 7 The usefulness of public services perceived by enterprises in the Czech Republic (2012)

among Czech agricultural enterprises. There were 93 % of enterprises in agriculture with access to the Internet in 2009, while 12% used to have mobile access. The access to the internet among agriculture enterprises used to be fair then and farmers have been currently big consumers of eGovernment services due to their strong connections to the system of state and EU funds, donations and control mechanisms. Since farmers and agriculture enterprises were poorly represented in our survey (2,88 %), it is needed to conduct another survey among them.

## Conclusions

EGovernment benchmarking and evaluation has undergone long effort in European countries. Many dispute the lack of focus on user impact of e-services supplied by governments (Heeks, 2006), (Yildiz, 2007), and (Arduini et al., 2011). Authors at the Department of information technologies in FEM CULS in Prague have developed the simple method of quality evaluation of e-services provided by the government to businesses (CBG). The research was already conducted in three periods between 2010 and 2012. The method was reviewed regarding the benchmarking method of European Commission, as to the range of evaluated e-services – three new services were added while nine were omitted or joined with others. New quality evaluation model

was introduced in the CBG method – a set of quality indicators that were identified from the previous research and the literature review.

The authors believe that main effort of quality evaluation should be to meet the public demand for government and public administration services with their supply respecting public values (Grönlund, 2010). We also found a large group of users of electronic public services in agriculture and forestry that still have not been surveyed about the use of public e-services yet despite they generate large volume of electronic communication with public administration.

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