Usability and functionality of websites of commune offices as stimulants of sustainable development of e-government

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Abstract. Sustainable development of e-government should be based on facilitating the meeting of society's needs, mostly through enhancing access to information and providing public services which can be realized through the Internet, which is especially important in the time of dynamic increase in the number of its users. Creating useful and functional websites of offices, which will fully allow the enjoyment of benefits coming form new technologies, is an indispensable condition of this realization. Due to the above, research has been conducted the subject matter of which was the assessment of the content of the websites of commune offices of the West Pomeranian Voivodeship in the context of adjusting them to the needs of local communities. The websites of the offices were analyzed in terms of their usability, functionality and the level of advancement of selected self-government e-services, where the criterion was, i.a. the substantial content, accuracy, technical and ergonomic quality. The results of the conducted research show that creating websites allowing smooth implementation of electronic services, employing standardized procedures related to the process of providing services makes the office more transparent and thus more citizen-friendly. This will also allow the improvement of the quality of their life as result-wise improvement of administrative serving the society thanks to offering an additional way of carrying out public services. These actions need to be recognized as an indispensable condition for enhancing the efficiency of e-government contributing to its sustainable development.

1 Introduction

Sustainable development of public e-government both refers to problems related to its sustainability and also focuses on creating the appropriate organizational and legal framework necessary for the implementation of such a system, while taking care of the public aspect. The idea of sustainable development includes the pursuit of economic growth in industry and services, which in relation to e-government should be based on increasing access to services that can be carried out via the Internet. The public aspect here primarily involves improving the quality of service to the local community by providing electronic public services. Public services, through their specificity, influence subsystems of sustainable

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development, i.e. economy, society and the environment. The essence of administration is to a large extent based on satisfying the numerous and changing needs of citizens, which most often occurs through the provision of public services. In the presented service approach, an important element of standardization is the creation of a coherent architecture of administration systems that allows for efficient carrying out of electronic services. Standardization of procedures related to the process of providing services makes the office more transparent and thus more citizen-friendly. Therefore, it is important to create an efficient, effective, operational and open system architecture, which already at the software development stage must be focused on carrying out public services. Satisfying citizens' needs thus becomes important in the process of designing a new architecture of e-government services. The usability and functionality of websites of offices is a major contributor to the increase in the number of e-government users, affecting the improvement in providing public e-services. Their online availability improves the quality of life of citizens, which in turn is the essence of sustainable development of e-government and its basic determinant.

The idea of sustainable development of e-government should therefore be based on assumptions aimed at facilitating the implementation of society's needs, including access to information. The necessary condition for this implementation is the use of websites that should provide the user with content tailored to his needs in a functional and useful manner.

2 Literature review

E-government is often considered as the basis for building a strategic framework for sustainable development. One of the key functions that it fulfills is the creation of an integrated policy framework, laws and regulations as well as the development of institutions and processes that allow utilization of the benefits coming from new technologies [1]. Among the guiding activities that we are obliged to take for sustainable development, there is the use of information and communication technologies (ICT) by communities. This use should allow the obtaining of benefits related to open and transparent e-government, which should provide a wide range of services for citizens and entrepreneurs. A comprehensive approach to the computerization of public administration depends largely on the interoperability and close cooperation of all administration units. Participation in this process should be based on a sense of responsibility for the supported functionality and activities based on comprehensive and coherent organizational and legal principles [2]. Obtaining the desired shape of the information system requires the development of an appropriate cooperation model aimed at achieving a specific, measurable level of services in each field that satisfies the needs of users. In order to be able to create an administrative model properly, it is necessary to take into account the basic criterion of modern administration, which includes usability and functionality, mainly in relation to websites of offices [3]. The term "usability" is most often translated as the ability to satisfy needs, and the value in use it provides as "the acquirer's recognition of the usefulness of a given good", which depends on the rank of needs and the degree of their satisfaction [4]. From the point of view of adapting to the needs and skills of the users, it is important to have a proper website architecture that facilitates intuitive finding of information. The usability of a website to a large extent determines whether the provision of services will be efficient and errors will be minimized, so as not to discourage users or generate costs of claims and investigations. As J. Nielsen defines, the usability of websites includes every element of the user interface that can be assessed negatively in relation to an indicator such as understandability or user's subjective satisfaction [5, 6]. Thus, a website, which also applies to offices' websites, should be updated frequently and contain all necessary information that is easy to find. The quality of websites is determined by the quality model established by the ISO/IEC 9126-1:2001 standard. This model presents a set of six main characteristics: functionality, usability, reliability, efficiency, maintainability and

portability. According to the standards assumed in the research, functionality is understood as a set of attributes describing the set of functions that should be fulfilled by a given website. These include [7, 8]: (1) suitability, i.e. the ability of a website to provide a set of functions needed to carry out the user's tasks and goals; (2) accuracy/correctness of obtained results, which can be defined as the possibility of accurate delivery by the website of correct or agreed results or effects; (3) interoperability, which is treated as a website's ability to work with other ICT systems; (4) security, i.e. the website's ability to protect information and data, and no access for unauthorized users; (5) compliance with standards, norms and regulations. In turn, usability of websites is defined as a set of attributes describing the workload necessary to use a given website, software and individual assessment of such use of software by a stated or implied set of users. The following features affect it: (1) understandability, i.e. ease with which the user can see the operation of the website and conditions of its use; (2) learnability, determining the ease to master the use of a service, so that the user can quickly start certain activities; (3) operability, i.e. ease with which the user can use the software, determined by the amount of time; (4) attractiveness, understood as the degree to which the portal is attractive to the user; (5) the website's compliance with standards, conventions and legal or similar regulations relating to usability. In view of the above, the assessment of the quality of web portals is usually carried out in three dimensions [9]: (1) technical quality related to the architecture of the system; (2) ergonomic quality, related to compliance with ergonomic requirements, mainly in terms of convenience and ease of use, (3) usable quality ("usability"), which determines the degree of fulfillment of user requirements, in other words their satisfaction with its use during work.

Usability of a portal according to ISO 9241-11 presented as a component of three parts [10]: (1) effectiveness, involving users' completion of set goals; (2) efficiency, relating to the relationship between inputs and the results obtained in relation to the completeness and accuracy with which the user achieves given goals; (3) satisfaction, which involves a positive attitude to the use of the product, satisfaction felt by users as a result of using an IT product. J. Nielesen also defines the criteria influencing further functionalities [5, 8, 10, 11, 12]: (1) *learnability*, defining the ease to master the use, so that the user can quickly start certain activities; (2) *memorability*, defining the ease to remember, so that the ordinary user is able to return to the system, after a break in using it, without having to learn everything from scratch; (3) error rate - saying that the system should have a low error rate.

To sum up, the elements of the assessment of websites usually include the following [13-15]: (1) ease of use - related to the ease of navigation and complexity of portals, particularly important in the case of websites that allow electronic transactions, as well as when used by people with disabilities; (2) speed of use - mainly related to the speed of information retrieval and ease of filling in forms; (3) suitability - relating to the adequacy of the website to the task, as well as comprehensiveness from the point of view of the user's ability to achieve the goal; (4) accessibility - which means the ease of access to all website functions, mostly to full information, (5) integrity - it concerns the consistency of elements on individual pages of a website, as well as compliance with standards, which is even more difficult with websites that gather several different services in one place, (6) aesthetics - involving visual attractiveness. These characteristics also include: error tolerance, comprehensibility of the presented content, usefulness of published materials, ease to learn to use a given website, self-describability, which involves, among others, the possibility of referring to sites containing the necessary explanations.

Meeting both the functional and aesthetic requirements in terms of the quality of websites is conditioned by the recognition of users' expectations [16]. It should be taken into account, after C. Menager, that the various needs of users can give these requirements a subjective character.

3 Research methodology

The subject matter of the research was the content of websites of individual offices of the communes of the West Pomeranian Voivodeship, which was analyzed in terms of their usability and functionality, according to the criteria set out above. These communes do not diverge from the general population as regards the investigated attributes. Based on the statistical formulas used in sample selection, the significance level was calculated for the sample size obtained at the level of 46 communes according to the Formula (1) for the sample size with the finite population [17]:

$$n = \frac{N}{1 + \frac{e^2(N-1)}{Z_\propto^2 pq}} \tag{1}$$

where:
- n - sample size
- p - estimated proportion in the population (percentage share of the phenomenon in the general population) (P=50%)
- e - acceptable estimation error
- N - size of the investigated population
- $Z_\propto$ - value resulting from the assumed significance level, read from tables of normal distribution at a fixed α
- Q = 1-p

With the obtained sample size at the level of 46 communes, based on the presented formula, it can be assumed that the sample corresponds to the entire investigated population and the obtained test results are subject to error of 10% at the significance level of 0.08.

The research covered the functioning of websites in the task plane. The subject matter of the research was primarily self-government e-services (possible to be implemented even at the lowest local level, i.e. in rural communes) Therefore, the content of the websites of the offices was analyzed in multi-faceted way, focusing only on the basic issues of tailoring the offices' websites to serving local communities, such as their accessibility for disabled people, the presence of links from the main websites to those of BIP (Public Information Bulletin) or ePUAP (Electronic Platform of Public Administration Services), language versions offered, adaptation to be used on mobile devices or the possibility of electronic contact. Therefore, the issues concerning, among others, availability of information related to everyday life, promotion of communes, searching for information on cultural events, publishing commune's strategy or commune's investment plans were omitted.

The performed examination of the evaluation of the offices' websites was based on criteria that take into account, among others: (1) substantive content (basic information, such as local authorities' contact details, e-mail address); (2) technical quality, related to the architecture of the system (the case study method was used for this purpose); (3) ergonomic quality, associated with convenience and ease of use; (4) usability, specifying the degree to which users' requirements are met in terms of accessibility and adaptation to the needs of, among others, people with disabilities.

4 Empirical results

In the West Pomeranian Voivodeship, all but one of the analyzed communes (the Biesiekierz commune) had their own website. For comparison, according to the data of the "Cities on the Internet" Association, in 2002 56% of such communes in the voivodeship did not have their websites, which then placed the voivodeship in fifth place in terms of having them among all voivodeships in Poland [18]. The Biesiekierz commune, which does not have its own website,

however, uses the resources of the BIP (Public Information Bulletin) website, which it has tailored to and adapted for its own needs. The advantage of this solution is the elimination of the problem related to the duplication of a lot of content. What happens is that when it is necessary to use several websites, searching for information is significantly difficult. It is necessary to search at least two websites simultaneously. All this causes that the process of reaching the information needed is extended, often coupled with its not clear presentation.

When assessing the usability of the offices' websites in terms of availability, their information content regarding the presence of email contact details of local authorities was taken into account. The widespread development of the Internet has generated the possibility of changing relations in the communes' contact with citizens, allowing easier access to information and establishing contact, thus improving information services. Information services, in the case of commune offices, should provide communities with access to basic information, such as contact details or information on how to handle official matters. Despite the progressing process of computerization of offices, the share of communes providing an e-mail address to the commune authorities is still relatively small. Only 60% of communes offered this form of contact with the authorities by providing an email address to the commune authorities, which in the era of widespread use of the Internet should be considered unsatisfactory. The lowest share in terms of providing a personal e-mail address to the commune authorities on their own website is seen in rural communes. Only 8% of these communes do this, the others most often provide an e-mail address to the commune office help desk, without providing a personal e-mail address of the authorities. The share in other communes was on average 26%. Comparing this data with the results of people using the Internet to communicate with the office, it can be assumed that the interest exists and together with the society being generally accustomed to this type of communication, participation also in this case in the subsequent years will grow.

Although communes use websites widely, this does not mean that they are fully functional. The lack of any guidelines regarding the appearance and content of websites prepared for communes may be considered a factor causing this state of affairs. The usability of offices' websites is primarily determined by the ease of use, which is particularly important when tailoring websites to the requirements of people with disabilities (hearing impaired, visually impaired), thus meeting the Web Content Accessibility Guidelines WCAG 2.0 recommendations [19]. As shown in the research, on average 38% of offices had at least one of the facilities for the disabled. In the vast majority of communes, facilities for the visually impaired (49%) were more frequent than the those for the hearing impaired, whose presence in all the surveyed offices was 27 per cent. Among communes with websites adapted for the visually impaired, in 54% of them use this function only appeared on the BIP website. Facilities on websites for the hearing-impaired are generally fewer. 26% of all surveyed offices had such a function, in 28% of which such an option appeared only on the BIP website. Urban-rural communes provide the highest accessibility to information contained on websites for the disabled, where 21% of communes have adjusted their websites for the visually impaired and almost half of this number (11%) made them available to the hearing impaired. The least frequently provided access in this area was observed in rural communes.

Another aspect affecting usability of websites is making them available in different language versions. In the investigated communes of the West Pomeranian Voivodeship, 39% of communes had a language version other than the Polish one. The overall level of multilingual website support in the West Pomeranian Voivodeship is relatively low. Usually, however, websites of self-government bodies in Poland are characterized by a small range of available data in foreign languages. Most communes in the West Pomeranian Voivodeship have webpages in the English language version (39% of the investigated communes) and only one per cent less of the same communes also have a German version. A relatively high result of translations into German compared to national results can be conditioned by the

location of the voivodeship, which borders Germany. It should be noted that a language version other than Polish is not available on the website of the office of the city of Szczecin (www.szczecin.pl), which is the capital of the voivodeship. Translations into English and German are only present when we enter the website considered to be the official portal of the city of Szczecin (www.szczecin.eu), containing mainly a promotional, tourist and investment offer. A good example is provided by the practice of solutions of some of communes, such as Darłowo, Szczecinek or Goleniów, which use the function offered by Google Translate in their translation, thanks to which they provide various language versions. Despite the undisputed, yet still not very high quality of these translations, it is a chance for many communes to make such translations at a low cost. The first two communes use this function for language versions other than English, which can be considered quite a good solution at this stage of implementation. Similar to the case of adapting websites to the needs of people with disabilities, websites of urban-rural and urban communes perform better compared to rural communes in terms of multilingual support. The satisfaction from using these websites largely depends on their usability. Offices should, therefore, eliminate errors appearing on websites. In the case of the investigated websites, the inconvenience was the lack of results often appearing when using the search option, i.e. lack of information on the request even though the searched issue was available on the website at the so-called manual search.
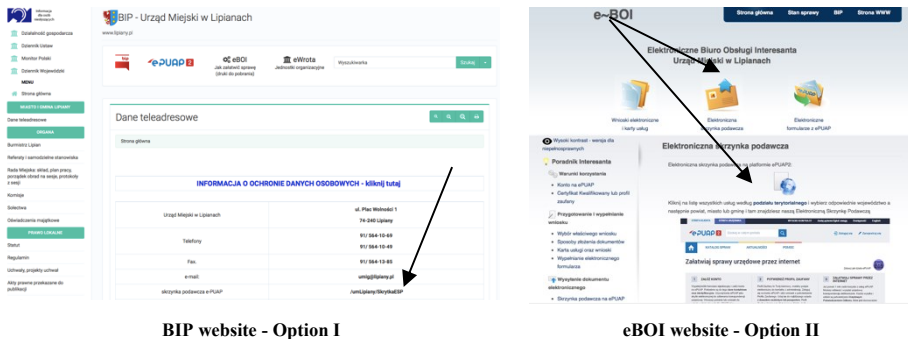

BIP website - Option I   eBOI website - Option II

Fig. 1. Information about ESP – Options I and II.
Source: http://bip.lipiany.pl/esp; http://eboi.lipiany.pl/skrzynka.

The main problem, as research shows, was the fact that the functioning of the office on the Internet is based on at least two separate websites, usually compatible with each other only to a small extent. In the majority of offices, their own websites and the BIP website are separate IT systems, which causes difficulties in using them, both for offices that have to ensure that the information posted on different websites is not contradictory, as well as for the community, because the use of such solutions often results in the necessity of searching separately through all the websites of the office (primarily the office's own website, the BIP website, the ePUAP website, or, as in the case of the West Pomeranian Voivodeship, the eBOI website - the Electronic Office for Services for Citizens) In view of the above, analyzing the researched websites in terms of information resources and adapting them to the user's needs, it was verified whether they had links from their home page (commune's own website) to BIP, ePUAP, eBOI websites and whether they included information about ESP, i.e. electronic inbox. All investigated communes had a link from their websites to the BIP website. For the other websites, the results were definitely worse. Information about ePUAP, if it appeared at all, was most often placed only on the BIP website, but there are cases where the link to the page was available on the home page, however this happened only in 15% of cases. Better results were obtained when taking into account the number of links already posted on the BIP website. There, 38% of the surveyed offices published information about

ePUAP and 25% about eBOI, and additionally 45% also provided a link from the BIP home page to the electronic inbox (ESP) Often, information about the ESP is difficult to find on the websites of offices. In the case of the commune of Lipiany, the link to the ESP only appears when one enters the BIP website from the home page, (Option I, Fig. 1.)

Other, more clear information about ESP appears when we enter the eBOI website from the aforementioned BIP website (or shorter, entering the eBOI website immediately from the home page) and there is a link to ESP, which finally refers to ePUAP (Option II, Figure 2) The path will be shortened if one logs into ePUAP right away, where the authorities have been obliged to create the ESP. However, the problem lies primarily in the constant lack of public awareness in this area. Thus, the lack of promotion of information about where to look for ESP and the lack of standardization means that the path to finding it is significantly longer. However, this does not change the fact that ergonomics is not very applicable in this case and often discourages potential users, and, as results from the research by T. K. Huang and F. L. Fu, a "clumsy" interface may discourage the user, resulting in interruption of carrying out electronic services [20]. Quite a low level of convenient posting of information about ESP on the websites of offices can be surprising, especially in the face of the amendment to the Act on the activities of entities performing public tasks, which makes proceeding with official matters electronically dependent on contact through it. This aspect can be considered as limiting the quality of the websites of offices.

A change in the commonly used logotype may be considered another limitation in terms of usability. An example here is the commune of Chojna, where the BIP logo was changed (Fig. 2.)

Fig. 2. Changed logotype of BIP.
Source: http://www.chojna.pl.

Despite the rich graphic design, due to the lack of standardization, it may take longer to find and reach the desired page. Therefore, usability, which can be measured on the basis of access to particular information, the method of navigation, the amount of time required to perform specific functions [6], is reduced. A website should contain all the necessary information that is easy to find and consistent, regardless of how many sub-pages it links to, keeping in mind the principles of ergonomics. For example, in the Banie commune different forms concerning the same official matter were posted on different websites (BIP and eBOI) used by the office. Information on how to proceed with the matter is also described in a more or less comprehensive way depending on the website. Even if both of them are legally binding, this does not change the fact that usability of such a site is reduced, and the client seeking information through such activities may feel confused.

As M. Pańkowska and H. Sroka put it, "creating a new type of highly efficient, integrated, open, customer-oriented organizations requires efficient, integrated, open, customer-oriented technologies" [21]. Therefore, the constant growth of the number of mobile Internet users and predictions as to its development and importance in the future oblige the offices to adapt their websites to the requirements of mobile devices (such as smartphones, tablets) In the

West Pomeranian Voivodeship only 17% of offices admitted by means of a questionnaire that their website was adapted to be used by this type of devices, and another 7% admitted that they would make efforts in this respect and that such adjustment would take place during the year. Due to the growing importance of the mobile Internet, the website's adaptation to be used on mobile devices may be a feature that will have an impact on the customer's sense of satisfaction from using the website. It is also commonly accepted that currently social networking sites are the most intensively developing area of the Internet and a significant number of users of these websites point to their increasing social role.

Offices' websites should be user-friendly, regardless of their knowledge or skills. The navigation interface should be simple and should not raise objections as to the content posted on the webpages. An example of erroneous provision of information is the eBOI website of the Pełczyce commune, where information about the modes of submitting documents as well as the method of their collection is accompanied with information indicating that the selected document cannot be submitted using any of the mentioned channels. This situation is illustrated in Fig. 3.

Fig. 3. Erroneous information on how to submit documents.
Source: http://eboi.pelczyce.pl.

According to the Ministry of Administration and Digitization (MAC) report, the ease of finding information on the websites of the offices in the West Pomeranian Voivodeship was identified in 2013 at 60% [22]. The errors resulting from improper website architecture and the offices' using several websites at the same time may be responsible for the low score. This often causes the users feeling lost when faced with the abundance of information and searching for the necessary forms and disrupts its development. An example of this is the website of the commune of Dobra Szczecińska. On the website of this commune, a user who wants to proceed with an official matter, by searching for forms on the commune's website that are of interest to him may select the tab "Electronic Customer Service Office", where, after clicking this tab, the "Service Catalogue" page appears together with a collection of downloadable services. If, however, using the BIP's website, he enters the "Information" tab, and then selects the "How to proceed with the matter - APPLICATION FORMS, FORMS" option, a list of downloadable application forms appears, unfortunately different to the one described before. The graphic layout and naming of both websites differ significantly. Such a presentation of data means that the search for information is difficult and therefore may not be very effective. Official matters that can be dealt with are available in various places and in different numbers. Such a solution undoubtedly contributes to lowering the usability of a given office website.

5 Conclusions

The improvement of the quality of life in the era of contemporary world is largely conditioned by the use of information and communication technologies, which serve to improve this communication. Therefore, by implementing solutions in the area of e-government, access to communication between the authorities and citizens becomes easier, and the result of the development of communication with the use of ICT tools should be better quality and tailoring to consumer needs, increase in work efficiency, reduced production costs, and the emergence of new products.

Usability and functionality of websites of offices can be considered, determining whether they meet the expectations of users, by satisfying specific information needs, in terms of their improving the operation of records-keeping devices in public administration offices. Sustainable development of e-government should be based on constant adaptation to changes, in order to be able to effectively respond to the needs of citizens. When introducing electronic administration systems, one should take into account those that will be cost-effective with at least satisfactory usability in order to achieve the expected level of IT services. The usability of information systems of public administration should therefore be taken into account when creating new investments, thus often conditioning the success of its further development. It is also assumed that the functionality of e-government will depend on the creation of an economic model and on objective evaluation of adherence to principles and economical IT solutions in public administration [1]. When creating information and communication systems dedicated to e-government, one should consciously manage resources, taking care of the proper architecture of the system.

The paramount characteristics of information and communication systems used in the e-government development process based on e-services should include comprehensiveness, efficiency and reliability, impossible to achieve without providing proper usability and functionality of the offices' websites. These features should occur regardless of the e-government model adopted. Some countries are moving towards a single integrated national portal, while others are developing their e-government offer based on more than one portal with thematic and/or functional integrated services, facilitating obtaining e-information separately from e-services or e-participation. In Poland, the level of adaptation of websites and their usability are diverse and it is difficult to assess them unequivocally. For the most part, due to the fact that the commune self-government uses several Internet portals, the stakeholders encounter barriers in the search for matters of interest to them that theoretically can be dealt with by each of them: the office's own website, websites of BIP, eBOI, eWrota, or ePUAP. The latter was supposed to be such a comprehensive platform, however, due to many system, technical and functional flaws as well as poor usability this system is still not very eagerly used. Offices still use several different websites. In order to increase the universality of handling official matters over the Internet and to provide other public services by electronic means, it is extremely important that all these systems are integrated with each other, their contents are coherent and their architecture should be the same for each commune (at least on BIP's website), so that they do not unnecessarily misinform. Therefore, the creation of an interoperable system, maintaining the principles of its usability and functionality, will serve to improve satisfaction with providing services to citizens, which is considered to be the driving force of sustainable development of e-government.

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