An Ergonomic Evaluation of the Adaptation of Polish Online Stores to the Needs of the Elderly

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Abstract. Recently websites have been a key intermediary in the exchange of information. The share of trade conducted based on online services transactions is also dynamically growing. Among people using online services and communicating this way, are now also the elderly. These are often people whose first contact with these technologies occurred during adulthood. Many of elderly people did not use a computer in their work, and their first contact with the Internet has been during their retirement. In conclusion, the currently operating focus in Poland on young online shoppers is faulty. With the increasing proportion of elderly people in Polish society and the dissemination of computer technology among them, the need for senior-friendly online stores will grow. The choice of this form of purchase will be decided by convenience, price, range of goods and delivery terms. However, the ultimate determinants of whether elderly users will enjoy the benefits of online shopping are the ergonomic features of services, particularly criteria such as: security, ease of use, rule transparency and ascetic aesthetics.

Keywords: elderly design, ergonomic evolution, usability, online shops for seniors.

1 Introduction

Internet technologies, though initially inaccessible, have become almost universally good. They ceased to be a domain of the young and modern users and have become an obligatory tool. This change led to broad consequences. Internet resources must give the opportunity to be used by groups with different levels of experience and perception, including the elderly. The similar situation is characteristic to online shops, whose more and more customers are so called the early. In Poland today, according to date from the National Census in 2011, nearly 35% of the population has exceeded the age of 50 years (34.89%) [18]. It is expected that due to the aging process, this percentage of the population will increase, so that even greater number of potential customers will be elderly. The increase in older online shoppers will involve decreasing motor

C. Stephanidis and M. Antona (Eds.): UAHCI/HCII 2014, Part IV, LNCS 8516, pp. 26–36, 2014.

abilities of these people. The above-mentioned factors cause a greater demand for solutions with the appropriate level of ergonomic quality [4], and the solutions of this type will be required in every manifestation of human activity [12].

However, the problems of the elderly connected with the use of online shops constitute a complex methodical problem. This is due the fact that they constitute a combination of weakening physiological function - such as the weakening ability to see close objects - which starts after the completion of 40-45 years of age [16, p 121] and psychological determinants - aversion to the unknown solutions. For that reason, it is impossible to be certain whether older people do not use modern technologies just because they are too modern for their cognitive system, or simply they do not have the need, habit, or what is most essential, have not been "infected" by the computer skills because they were born much longer time ago. The identified problems of the elderly connected with the use of modern technology have been combined with the usability, in order to diagnose the interfering and assisting factors for the elderly people in the use of online shops. The aim of the article is to present the study on the characteristics of online shops as well as their adaptation to the needs of the elderly in Poland.

2 Literature Review

Among the many publications on internet websites for elderly people, there are only a few that describe problems of the elderly with the use of online stores [10]. In addition to the small spread of this form of shopping among the elderly, the reason for this could be methodological problems - behavioral differences in terms of the behavior of older and younger customers are of a cohortative nature [17].

Among the identified problems connected with web technologies of older, the most common ones are problems with finding broken links, viewing graphics, searching for new information and re-visiting previously used pages. [14, p 375]. However, a significant factor which increases the difficulty of their operations and extends the time for their implementation is the disorganized site, with a large number of links, different colors and placement of navigation elements in unexpected places (especially at the bottom of the page) [14, p 396].

The rules concerning ergonomic websites design for elderly people are included in many guides [3]: SPRY, 1999 - Older Adults and the World Wide Web: a Guide for Web Site Creators [9], AgeLight, 2001 - Interface design guidelines for users of all ages [2], NIA / NLM, 2002 - Making your Web site senior friendly - A checklist [15], Coyne & Nielsen, 2002 - Web usability for senior citizens [5], de Sales & de Abrew Cybis, 2003 - Development of a checklist for the evaluation of the web accessibility for the aged users [6], AARP, 2004 - Designing Web Sites for older adults: heuristics [1], Fidgeon, 2006 - Usability for older web users [7]. They were used to build a model of the criteria described in the next part of the publication.

3 Research Method

This method is based on a multi-level set of criteria. It was assumed that performance quality of an evaluated site has a three-level hierarchical structure (Figure 1) comprising a primary criterion, the group criteria and elementary criteria (detailed). Overriding the primary criterion results from meeting the criteria formed by the group of appropriate elementary criteria. This ensures the logical clarity and relational correctness of the model on the levels of the adopted structure. This method has already been applied in other studies of Web pages [8].

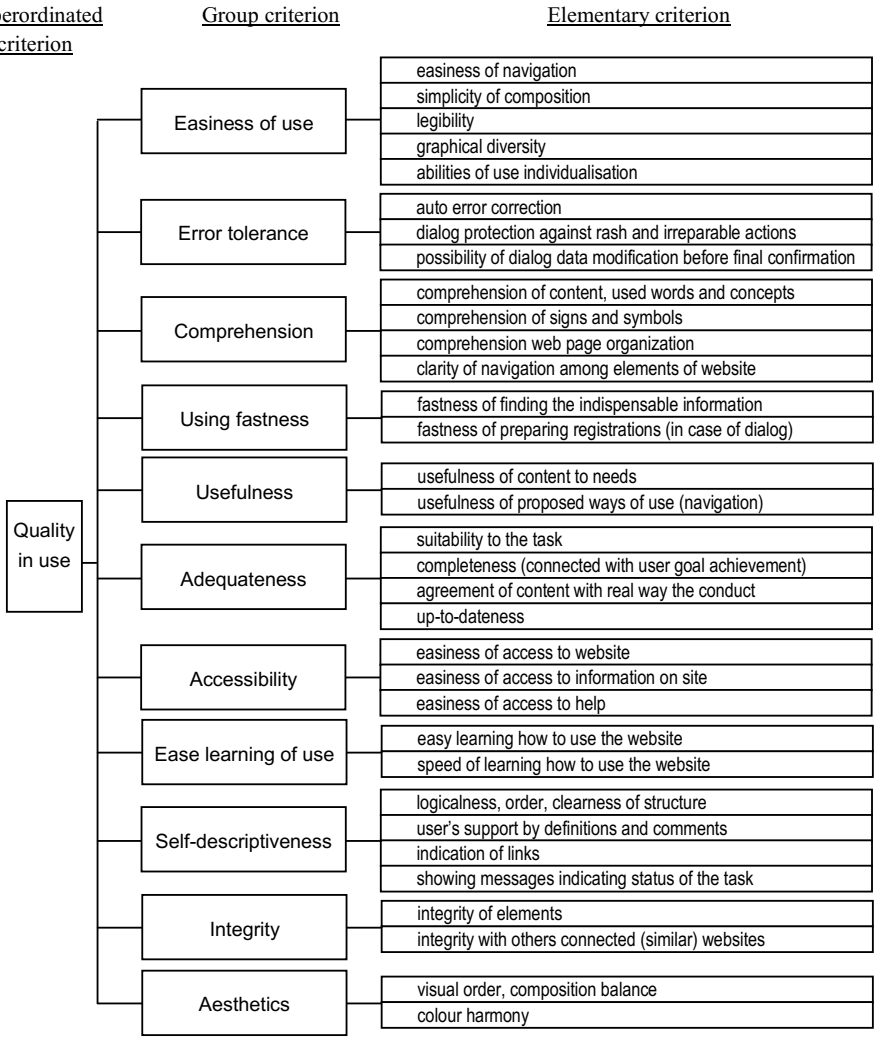

Fig. 1. The hierarchical quality model for use of WWW [8]

The process of the research was directed to identify the features which, according to the users, pose problems when using the web pages by the elderly.

The analysis of preferences, priorities and level of satisfaction with the usefulness of particular criteria was performed using a self-completion questionnaire.

The process of subjective quality assessment consisted of three steps:

1. establishing a set of criteria: Group evaluation criteria resulting from the general adaptation of the utility structure shown in ISO 9241-10 [11],
2. preparation of assessment: transforming a set of criteria into a list of questions about the degree of users satisfaction with the fulfillment of the criterion;
3. making an assessment using a hierarchical model:
   (a) determining preferences of the users, which consists of indicating the significance of a group functional characteristics using an ordinal scale,
   (b) an assessment of the widely understood usefulness by means of a verbal scale.

This course of study was due to the adopted hypothesis that the fulfillment or non-fulfillment of the needs and expectations of the users decide on the satisfaction of the operated website.

The structure of the questionnaire was divided in two parts. The aim of the first part of the questionnaire was to identify the priorities of users in relation to the validity of group characteristics forming a hierarchical model of functional quality. The aim of the second part was to assess the level of users satisfaction with meeting particular elementary criteria.

Satisfaction (dissatisfaction) was evaluated on the basis of responses to closed questions about satisfaction with the degree of meeting the criterion. Verbal scale was used to make an assessment: yes / rather yes / rather no / no. In case of difficulty to indicate the evaluation, a respondent had a choice of 'do not know'.

4 Object of Research – The Evaluated Aspects and Their Users

It was noted that the needs of elderly people concern mainly products of everyday use. That is why, stores got limited to offer only such products. The choice was related to the fact that these types of stores operate locally, ie even nationwide stores have their logistics centers in larger cities. Only in this way can they ensure the delivery at the acceptable time to the customer, freshness of foods with a short shelf life and transport parameters associated with the delivery of frozen products. It turned out that some elderly people, until they are able to go shopping on their own or someone close to them can do it, avoid using e-shops. These concerns arise from the lack of trust to such shops and the lack of ability to look closely at the goods. For this reason, after a preliminary analysis of the available suppliers in a given area, a renowned service was chosen.

Purchasing service was given an assessment. Its main functions were:

- to present the product range,
- the purchase of selected goods while ensuring their delivery to the indicated address in the selected period,
- the purchase of goods based on registered lists of shopping - repeatability of a fixed set of products without the necessity to select them again,
- choice of payment method and its service in the case of payment by bank transfer or credit card prepayment,
- reviewing past purchases and creating shopping lists based on them.

Users of the site can be either regular customers or occasional ones. Forcing them to register by entering e-mail address and password assigned is likely to encourage them to use the service more often, as it significantly reduces the amount of data that is necessary to enter. Creating an account allows to view previously made purchases and even to repurchase the same products.

The research users were elderly people aged over 70 and comparatively younger people aged 20-25. The users were asked to trace the shop's offer and the possibility of purchasing the selected goods.

It was assumed that the study would be preliminary. The research sample was limited to 10 persons, in accordance with the assumptions developed by Steve Krug [13, p 138].

5 Results

Table 1 presents the results of validity assessment of the group criteria in hierarchical model, specified by the studied group of elderly people, and a Table 2 indicates a reference group made up of younger people.

Table 1. Assessment results of the validity of group criteria by older persons

Characteristics of functional quality	Evaluation [%]				
	Very important	Important	Of little importance	Not important	Do not know
Easiness of use	**40%**	**40%**	0%	0%	20%
Comprehension	25%	**75%**	0%	0%	0%
Using fastness	33%	**67%**	0%	0%	0%
Usefulness	33%	**34%**	33%	0%	0%
Adequateness	33%	**67%**	0%	0%	0%
Ease learning of use	0%	**67%**	0%	0%	33%
Accessibility	**50%**	**50%**	0%	0%	0%
Self-descriptiveness	17%	**25%**	**25%**	8%	**25%**
Integrity	0%	**100%**	0%	0%	0%
Aesthetics	0%	**67%**	17%	0%	16%

Table 2. Assessment results of the validity of group criteria by younger people

Characteristics of functional quality	Evaluation [%]				
	Very important	Important	Of little importance	Not important	Do not know
Easiness of use	**43%**	26%	23%	8%	0%
Comprehension	42%	**54%**	4%	0%	0%
Using fastness	**57%**	29%	0%	14%	0%
Usefulness	43%	**57%**	0%	0%	0%
Adequateness	**71%**	29%	0%	0%	0%
Ease learning of use	14%	**71%**	15%	0%	0%
Accessibility	36%	**50%**	7%	7%	0%
Self-descriptiveness	18%	**36%**	25%	21%	0%
Integrity	0%	**86%**	14%	0%	0%
Aesthetics	14%	36%	**50%**	0%	0%

The satisfaction of service users with regard to group criteria was specified on the basis of particular assessments of elementary criteria. The results obtained for the elderly and a comparative group of younger individuals respectively was shown in Table 3 and 4.

Table 3. Assessment results relating to satisfaction of service use by older persons

Characteristics of functional quality	Evaluation [%]				
	Yes	Rather yes	Rather no	No	Hard to say
Easiness of use	**33%**	27%	20%	7%	13%
Comprehension	**75%**	25%	0%	0%	0%
Using fastness	33%	**67%**	0%	0%	0%
Usefulness	33%	**67%**	0%	0%	0%
Adequateness	**67%**	33%	0%	0%	0%
Ease learning of use	**67%**	0%	0%	0%	33%
Accessibility	**33%**	**33%**	17%	17%	0%
Self-descriptiveness	0%	25%	8%	0%	**67%**
Integrity	**67%**	33%	0%	0%	0%
Aesthetics	17%	**67%**	0%	0%	17%

The comparison of distribution of positive verbal evaluations ("Yes" and "Rather yes" collectively) is shown in Fig. 2. In order to show precisely the details of the assessment, Fig. 3 contains only "Yes" answers and a Fig. 4 contains "Rather yes" answers.

Table 4. Assessment results relating to satisfaction of service use by younger people

Characteristics of functional quality	Evaluation [%]				
	Yes	Rather yes	Rather no	No	Hard to say
Easiness of use	**46%**	31%	9%	14%	0%
Comprehension	**57%**	32%	11%	0%	0%
Using fastness	**57%**	29%	0%	14%	0%
Usefulness	43%	**57%**	0%	0%	0%
Adequateness	**71%**	14%	14%	0%	0%
Ease learning of use	**57%**	29%	14%	0%	0%
Accessibility	36%	**57%**	7%	0%	0%
Self-descriptiveness	36%	**39%**	11%	11%	4%
Integrity	29%	**71%**	0%	0%	0%
Aesthetics	**64%**	36%	0%	0%	0%

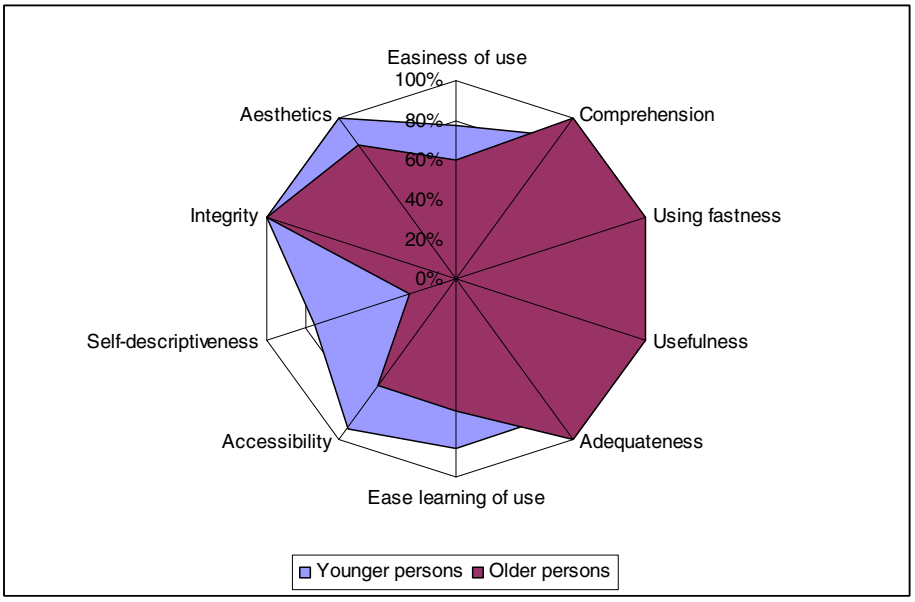

Fig. 2. Comparison of the verbal assessments "Yes" and "Rather yes" collectively

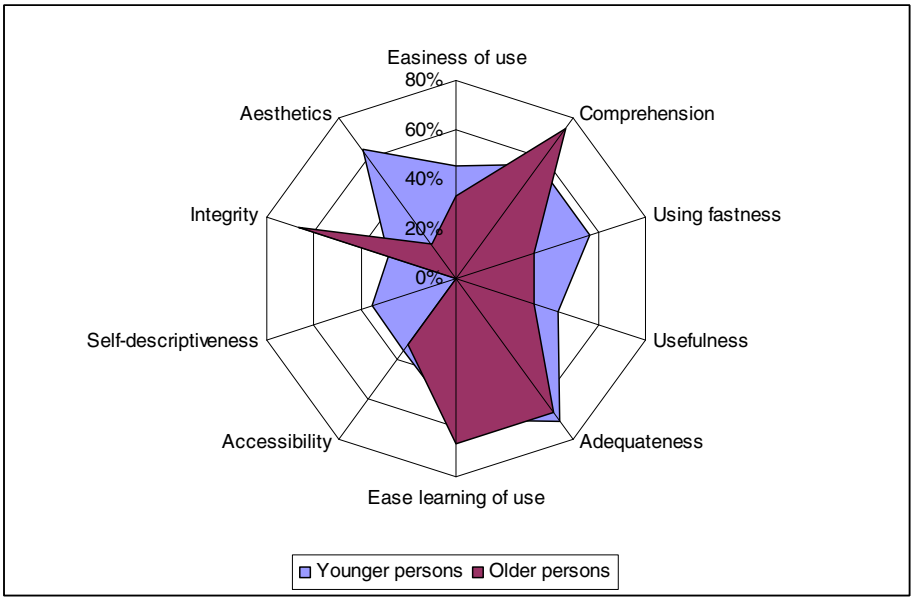

Fig. 3. Comparison of the verbal assessments "Yes"

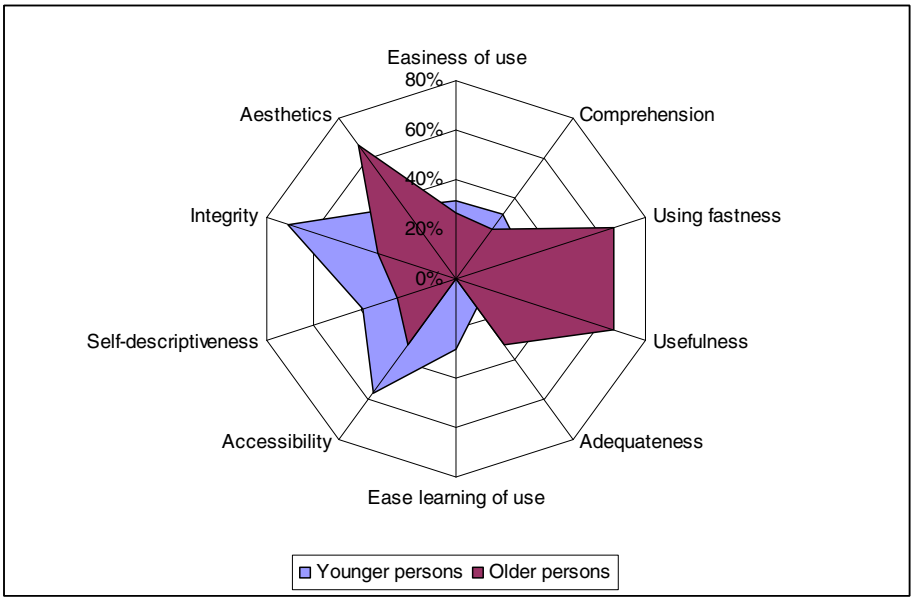

Fig. 4. Comparison of the verbal assessments "Rather yes"

6 Conclusion

On the basis of the presented results describing the assessment of validity of group criteria, it can be concluded that they oscillate around similar values, although obtained maxims differ slightly. For example, the criteria Using fastness and Adequateness are of greater importance for younger people, while Integrity and Aesthetics seem to be paramount for older people. When assessing validity, an important signal are "I don't know" answers of the elderly and they appear in three categories. Although each of the question was individually clarified if necessary, the category of Self-descriptiveness obtained especially high values, as much as 67%. Therefore, it can be concluded that the questions in this category should be very elementary and practical for this users group.

The obtained results demonstrate the satisfaction of users with the functional quality of service. Although the service that was qualified for research was initially rated as very good, it came as a surprise that 100% of positive ratings in five categories were given by older people. These were *Comprehension*, *Using fastness*, *Usefulness*, *Adequateness* and *Integrity*. In the case of younger people, three categories of *Usefulness*, *Integrity* and *Aesthetics* were the most significant. This situation, although the differences are small, may suggest higher expectations of younger users. On the other hand, older people, who are less likely to use the Internet, could have a different point of reference when it comes to previously visited pages, and online shops in particular.

It can be generally assumed that functionality assessment of a given group was successful from the point of view of the elderly. Aspects that still remain to be thought over are the ones related to the lower efficiency of elderly people and their smaller experience in using the Internet. Special attention should also be paid to the subjects' comments and observations of the people conducting the study.

Despite manifold positive solutions, it is worthwhile to point out those which are troublesome for the elderly and need to be resolved. The first analyzed case puts at the forefront the problem of the size of some interface elements. For example, graphic elements that are used to change the number of a product item turned out to be too small. This requires great precision and good eyesight from the users to notice it. Another inconvenience is the basket's symbol which seems is too small and is used for accepting the purchase of a given product. There is also a possibility to drag the item's picture above the basket, however, for the items which appear at the end of the page, it may require scrolling a screen.

Another difficulty seems to be the division into categories and subcategories of the products. It is quite understandable from the products size point of view, though for some people, it can be a little confusing. The user could abandon this procedure and use products search engine. Unfortunately, search results of the staple products encompass even hundreds of items. It may occur that most of the results do not have any connection with the product name in the search engine.

The next inconvenience for the elderly was an introduction of indispensable data of the orderer. While entering the name and address was understandable, inasmuch giving an e-mail address and a password not. It was impossible to skip it and it was not

adequately explained. It can be assumed that those who do not use an e-mail will need to quit shopping.

In contrast, payment options in the analyzed case seem to be quite exemplary. For example, card payment terminals carried by a courier delivering purchases give an opportunity of not preparing cash and enables elderly people to make bank transfers.

Finally, it should be noted that the technology of online stores, apart from the natural psychological resistance of older users, did not constitute a significant barrier and after appropriate adjustments the elderly can successfully take advantage of the benefits of trading via the Internet. However, using Internet technologies needs to be performed with caution so that it will not be a way for the alienation of the elderly from the rest of society.

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