

Study of Software Systems Usability Used for Customers Loyalty Identification

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Abstract. On the background of software (SW) increase in quantity and complexity and SW versions change, a friendly interface allows enhancing SW competitiveness, reduction in SW development costs, increase in SW users number and users satisfaction, as well as reduction in costs needed for users training and support. The product using which users achieve the goals set and solve various issues in an efficient way, is deemed to be a user-friendly software product. The purpose of the article is to study existing methods for assessing the application usability and analyzing the features of using the main software usability indicators on the example of software for customer loyalty of 'Infotech' consumer society.

Keywords: Software, Usability, Program Interface, CRM-system, Loyalty, Customer Database, Segmentation, RFM Method, Forms, SUS Form, Usability Testing, Main Factors Of SW Usability.

1 Introduction

On the background of software (SW) increase in quantity and complexity and SW versions change, a friendly interface allows enhancing SW competitiveness, reduction in SW development costs, increase in SW users number and users satisfaction, as well as reduction in costs needed for users training and support. The product using which users achieve the goals set and solve various issues in an efficient way, is deemed to be a user-friendly software product.

The study of SW usability acquires particular relevance when designing and applying customer loyalty identification systems, which, due to the features of their intended use usually have a very awkward interface: a large amount of data; entering output data for calculating customer loyalty and generalization of data received via tables, diagrams, charts, etc. The need to collect and analyze respondents' answers, work with a large number of judgments and statements, the probability of error in the calculation of loyalty indices, and a complicated mechanism for comparing the study results which complicates the design and development of the relevant software, are

characteristic of various of loyalty assessment methods.

The purpose of the article is to study existing methods for assessing the application usability and analyzing the features of using the main software usability indicators on the example of software for customer loyalty of 'Infotech' consumer society.

2 Recent research and publications analysis

The term of CRM (Customer Relationship Management System) denotes the system for customers relations management. This approach means that when dealing with a customer, the company employee has access to all the necessary information about the relationships with a particular customer and the decision is taken based on this information [1]. Specialists highlight a number of disadvantages of their use or hidden threats in the scientific literature and analysis of CRM-systems practical use. They distinguish three main reasons for the failure of CRM-systems introduction:

- technological reasons (difficulties in ensuring the security of customer's personal data; data export and data exchange with other software failures; long-term development process);
- functional reasons (unfriendly to use for specific tasks; too many functions of redundant nature; unreadiness of staff to encounter technical difficulties in the system introduction);
- organizational reasons (low tolerance on the part of the staff due to the lack of awareness of the benefits; the lack of staff desire to use all available tools; the need of staff and management instruction) [2, 3, 4].

The CRM system helps to optimize and expand customer interaction, while accumulating information about their purchases and interests. This allows further formation more personalized propositions for each particular buyer, which increases the chance of purchasing and tracks customers loyalty features.

The term of *usability* denotes friendliness of use. This is a combination of software features to ensure a predictable users range that reflects its ease and adaptation to changing conditions, operation, operation stability and data preparation, the results clarity, the convenience of introducing changes to software documentation and SW [5, 6].

The software usability can be estimated using a set of characteristics.

1. Efficiency (effectiveness) – positive dynamics in solving the goals set by the user when using a program or a site.

2. Productivity – the ratio of time and resources spent on work with the program, to the efficiency of the *usability* methods used.

3. Satisfaction – users portal assessment in terms of use and solving the tasks set [7]. The users satisfaction is determined by standardized surveys.

Advantages and disadvantages of standardized surveys are given in table 1.

Table 1. Advantages and disadvantages of standardized surveys

No. seriatim	Method name	Advantages	Disadvantages
1.	ASQ: after scenario polling (3 questions)	- speed and low budget; - a questionnaire allows detection features and factors of influencing on SW usability and correction of customers retention policy in a relevant way; - to assess SW usability many respondents are employed and there are many scenarios of SW testing.	A small number of judgments
2.	NASA-TLX: NASA load index – an index of mental efforts (6 questions)	A tool for work load assessment which allows users meet requirements to the work loads for operators who work with different systems of humane-machine interface.	A small number of judgments
3.	SEQ: one simple questions (1 question)	Speed and low budget	- contains only one judgment but this is insufficient for SW usability testing; - no sense while using a questionnaire with one judgment only.
4.	SUS (usability system scale; 10 questions)	- SUS questionnaire advantage is promptness and low budget; - SUS questionnaire contains a sufficient number of judgments; - SUS questionnaire is designed for SW usability testing.	
5.	SUPR-Q (standardized survey; 8 questions)	The questionnaire measures basic aspects of web-sites (usability, reliability, loyalty and web-site appearance)	- the questionnaire allows detection of specific problems in web-site interface; - the questionnaire results are better used together with feedback on a web-site (comments on the web-site).
6.	CSUQ (a questionnaire to SW usability; 19 questions)	- CSUQ questionnaire is designed for SW usability testing; - the questionnaire contains a sufficient number of judgments and covers different elements of SW interface.	The questionnaire processing time
7.	QUIS (the questionnaire for satisfaction of interaction with a user; 24 questions)	- design or systems reorganization management; - providing managers with tools for assessment of the system perfection potential regions; providing researches with a tested tools for carrying out comparative assessments.	- the questionnaire results processing time; - a large number of questions.
8.	SUMI (a indices of SW usability use; 50 questions)	SUMI questionnaire measures users satisfaction: effectiveness; emotional reaction; ability to help; control; comprehensibility.	- the questionnaire results processing time; - a large number of questions.

3 Testing usability of customers loyalty assessment system

Testing usability of customers loyalty assessment system. Usability testing implies: test objectives and tasks determining; application environment description; generalization of data obtained; inferencing of conclusions and recommendations.

Diagram of usability test activity is given in figure 1.

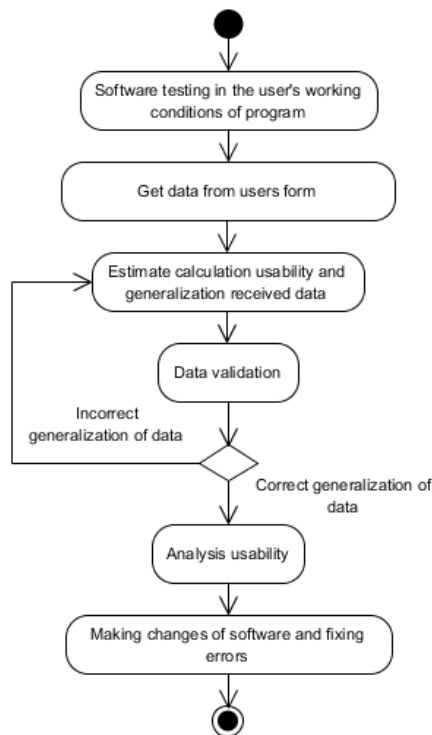


Fig. 1. Activity diagram for usability testing

Diagram of application options is given in figure 2.

The system of 'Infotech' consumer society's customer loyalty assessment is chosen as the subject of research.

Purpose and objectives of usability analysis. The software product for 'Infotech' consumer society's customer loyalty assessment shall be simple and usable. The purpose of testing is to check SW usability in predictable working conditions. The objectives of testing:

- to study application environment, to define customers needs and all persons concerned;
- to study users, define their needs;
- remove errors associated with a user's interface;
- to estimate the level of customers loyalty assessment SW usability;
- to define possible ways of customers loyalty assessment SW improvement.

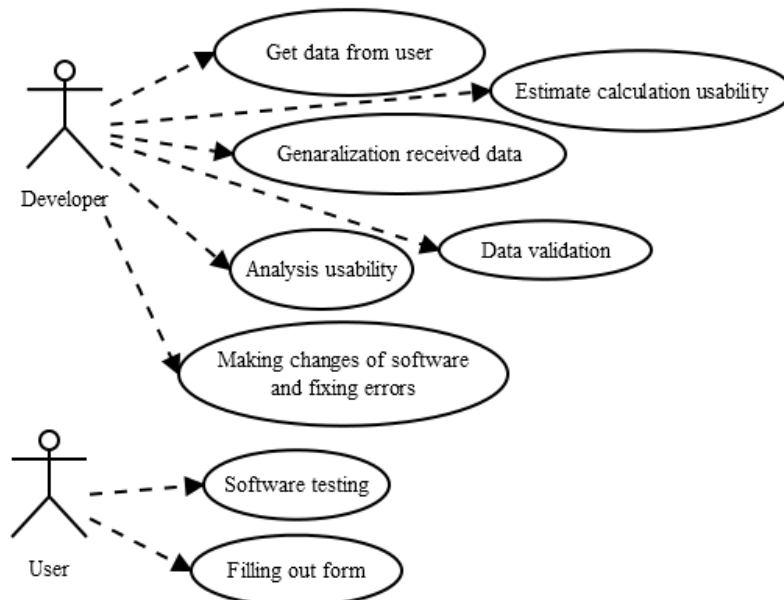


Fig. 2. Precedents diagram

Application environment description. Application environment is the activity of 'Infotech' consumer society enterprise which is associated with customers servicing. The aim of the society is to increase the number of loyal customers number which would result in profitability increase and attraction of new customers.

'Infotech' consumer society is a legal entity acting on the basis of charter [8]. Activity type: 62.03 Computer equipment management. 'Infotech' consumer society renders the following services:

- introduction and support of licensed software;
- system servicing;
- mounting, installation, servicing [9].

Software product based on RFM method use designed for the enterprise operation automation.

The program system is implemented through the Internet store site using which, the customers can order products, and loyalty assessment software application. Information about each customer's orders is stored in the database. The software application ensures automation for data processing solutions with regard to the enterprise customers loyalty.

Functional requirements for software are given below.

1. Internet store (the site servicing in the administrator panel; search by categories; review of stock line; authorization; login; choice of product; checkout).

2. Software application (authorization; calculation of customers loyalty; customer's data removal; generalization of data obtained).

3. Non-functional requirements are reliability, usability, safety, expandability.

Site is given in figure 3.

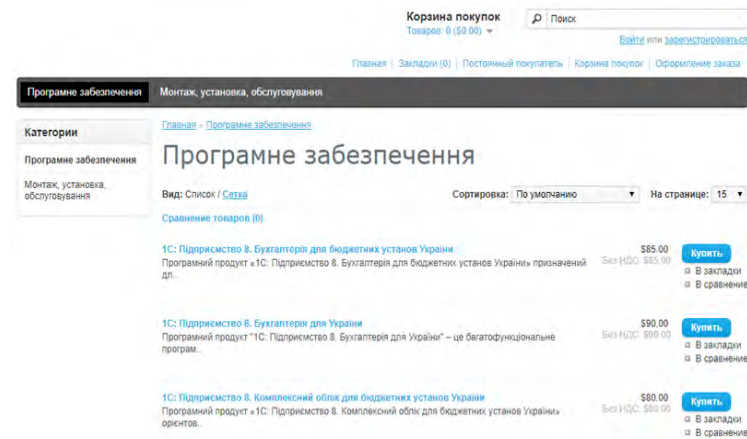


Fig. 3. Site

Software is given in figure 4.

Loyalty

Оцінка Керівництво користувача

Почати роботу Розрахувати лояльність Виділити лояльних Вибразити VIP-клієнтів

	customer_id	FIO	email	Recency	Frequency	Monetary	Баллы Recency	Баллы Frequency	Баллы Monetary
▶	1	Бондаренко Максим	max@ukr.net	45	1	3000.0000	1	4	3
	2	Андрущенко Павло	pavlo@ukr.net	41	1	1500.0000	1	4	1
	3	Тимошук Людмила	lyda@gmail.com	39	1	10000.0000	1	4	5
	4	Діденко Марина	marina@gmail.com	38	1	1000.0000	2	4	1
	5	Коваленко Микола	mikola@gmail.com	38	1	5000.0000	2	4	4
	6	Петренко Тарас	taras@gmail.com	36	1	3700.0000	2	4	3
	7	Устименко Оксана	ustimenko@gmail.com	36	1	2400.0000	2	4	2
	8	Запичний Максим	zapichnyi@gmail.com	35	1	7200.0000	2	4	4
	9	Погорелов Юрій	pogorelov@gmail.com	32	1	4100.0000	3	4	3
	10	Мартиненко Євген	martunenko@gmail.com	32	1	2700.0000	3	4	2

Fig. 4. Software

Generalization of data obtained. During SW usability testing, 15 employees of 'Infotech' consumer society were proposed to perform certain actions with SW with respect to scenarios.

SUS questionnaire was chosen for testing, since:

- SUS questionnaire advantage is promptness and low budget;
 - SUS questionnaire contains a sufficient number of judgments;
 - SUS questionnaire is designed for SW usability testing.
- SUS questionnaire was compiled after Likert scale principle. The questionnaire has five grade scale from 1 ('strongly disagree') to 5 ('strongly agree') [10].

Algorithm of SUS estimate calculation for each respondent is given below.

1. For questions with odd numbers 1 is deducted from a user's answer.
2. For questions with pair numbers 5 is deducted from a user's answer.
3. All estimates are within an interval from 0 to 4, where 4 – a positive answer.
4. The numbers obtained are summarized and multiplied by 2.5.

SUS estimate is within the interval from 0 to 100 but it should not be confused with per cents. Average is deemed to be an interface which scored 68 points (approximately 50%) and excellent one – 85 and higher. The analysis of testing results of 'Infotech' consumer society customers' loyalty software usability assessment is given in table 2.

Table 2. Analysis of usability assessment as per SUS questionnaire

Respondents	Respondent answers to 10 questions of quest.										SUS assessment
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	
worker 1	4.	1.	4.	3.	4.	1.	5.	4.	5.	1.	80.
worker 2	5.	1.	4.	3.	4.	3.	4.	5.	5.	2.	70.
worker 3	3.	1.	4.	3.	4.	2.	4.	5.	5.	1.	70.
worker 4	5.	1.	5.	2.	3.	2.	5.	5.	4.	1.	77.5.
worker 5	4.	2.	5.	3.	4.	1.	4.	4.	5.	1.	77.5.
worker 6	5.	3.	4.	1.	4.	1.	5.	4.	4.	2.	77.5.
worker 7	4.	2.	3.	3.	5.	1.	4.	5.	5.	2.	70.
worker 8	5.	2.	5.	4.	4.	2.	5.	3.	5.	3.	75.
worker 9	5.	1.	5.	4.	5.	2.	4.	5.	4.	1.	75.
worker 10	4.	2.	4.	3.	4.	2.	4.	4.	5.	3.	67.5.
worker 11	3.	3.	5.	3.	5.	2.	5.	4.	4.	4.	65.
worker 12	4.	2.	4.	5.	4.	2.	5.	5.	5.	2.	65.
worker 13	5.	2.	3.	5.	3.	1.	4.	4.	4.	3.	60.
worker 14	4.	1.	3.	5.	3.	2.	5.	4.	5.	1.	67.5.
worker 15	3.	2.	2.	4.	3.	3.	4.	5.	4.	1.	52.5.
Average value of SUS assessment											70.

4 Analysis of results obtained

In accordance with analyzed questionnaires of 'Infotech' consumer society employees, average value of SUS assessment equals to 70. The majority of respondents find the SW under study awkward to use. Additional survey detected such faults of the system:

- impossibility of reviewing data on customers orders;
- the software product user cannot create new customer groups by their loyalty level;
- absence of possibility to edit available loyalty groups (work with lists of loyal and VIP customers);
- the software product user cannot edit customers contact information;
- absence of an additional field for adding comments;
- the necessity of saving assessment results to a separate file while specifying generation date.

Some employees indicate that usability is influenced by the absence of possibility of interface customizing (change in font size and theme color). The analysis of usability testing results allows making inference on the need to improve interface of customers loyalty assessment software. Feedback with the program developer is also planned to be made in the software.

5 Conclusions

During the article preparation, the selection, processing and systematization of scientific software development literature from the perspective of its usability, was carried out. The results of the work should be considered as follows.

1. The study of the content and usability characteristic features which indicates usability, was performed.

2. It was noted that the most popular methods of data collection for users study, are questionnaires and interviews. ASQ, NASA-TLX, SEQ, SUS, SUPR-Q, CSUQ, QUIS, SUMI questionnaires are used to assess SW usability.

3. Features of SW main usability indices were analyzed. It was determined that SW usability can be assessed using a set of such characteristics as effectiveness, productivity, and satisfaction.

4. The conclusion was made that the best way to assess the SW usability is to perform usability testing in order to test the software in the intended operating conditions.

5. The usability of 'Infotech' consumer society customers loyalty assessment system was studied with the use of SUS questionnaire, which resulted in the assessment score of 70. The conclusion was made on the necessity of SW improving due to the possibility of reviewing the data on the customers orders; additional field for adding comments; possibilities of interface customization (changing font sizes and color themes), etc. The analysis of usability testing results allows making inference on the need to improve interface of customers loyalty assessment software.

References

1. Kaverina, I.: Analysis of the existing methods for customer database management to enhance competitiveness of a drug store network. Bulletin of Siberian medicine, vol. 4, 172–176 (2014).
2. Informational web site LIFE-PROG.ru. http://life-prog.ru/1_33645_preimushchestva-i-nedostatki-CRM-sistem.html.
3. Ryazantsev, A.: How to introduce CRM-system for 50 days. Omega-L Publishing House, series 1000 bestsellers (2017).
4. Kinzyabulatov, R.: CRM. In detail and to the point. Publishing solutions Publishing House (2016).
5. Isakov, O., Cherednichenko, O., Mozgin, V., Yangolenko, O.: Study of software products usability testing processes models. The National Technical University Bulletin XIII. Series: Strategic management, portfolio, programs and projects management, vol. 2 (1278), 73–80 (2018).
6. Kirilenko, O., Kuznetsova, Yu., Sokolova, E., Frolova, G.: Procedure for user interface usability testing. <http://ena.lp.edu.ua>.
7. Prokhorova, A.: The concept of site usability: design indices and standards. Economics and Law, vol. 9 (67), 87–90 (2016).
8. Official site of Ukraine Verkhovna Rada. <http://zakon3.rada.gov.ua/laws/show/436-15>.
9. Informational web site of Infotech consumer society. <https://www.ua-region.com.ua/38667722>.

10. Brooke, J.: SUS: A Retrospective. Journal of usability studies, vol. 8 (2), 29–40 (2013), <https://usabilitygeek.com/how-to-use-the-system-usability-scale-sus-to-evaluate-the-usability-of-your-website/>.