

ORIGINAL ARTICLE

Determining Reliability and Validity of the Persian Version of Software Usability Measurements Inventory (SUMI) Questionnaire

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Received June 28, 2012; Revised September 2, 2012; Accepted September 30, 2012

This paper is available on-line at <http://ijoh.tums.ac.ir>**ABSTRACT**

The term usability refers to a special index for success of an operating system. This study aimed to determine the reliability and validity of the Software Usability Measurements Inventory (SUMI) questionnaire as one of the valid and common questionnaires about usability evaluation. The back translation method was used to translate the questionnaire from English to Persian back to English. Moreover, repeatability or test-retest reliability was practically used to determine the reliability of the SUMI questionnaire. The target population of the study consisted of all personnel of the governmental organizations in the city of Tehran, Iran, from whom 29 persons participated in the study to fill out the SUMI questionnaire. The Persian version of this questionnaire is available at designer's data bases under the title of IRSUMI_31. The obtained coefficients of reliability were 0.838 in testing step and 0.722 in re-testing step, respectively. The coefficients represented a satisfactory proof for the content validity and reliability of the questionnaire. The Persian version of SUMI questionnaire is applicable for all domestic made software as a valid and applicable factor.

Keywords: Usability, Validity, Reliability, SUMI questionnaire**INTRODUCTION**

Usability is one of the key words presented in Human-Computer Interaction (HCI) discussions. The presented definition by International Standard Organization (ISO) 9241-11(1998) is the rate of effectiveness, efficiency and satisfaction out of a product by special users for finding out some special goals in special environments [1]. Usability evaluation is a process for ensuring about profitability of a product, system and /or services [2]. All evaluation methods of usability are applicable by the goal of determining any problems and optimization of a product. It is possible to evaluate any product which is usable by human being

from usability viewpoint including all aspects of a product including software, hardware, icons, messages, manuals, quick reference, benefiting from help in network and especially online help and education [2].

Questionnaire is one of the usability inquiry methods with a lot of applications in evaluation of usability [3]. SUMI standard questionnaire is one of the world valid questionnaires approved by ISO9241. In fact, the latest draft of ISO9241, Part 11 has presented SUMI as a reference [4-5]. For the first time, SUMI questionnaire was distributed in 1993 and then it was used widely in Europe and U.S.A. [4].

SUMI questionnaire is based upon Computer User Satisfaction Inventory (CUSI) and there are 50 statements in its final version with classified answers in Likert scale including (I agree, I am moderate, I

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disagree). It is possible to present three types of measurements in such questionnaire: a general evaluation, a usability profile and satisfaction analysis. Usability profile includes the five criteria of Effect, Usability, Profitability, Controlling and Learning capability [1]. This questionnaire has been applied in different studies like comparing the usability of 5 word processors at 11 different companies at Kurk of Ireland [6], comparing the usability of Hospital Information System at three wards of rehabilitation center [4] and comparing any usability of integrated development environments (IDE) [7]. The final version of this questionnaire has been translated into different languages like Italian, Spanish, French, Dutch, Greek, Swedish and English [4].

Since there is not any valid questionnaire about usability evaluation in Iran, the present study aimed to determine the reliability and validity of the Persian version of this questionnaire.

MATERIAL AND METHODS

This study was a partial evaluation including two parts for determining the reliability and validity of SUMI questionnaire. In order to specify the validity of SUMI questionnaire, the back translation method was used to translate the questionnaire from English to Persian back to English. The following steps were taken:

1. First, the SUMI questionnaire was translated from English to Persian by the researcher.
2. Comparison between the two English and Persian versions (the original and the translated versions) was conducted to examine the exactness of the translations. Two ergonomic specialists with good knowledge of English language evaluated the exactness of the translations. A general agreement was reached after making discussions about the translation of concepts, words and sentences.
3. The Persian translated questionnaire was translated back to English by a specialist in Persian to English translation without any previous familiarity with this questionnaire.
4. Then the translated questionnaire was emailed to Professor Jurek Kirakowski. The researcher was informed about any modifications resulted from the lack of accurate understanding of words or phrases from major content and/or back translation.
5. All the modifications were made in the Persian translation by the researcher and then it was translated back to English. The final content was also sent to the questionnaire designer.
6. After the repetition of steps 4 and 5 for two times, the final copy of the translated questionnaire was obtained.

The test-retest method was applied for determining the reliability of the questionnaire. Therefore, 29 persons of the personnel of a governmental organization filled out the translated questionnaire within a time interval of 19 days. Due to some ethical considerations,

there is not an approval for specifying the name of the concerned organization. All personnel of this organization are using office automation system (Paperless office) for performing their daily administrative activities. There are a lot of definitions for Paperless office. But it means any function without any relying upon paper as input and/or output. Either we mean by paper for obtaining any information (in relevant forms, application, questionnaire, contract and so on) or for transfer of information to those who are performing a process according to the relevant data and even completion of an output in the form of a report or chart [8]. At evaluation of reliability, they filled the Persian copy of SUMI questionnaire in relation with usability specifications of office automation software.

RESULTS

The designer of SUMI questionnaire approved the final version of the Persian translation and it is available right now in database of Professor Jurek Kirakowski under the title of IRSUMI_31. The obtained Chronbach's Alpha coefficients of reliability were 0.838 in testing step and 0.722 in re-testing step, respectively. Therefore, overall coefficient represented a satisfactory proof for the reliability of the questionnaire. As Table 1 shows, the intraclass correlation of all the statements at test-retest step was higher than 0.5 and the results of *P*-value show the lack of significant difference in the statements at both testing steps.

DISCUSSION

Although it is not necessary to translate all parts with complete loyalty and with regard to the concerned terms for SUMI, it is really necessary to have similar and equal systems with numeric positions. Otherwise, we should produce a separate database for any standards and all considered languages. The SUMI questionnaire is available in several languages including English, Italian, Dutch, Spanish, French, German, Greek and Swedish [4]. The translation has been analyzed to make sure that meaning change has not taken place on any of the statements. The reliability of Italian version of this questionnaire has been prepared with a similar method of back translation method [5].

Keline and Seffah (2005) reported the internal correlation Chronbach's Alpha in a scope of 0.7 to 0.9. The results of Chronbach's Alpha for reliability of the latest copy of questionnaire have a limitation from 0.71 to 0.92 [5]. The results of correlation of Chronbach's Alpha of the statements in this study have a scope of 0.431 to 0.823. Therefore, with regard to the results of Chronbach's Alpha, the reliability of its Persian version at test-retest step has been confirmed.

CONCLUSION

Designing and manufacturing of usable software is the real need of development of any thinking which is

Table 1. The results of inter-group correlation of the statements in SUMI questionnaire

No.	Question	Intraclass correlation	P Value	Confidence interval 95%	
				Upper bound	Lower bound
1	This software is low against different inputs (including data entry, clicking, pressing keyboard keys and ...)	0.644	0.004	0.833	0.243
2	I prefer to instruct this software to my colleagues.	0.539	0.022	0.784	0.019
3	There are useful manuals and messages.	0.576	0.013	0.801	0.097
4	Sometimes the software suddenly stops.	0.467	0.051	0.750	-0.136
5	Primary learning is difficult with this software.	0.642	0.004	0.832	0.238
6	When I am working with this software, sometimes I do not know what to do next.	0.762	0.000	0.888	0.494
7	I enjoy from using this software	0.491	0.040	0.761	-0.084
8	I noticed that auxiliary information presented by this software are not enough?	0.801	0.000	0.906	0.575
9	In case of hanging up of this software, it is not easy to restart it.	0.524	0.027	0.776	-0.014
10	It is necessary to apply long-terms for learning all orders of this software.	0.556	0.018	0.791	0.053
11	Sometimes I am not sure about using correct order	0.591	0.011	0.808	0.128
12	I am satisfied of this software	0.633	0.005	0.828	0.218
13	There is a clear and understandable method for displaying of information.	0.579	0.013	0.802	0.103
14	I feel more safeguard when using the orders and functions	0.605	0.008	0.814	0.158
15	Software documentation are really useful (installation method and manual)	0.619	0.006	0.821	0.189
16	It seems that this software may make some disorders in usual method of organizing of the jobs	0.489	0.041	0.760	-0.089
17	It is really excitement to work with this software	0.523	0.028	0.776	-0.017
18	There is not enough information on the screen when necessary	0.658	0.003	0.839	0.271
19	When I am using this software, I think that all things are under my own control	0.573	0.014	0.799	0.089
20	I prefer only to use relevant applications of this software with enough knowledge about them.	0.513	0.031	0.771	-0.038
21	I think there is not required integration while working with this software.	0.519	0.029	0.774	-0.024
22	I do not prefer to use this software on daily basis	0.587	0.011	0.806	0.121
23	I could understand all presented information in this software for further functions.	0.510	0.032	0.770	-0.044
24	This software is bad-job when I want to do non-standard things.	0.651	0.003	0.836	0.257
25	Before using the software it is necessary to study a great deal of topics.	0.660	0.003	0.841	0.277
26	Performing tasks by this software is easy	0.542	0.021	0.785	0.026
27	Using this software is not suitable for performing a job effectively.	0.402	0.090	0.719	-0.274
28	This software has helped me overcome any problems I had while using it	0.586	0.011	0.805	0.117
29	This software is fast enough	0.562	0.016	0.794	0.067
30	I regularly go back to look at guidelines	0.557	0.018	0.792	0.056
31	It is obvious all requirements of the user has been fully considered	0.590	0.011	0.807	0.127
32	There were times when I have become fully nervous and anxious.	0.621	0.002	0.851	0.323
33	It seems that menus organization or data lists in this software is logical	0.621	0.006	0.822	0.193
34	This software enables the user to act economically in respect of the number of keyboard hits	0.509	0.032	0.769	-0.046
35	For executing new operations, learning how to use this software is difficult	0.504	0.034	0.767	-0.056
36	When using this software too many different stages are required to do a job.	0.605	0.008	0.815	0.159
37	I think that this software sometimes puts me into trouble	0.823	0.000	0.917	0.623
38	There are not enough errors preventive messages	0.623	0.005	0.829	0.002
39	It's easy to use this software to achieve a specified goal	0.531	0.025	0.780	0.002
40	I will never learn all features that this software can offer	0.668	0.002	0.844	0.292
41	The software has not always done what I expected	0.608	0.008	0.816	0.165
42	The software's screen is very attractive	0.552	0.019	0.790	0.047

43	The quality and quantity of the supportive data in different parts of this system is varied	0.631	0.005	0.827	0.215
44	Moving from one task part to the other part is relatively easy	0.613	0.007	0.818	0.175
45	The way of working with this software is easily forgotten.	0.466	0.051	0.750	-0.136
46	Sometimes software works in a way that it isn't understandable	0.590	0.011	0.808	0.127
47	This software is hard to operate	0.541	0.022	0.785	0.023
48	It's easy to see all operations in every stage at first glance	0.565	0.016	0.796	0.074
49	It's easy to obtain data files, both in /out of system	0.651	0.003	0.836	0.257
50	When applying this system, most of the times, I have to get the assistance of another person or a book.	0.543	0.021	0.785	0.026

applicable in other electronic products. It may start from the first step which is usability evaluation. SUMI questionnaire is one of the useful and valuable tools in the field of usability evaluation. Right now the Persian version of SUMI questionnaire is available for usability evaluation of all software products.

ACKNOWLEDGEMENT

The authors declare that there is no conflict of interest.

REFERENCES

1. Fu L, Schmidt K. *Usability evaluation*. 1st ed, Taylor & Francis Co., New York, USA, 2001.
2. Nemeth, C. P. *Human factors methods for design*. CRC Press LLC; 2004.
3. Folmer E, Bosch J. Architecting for usability: a survey. *The Journal of System*. 2004. Available from: [http://www.ElsevierComputerScience.com/doi/10.1016/S0164-1212\(02\)00159-0](http://www.ElsevierComputerScience.com/doi/10.1016/S0164-1212(02)00159-0).
4. Terazzi A, Giordano A, Minuco G. How can usability measurement affect the re-engineering process of clinical software procedures? *IJMI*1998; 52 (2) 229-234.
5. Kirakowski J. The Use of Questionnaire Methods for Usability Assessment. Available from: <http://sumi.ucc.ie/sumipapp.html>. Accessed 07/12/2010.
6. McSweeney R, Nielsen J. Improving a human- computer dialogue. *Comm Acm* 1990; 33(3): 338-344.
7. Kline RB, Seffah A. Evaluation of integrated software development environments: Challenges and results from three empirical studies. *IJHCI* 2005; 63(4)607-627.
8. Walker R. White paper: achieving the paperless office. 2010; Available from: http://www.scribd.com/doc/20262773/whitepaper_achieving_the_paper_less_office. Accessed 04/18/2010.