

Reexamining Usability Dimensions: The Case of Social Media

Almed Hamzah¹, Fathul Wahid²

^{1,2}Department of Informatics, Faculty of Industrial Technology
Universitas Islam Indonesia
Yogyakarta, Indonesia

¹almed.hamzah@uii.ac.id, ²fathul.wahid@uii.ac.id

Abstract—This study aims to reexamine some traditional usability principles in the context of social media. The instrument was based on 14 items of usability dimensions (i.e. learnability, flexibility, and robustness) proposed by Dix et al. [1], we employed exploratory factor analysis (EFA) to contextualize them into the suitability of social media usability. Using 54 responses from active users of Facebook and Twitter, this study revealed five new usability dimensions of social media: interactivity, intuitiveness, conformability, adaptability, and forgiveness. The findings substantiate some claims that usability is context-specific: culturally variant and dependent upon the product under examination.

Keywords—human-computer interaction, social media, usability, evaluation.

I. INTRODUCTION

Failure to comply with a number of usability principles can lead to failure of system implementation [2]. According to ISO 9241-11 [3], usability is defined as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.” In the context of human computer interaction (HCI), this definition has been translated into more specific constructs. For example, Dix et al. [1] propose three principles supporting usability, i.e. learnability, flexibility, and robustness. Other scholars [4] offered another set of usability constructs: performance, efficiency, cost-effectiveness, and learnability. Yet, other sets of constructs exist [e.g. 5]

Along with advanced technology, the concept of existing usability principles becomes problematic: unsatisfactory, vague and ambiguous [6], too many guideline with different structure, content, and terminology [7], inconsistent and confusing [8], can't measure clearly [4], only represent authors' opinion and lack of empirical validation [4]. Hence, there is a need to review the existing principles with a more holistic approach [5].

Previous studies have noted that usability is context-specific. Usability, to some extent, is culturally variant [9] and dependent upon the product under examination [5] and the user's purpose [3]. This paper focuses on specific product, i.e. social media, and specific cultural context, i.e. Indonesia. Using the existing usability principles, Hart et al. [5] conclude that social media has a low degree of usability. This is an inconsistency with the way that social media has a great deal of users.

In this study, we reexamined the existing usability constructs in the context of social media through empirical study based on the constructs proposed by Dix et al. [1]. Our intention is to test whether the existing usability constructs are applied into a specific technology (i.e. social media) within a specific context (i.e. Indonesia). The results may be used to confirm or disconfirm the claims about specificity of usability mentioned above. To do so, we employed exploratory factor analysis (EFA). We believe that reexamining the existing constructs would lead us to a better understand on usability issues within social media.

The remainder of this paper is organized as follows. Section II describes the key concepts of usability and the nature of social media. Section III briefly explains the research method followed by Section IV to presents research findings. Section V discussing the findings and drawing conclusion brings this paper to end.

II. RELATED WORK

A. Concept of Usability

Usability has been variously defined, but the most widely used and approved is the concept of usability as described in ISO 9241-11. The usability principles consist of three main components: efficiency, effectiveness, and user satisfaction [3]. These components have become the standard to measure usability of a system [1], although it is not context-free. A measurement was carried out only in a particular environment with a specific purpose [3]. This explains when a set of usability guidelines is applicable into a system with a good result, but sometime it cannot be applied to other systems. Nevertheless, usability is one of the main factors that determines the success of a system [10] and a critical factor for the acceptance and adoption of a system [4].

As aforementioned, various set of usability constructs exist in the extant literature. To give an overview, Table I summarizes some of them. Ji et al. [11] examined the usability in the context of mobile web applications based on usability guidelines from Nielsen [12] and Dix et al. [1]. He combined two usability guidelines into a new set of working usability guidelines, which consist of five dimensions¹: cognition, information, interaction, user, and performance. Bolchini [4] examined the usability in the context of web applications in

¹ In this paper, terms ‘dimension’ and ‘construct’ are used interchangeably.

general. Based on an empirical study, he classified usability principles into four main dimensions: performance, efficiency, cost-effectiveness, and learnability. Hart et al. [5] probably is one of the early researchers who conducted study on usability within social media context. They proposed five usability dimensions: pleasure, curiosity and fun, identification and self-expression, surprise and serendipity, privacy.

This study focuses on the usability constructs proposed by Dix et al. [1] for one reason: the items to operationalize the proposed dimensions (i.e. learnability, flexibility, and robustness) are clearly defined. According to them, learnability means that system should be fairly easy to learn even by beginners. Flexibility, meanwhile, refers to the system ability to provide multiple channels to communicate with the user to complete a task. Robustness means that the user has the freedom to try out all features available in the system without causing damage to the system. These three dimensions are detailed into 14 items (see Table II).

TABLE I. USABILITY CONSTRUCT REFERENCES

Reference	Usability construct
Nielsen [12]	Visibility of system status, match between system and the real world, user control and freedom, consistency and standards, error prevention, recognition rather than recall, flexibility and efficiency of use, aesthetic and minimalist design, help user recognize, diagnose and recover from errors, help and documentation
ISO [3]	Effectiveness, efficiency, satisfaction
Dix et al. [1]	Learnability, flexibility, robustness
Ji [11]	Cognition support, information support, interaction support, user support, performance support
Bolchini and Garzotto [4]	Performance, efficiency, cost-effectiveness, learnability
Hart et al. [5]	Pleasure, curiosity and fun, identification and self expression, surprise and serendipity, privacy
Benyon [8]	Learnability, effectiveness, accommodation

To sum up, there are many viewpoints in assessing the usability of a system. Each viewpoint has different level of abstraction; some has a higher level, while other have a lower level of abstraction, and even down to the technical aspect.

B. Social Media

Social media has grown very fast as it has attracted a lot of users. It facilitates its users to generate a content by sharing their knowledge, opinion, and experiences on a wide variety of topics [13]. It set trends and agendas for various issues, such as environment, politics, entertainment, and also technology issues [14].

There are various motivations of people in using social media, such as socializing, entertainment, self-status,

information [15], and even transaction [16]. However, the most frequent motivations in using social media is to have communication and connection instantly with others [17].

Nowadays, Facebook and Twitter are the most phenomenal social media among others. In fact, the two had become the largest social media competing each other head to head [18]. Facebook, in one hand, is a social media with the largest number of users. Currently, it has more than 1.32 billion active users [19] and is still unbeaten although many other social media are emerging. While Twitter, on the other hand, is the pioneer of microblogging tools that is simpler and have less social pressure compared to Facebook [18].

Despite the popularity of social media, there is only limited attention paid to study its usability. It is an indication of a gap between traditional usability constructs with recent social media technology as a system [5]. This study aims at fulfilling this void.

III. METHODS

This study is positivist in nature. A survey using a questionnaire was conducted to collect data. The questionnaire was based on 14 items of the usability dimensions proposed by Dix et al. [1]. The survey was held on October and November 2014. Indonesia is chosen as a representative of context and social media, in this study Facebook and Twitter, is specific instantiations of emerging technologies. Both were unlikely considered by the study of Dix et al. [1].

Respondents of this study were students as the active users of Facebook and Twitter aged between 20 years and 24 years old. Twenty-seven students filled the questionnaire assessing the usability of both Facebook and Twitter. Students, most of them are young adult, were chosen because they are the most active user of social media and it become very important part of their lives as stated by Subhramanyam [20]. There are many activities done by students within social media. Thus, they have more comprehensive view of social media usage. Furthermore, they will more understand about the usability at a glance so we will have more accurate data. By splitting the responses, in total we have 54 data. This number is expected to ensure the validity of the findings. Previous studies on usability used various number of data: 10, eight, or even five [9].

In analyzing the data, exploratory factor analysis (EFA) was chosen. EFA is a tool to identify the factor structure or model for a set of variables. As its name implies, EFA is an exploratory method used to generate theory. It is used to search for the smaller set of dimensions to represent the larger set of items [21].

TABLE II. DIMENSIONS OF USABILITY BY DIX ET AL. (2004)

Dimension	Item	Definition
Learnability	Predictability	Support for the user to determine the effect of future action based on past interaction history
	Synthesizability	Support for the user to assess the effect of past operations on the current state
	Familiarity	The extent to which a user's knowledge and experience in other real-world or computer-based domains can be applied when interacting with a new system
	Generalizability	Support for the user to extend knowledge of specific interaction within and across applications to other similar situations
	Consistency	Likeness in input-output behavior arising from similar situations or similar task objectives
Flexibility	Dialogue initiative	Allowing the user freedom from artificial constraints on the input dialog imposed by the system
	Multithreading	Ability of the system to support user interaction pertaining to more than one task at a time
	Task migratability	The ability to pass control for the execution of a given task so that it becomes either internalized by the user or the system or shared between them
	Substitutivity	Allowing equivalent values of input and output to be arbitrarily substituted for each other
	Customizability	Modifiability of the user interface by the user or the system
Robustness	Observability	Ability of the user to evaluate the internal state of the system from its perceivable representation
	Recoverability	Ability of the user to take corrective action once an error has been recognized
	Responsiveness	How the user perceives the rate of communication with the system
	Task conformance	The degree to which the system services support all of the tasks the user wishes to perform and in the way that the user understands them

IV. FINDINGS

We performed EFA with a principal component analysis as the extraction method and varimax with Kaiser normalization as an extraction method. Table III summarizes the cross loadings of 14 items.

TABLE III. THE RESULT OF EFA ON USABILITY DIMENSION

Items	Component				
	1	2	3	4	5
Dialogue initiative	0.861				
Consistency	0.759				
Predictability	0.687				
Substitutivity	0.505				
Generalizability		0.828			
Familiarity		0.823			
Responsiveness			0.825		
Task conformance			0.699		
Multi-threading			0.505		
Synthesizability			0.409		
Customizability				0.803	
Task migratability				0.593	
Recoverability					0.866
Observability					0.581

EFA yielded five factors with Eigenvalues greater than 1.0. In total, these factors explain 70.45% of the total variance. The first factor was loaded by four items, which are dialogue initiative, consistency, predictability, and substitutivity. This factor explained 30.79% of the total variance. The second factor consisted of loaded by two items, namely generalizability and familiarity. This factor explained 13.62% of the total variance.

The third factor was loaded by four items, i.e. responsiveness, task conformance, multi-threading, and synthesizability. This factor explained 9.98% of the total variance. The fourth factor comprised of two items: customizability and task migratability. Finally, the fifth factor was loaded by two items, which are recoverability and observability. These two factors respectively explained 8.67% and 7.38% of the total variance.

V. DISCUSSION AND CONCLUSION

The analysis of study has revealed the new dimensions of usability principles in the context of social media. These new dimensions are expected to better explain the usability measurement of social media. These principles will also help researchers to understand social media phenomena and its usage. Table IV summarizes the factors along with their new labels. The new groupings indicate that the usability dimensions of social media are specific and differ from other technologies.

TABLE IV. NEW USABILITY DIMENSIONS

Dimension	Items
Interactivity	Dialogue initiative
	Consistency
	Predictability
	Substitutivity
Intuitiveness	Generalizability
	Familiarity
Conformability	Responsiveness
	Task conformance
	Multi-threading
	Synthesizability
Adaptability	Customizability
	Task migratability
Forgiveness	Recoverability
	Observability

We offer definitions of these new dimensions. *Interactivity* means that system must be able to facilitate the users in easily using the system with predictable and consistent experience. *Intuitiveness* refers to that the system must have a workflow that consistent with the user mindset and has a general and known representation of the interface. *Conformability* means how a system must be responsive and be able to help a user to work effectively and efficiently.

Furthermore, *adaptability* means that the system should be able to adapt to the work situation and character of its user. *Forgiveness* means that the system must have a mechanism to prevent errors and mitigate and recover the consequences if it occurs.

This study and other similar ones will provide a more context-aware usability dimensions of a certain system within a specific groups of users. We have redefined the usability dimensions emerged from EFA. The findings substantiated some claims made by previous studies [3, 5, 9] stated that usability is culturally variant [9] and dependent upon the product under examination [5].

However, more importantly, the findings of this study can be considered as exemplar showing the importance to pay more attention to the specificity of context in usability studies. This calls for awareness of evaluators to scrutinize finer-grained usability dimensions when evaluating a specific technology, such as social media, as the existing one can be too coarse.

This study is not without limitations. First, its validity may be questioned as we only involved a limited number of respondents in a homogenous group. Involving other groups of respondents may increase the validity of the findings. Second, we selected only one set of usability constructs to test. Further studies may reexamine other sets of well-established usability dimensions when they are applied into other technologies in particular contexts.

REFERENCES

- [1] A. Dix, J. Finlay, G. D. Abowd, and R. Beale, *Human Computer Interaction*. England: Pearson Education, 2004.
- [2] J. Fjermestad and N. C. Romano Jr, "Electronic customer relationship management: Revisiting the general principles of usability and resistance-an integrative implementation framework," *Business Process Management Journal*, vol. 9, pp. 572-591, 2003.
- [3] ISO, "ISO 9241-11, Ergonomic requirements for office work with visual display terminals (VDTs)—Part 11: Guidance on usability," 1998.
- [4] D. Bolchini and F. Garzotto, "Quality of web usability evaluation methods: An empirical study on MiLE+," in *Proceedings of Web Information Systems Engineering—WISE 2007 Workshops*, 2007, pp. 481-492.
- [5] J. Hart, C. Ridley, F. Taher, C. Sas, and A. Dix, "Exploring the facebook experience: A new approach to usability," in *Proceedings of the 5th Nordic Conference on Human-Computer Interaction: Building Bridges*, 2008, pp. 471-474.
- [6] S. Cronholm, "The usability of usability guidelines: a proposal for meta-guidelines," in *Proceedings of the 21st Annual Conference of the Australian Computer-Human Interaction Special Interest Group: Design: Open 24/7*, 2009, pp. 233-240.
- [7] M. Van Welie, G. C. Van Der Veer, and A. Eliëns, "Breaking down usability," in *Proceedings of INTERACT*, 1999, pp. 613-620.
- [8] D. Benyon, P. Turner, and S. Turner, *Designing Interactive Systems: People, Activities, Contexts, Technologies*. England: Pearson Education, 2005.
- [9] J. R. Lewis, "Usability: Lessons Learned... and Yet to Be Learned," *International Journal of Human-Computer Interaction*, vol. 30, pp. 663-684, 2014.
- [10] T. K. Chiew and S. S. Salim, "Webuse: Website usability evaluation tool," *Malaysian Journal of Computer Science*, vol. 16, pp. 47-57, 2003.
- [11] Y. G. Ji, J. H. Park, C. Lee, and M. H. Yun, "A usability checklist for the usability evaluation of mobile phone user interface," *International Journal of Human-Computer Interaction*, vol. 20, pp. 207-231, 2006.
- [12] J. Nielsen, "Heuristic evaluation," *Usability Inspection Methods*, vol. 17, pp. 25-62, 1994.
- [13] J. Benthous, I. Pahlke, R. Beck, and C. Seebach, "Improving sensing and seizing capabilities of a firm by measuring corporate reputation based on social media data," *Proceedings of European Conference on Information Systems (ECIS)* 2013, 2013.
- [14] S. Asur and B. A. Huberman, "Predicting the future with social media," in *Web Intelligence and Intelligent Agent Technology (WI-IAT)*, 2010 IEEE/WIC/ACM International Conference on, 2010, pp. 492-499.
- [15] N. Park, K. F. Kee, and S. Valenzuela, "Being immersed in social networking environment: Facebook groups, uses and gratifications, and social outcomes," *CyberPsychology & Behavior*, vol. 12, pp. 729-733, 2009.
- [16] N. Sopiah, "Faktor-Faktor yang Mempengaruhi Penggunaan Media Facebook," *Proceedings of Seminar Nasional Aplikasi Teknologi Informasi (SNATI)* 2013, 2013.
- [17] C. M. Cheung, P.-Y. Chiu, and M. K. Lee, "Online social networks: Why do students use facebook?," *Computers in Human Behavior*, vol. 27, pp. 1337-1343, 2011.
- [18] D. J. Hughes, M. Rowe, M. Batey, and A. Lee, "A tale of two sites: Twitter vs. Facebook and the personality predictors of social media usage," *Computers in Human Behavior*, vol. 28, pp. 561-569, 2012.
- [19] www.statista.com, "Statistics and facts about Facebook," 2014.
- [20] K. Subrahmanyam, S. M. Reich, N. Waechter, and G. Espinoza, "Online and offline social networks: Use of social networking sites by emerging adults," *Social Networking on the Internet - Developmental Implications*, vol. 29, pp. 420-433, 2008.
- [21] R. K. Henson and J. K. Roberts, "Use of exploratory factor analysis in published research common errors and some comment on improved practice," *Educational and Psychological Measurement*, vol. 66, pp. 393-416, 2006.