Information & Management 52 (2015) 295–304

Contents lists available at ScienceDirect

Information & Management

journal homepage: www.elsevier.com/locate/im

Antecedents and consequences of mobile phone usability: Linking simplicity and interactivity to satisfaction, trust, and brand loyalty

Dongwon Lee [a], Junghoon Moon [b,*], Yong Jin Kim [c], Mun Y. Yi [d]

[a] Robert H. Smith School of Business, University of Maryland, College Park, MD 20742, USA
[b] Program in Regional Information, Seoul National University, Seoul 151-921, Republic of Korea
[c] Global Service Management, Sogang University, Seoul 121-742, Republic of Korea
[d] Department of Knowledge Service Engineering, Korea Advanced Institute of Science and Technology, Daejeon 305-701, Republic of Korea

ARTICLE INFO

Article history:
Received 5 March 2014
Received in revised form 29 November 2014
Accepted 3 December 2014
Available online 12 December 2014

Keywords:
Simplicity
Interactivity
Usability
Satisfaction
Trust
Brand loyalty
Mobile phone
User interface

ABSTRACT

Usability is a central issue for mobile phone design and service because users need to access various functionalities via limited user interfaces (UI) often while they are on the road. In this paper, we propose simplicity and interactivity as the key determinants of mobile phone usability and assess their significance in an empirical setting. Furthermore, we examine the effects of mobile phone usability on user satisfaction, trust, and brand loyalty and provide a holistic view of the causal relationships between the proposed UI features and important organizational variables for building and maintaining long-term customer relationships. The study was conducted using survey questionnaire data collected from 310 mobile phone users in South Korea. The findings of the study confirm that simplicity and interactivity are two significant determinants of mobile phone usability and that interface simplicity is an important precondition for positive interactivity and usability experience. Our findings also show that usability is a distal determinant of brand loyalty, exerting its influence indirectly through the mediators of satisfaction and trust. We discuss the implications of the study findings for usability research and UI design.

1. Introduction

"Simplicity is the ultimate sophistication." — Leonardo da Vinci

The wide availability of high-speed telecommunication networks and wireless Internet services has spurred the rapid expansion of the mobile service market. In addition to telephony, smart phones enable various mobile services, including multimedia broadcasting, messaging, and social networking services through mobile applications. Usability is a central issue for mobile services because various and ever-expanding functionalities must be accessed via their limited input/output facilities on a small mobile phone, often while users are on the road. Limited input interface and screen size demand a high level of effort when interacting with the mobile device, highlighting the need for effective user interface (UI) design. Moreover, it is a well-known fact that recent innovations in UI had a significant positive effect on the success of mobile services [36]. A recent study also found that users failed to estimate their use of product functionalities before purchasing multifunctional products (e.g., mobile phone), which in turn negatively influenced product satisfaction [15]. In addition, the simplicity of UI may signal product value, which persuades users to purchase a product [26]. Thus, mobile phone manufacturers continuously seek to improve user experience by offering a well-designed interface that seeks to best utilize limited screen space. However, due to the unique characteristics of mobile phones (e.g., small screen size, non-traditional input methods, and navigational difficulties), many mobile applications remain difficult to use [9].

Usability has been a major theme in human–computer interaction (HCI) research. While there is no clear consensus on the definition of usability, it has been commonly associated with the notion of the ease of using a target object. According to ISO/IEC 9126-1, usability is "related with attributes of the product that make it understandable, learnable, easy to use, and attractive [4]." Nielsen [28] also defines usability as ease of use and learning. In addition, IEEE standards define usability as "the ease with which a user can learn to operate, prepare inputs for, and interpret outputs

* Corresponding author at: Seoul National University, 8203A, Bd. 200, Gwanangno 599, Gwanak-gu, Seoul 151-921, Republic of Korea. Tel.: +82 2 880 4722; fax: +82 2 873 5080.
E-mail addresses: dongwon.lee@rhsmith.umd.edu (D. Lee), moonj@snu.ac.kr (J. Moon), yongjkim@sogang.ac.kr (Y.J. Kim), munyi@kaist.ac.kr (M.Y. Yi).

http://dx.doi.org/10.1016/j.im.2014.12.001
0378-7206/

of a system or component [17]." We adhere to the definition of ISO/IEC 9126-1 for our conceptualization of usability tailored to a mobile service context.

Given that the user perception of usability has a considerable impact on the successful adoption of a phone, our study proposes a holistic research model that links the key design features (simplicity and interactivity) of a mobile phone to their consequent effects (user satisfaction, trust, and brand loyalty) via perceived usability. This study extends Flavian et al.'s [14] study, which finds that a website's perceived usability positively influences a user's satisfaction and trust, which jointly influences the user's website loyalty.

We include in our research model two antecedents of usability: simplicity and interactivity—concepts that have been identified as important for improving user experience with mobile services, but remain understudied [25,31,33,35]. Simplicity is considered a crucial concept for a successful UI design because the increasing complexity of technology makes our lives uncomfortably cluttered [25]. Interactivity has been studied as an essential feature of websites that drives user attitudes and activities [35]. Interactivity entails the sense of fun and satisfaction, improved user engagement, and subsequent performance quality [33]. Today, mobile phones provide multiple functionalities, along with different responses, feedback messages, and navigational cues and routes when users try to access these functionalities. Simplicity and interactivity are proposed as key determinants of usability in this context.

In sum, the primary goal of this study is to theorize and empirically validate the effects of simplicity and interactivity on the usability of mobile phones, which in turn affects user satisfaction, brand trust, and brand loyalty. To the best of our knowledge, no study of information systems (IS) or HCI has examined these relationships in an empirical setting. The findings of this research have practical implications for mobile user experience design and theoretical implications for usability research.

2. Theoretical development and research hypothesis

The research model and hypothesized relationships are shown in Fig. 1. Specifically, the research model is designed to examine the effects of simplicity and interactivity, which we propose as two major characteristics of a mobile phone's interface, on usability and its consequent variables. In the proposed model, simplicity is conceptualized as a second-order formative construct, where as interactivity is conceptualized as a second-order reflective construct, following Bollen and Lennox [5] and prior research on those constructs. Extending prior research findings on website usability, the model links usability to user satisfaction, trust, and brand loyalty to validate the effects of usability on those consequence variables in a mobile service setting.

2.1. Simplicity

Nielsen [28] emphasizes that the consideration of the trade-offs between features and simplicity is critical to designing any UI. System complexity increases as the number of features increase because the system inevitably has to provide more menu items, screen elements, interactive steps, and user options, all of which likely require increased processing time. Consequently, he recommends that UI designers minimize features and pursue simplicity for most projects. Thomson et al. [34] also suggest that adding features improves the initial attractiveness of a product but ultimately decreases customer satisfaction by causing feature fatigue. Moreover, Miyamoto [26] provides analytical evidence about how UI simplicity can be used to signal product value and to persuade users to purchase a product.

While acknowledging that both complexity and simplicity are important and that striking the right balance between the two is difficult, Maeda [25] posits that "the more complexity there is in the market, the more that something simpler stands out" (p. 45). Accordingly, when competing products offer compatible features and functions, simplicity is an indication of more thoughtful and superior design.

The concept of simplicity not only covers the concept of simple layout but also includes interface organization, functionality, structure, work flow, and framework. Specifically, based on the prior work on simplicity [25,31], we classify simplicity into four sub-constructs: reduction, organization, integration, and prioritization. Simultaneously, we theorize that simplicity is a formative second-order factor rather than a reflective one because each sub-construct measures a different aspect of simplicity. Thus, changes in any of these sub-constructs would cause a change in simplicity, and changes in one sub-construct are not necessarily accompanied by changes in any other sub-construct.

Reduction refers to the aspect of simplicity in which an application is reduced to its essentials [25]. Reduction can be applied to all aspects of application design: functionality (goals), structural and navigational complexity, and interface (screen) complexity.

Organization refers to the extent to which an application's structure, functionality, and navigation are logically arranged and ordered. A user's performance is higher if an application's structure, navigation, functionality, and screens are well organized. Efficient organization also simplifies an application, which has an additional positive impact on performance.

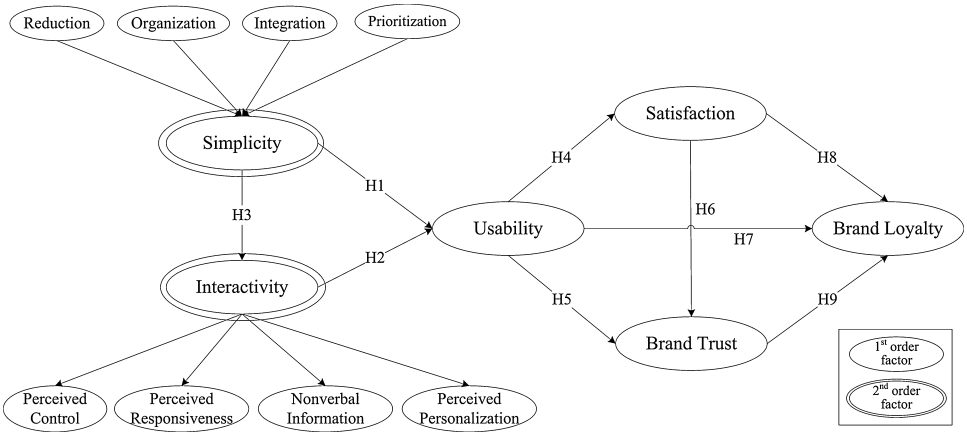

Fig. 1. Research model and hypothesized relationship.