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Determining the User Experience and Continuance Use of a Mobile Application and an Online Portal: A Comparative Case Study

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ABSTRACT

The increasing number of users with access to the internet, computers, and mobile devices propels most institutions to avail their services through online portals and mobile applications. However, there are instances where users underutilise or completely opt out of these platforms. This is a cause for concern since funds are invested in their development, with the anticipated return on investment. Against this backdrop, this study aimed to compare the user experience and continuance use of a mobile application and online portal for an organization in South Africa. This single case study followed an explanatory sequential design, where the initial phase consisted of data collection using a self-administered questionnaire. For the second phase, the data was collected using an interview protocol. The results established that the study participants had a positive experience with the online portal but not so much with the mobile application. The contributing factors to the online portal's positive user experience were its efficiency, attractiveness, perspicuity, dependability, novelty, and stimulation. The interview results corroborated the quantitative results, as participants indicated overall positive experiences with the online portal. In contrast, participants had negative experiences with the mobile application, citing its limited features and lack of user-friendliness, understandability, and learnability. Regarding continuance use, the quantitative and qualitative results suggested that participants were keen to use the online portal in the future. However, the quantitative results for the mobile application indicated no participant interest in using the mobile application again in future, despite the interview results indicating otherwise. Participants identified improvement in efficiency and visual appeal as conditions for their future re-use of the mobile application.

Keywords: Continuance use, User experience, Human-computer interaction, Mobile application, Online portal, Website

INTRODUCTION

Designing and developing user-friendly products is critical for the overall adoption and continuous use of the product. The usability and overall user experience (or UX as it is generally referred to) of a product are the cornerstones that determine whether the product will be used as intended or whether

the users will consider the product as part of their daily lives (i.e., continuance use). The juncture between the user and the product lies in the user interface of the product (Reynoso and Romo, 2020). User interaction with these products is generally via a well-defined user interface. The interaction may evoke a positive or negative experience, perception, or attitude towards the product. According to Knijnenburg *et al.* (2012), the extent to which the user has a positive experience with the product depends on the user's need for self-reliance, the capability to perform tasks at hand, and stimulation invoked when one uses the product. These needs are more important for self-service oriented products due to the limited availability of user support.

The preceding discussion highlighted two concepts: user experience, and continuance use. There is a gap in the body of knowledge regarding studies that compare the different service platforms for similarities and differences, if any, in terms of UX and continuance use. This study intended to fill this gap with specific reference to a mobile and an online portal of a South African institution. The primary research questions for this study were: (1) How does the user experience of a mobile application and its associated online portal compare in terms of user satisfaction? (2) How does the continuance use of a mobile application and its associated online portal compare in terms of continuance intentions?

CONCEPTUALISING USER EXPERIENCE

The conceptualisation of UX is premised on the users' perceptions of the product. The definition of UX is often tied to the adopted model. The UX White Paper (Roto *et al.*, 2011) defines UX as "the outcomes and memories" the user has upon interacting with the product. The paper differentiates UX based on the time span the user interacts with the system, which can be a specific change of feeling during interaction (momentary UX), appraisal of a specific usage episode (episodic UX), views on a system as a whole after using it for a while (cumulative UX), or before using it (anticipated UX). This paper will focus on the cumulative timespan (i.e., the user's feelings about the product a while after use).

Similarly, ISO 9241-210:2010 defines UX as a "person's perceptions and responses that result from the use/anticipated use of a product, system or service" (International Organization for Standardization, 2010). The intrinsic nature of UX is such that there is an overlap between the factors of usability and UX, particularly with satisfaction and efficiency. This paper considers satisfaction and efficiency as part of both usability and UX. However, UX extends to attractiveness, perspicuity, dependability, stimulation, and novelty (Schrepp *et al.*, 2014).

User Experience Models

Multiple UX models give rise to multiple perspectives of what constitutes UX. Roto *et al.* (2011) identify user affect, interpretation, and meaning as attributes underscoring UX and attributes that inform it. Bevan (2008) approaches UX in terms of the goals and consequences of using the product. The product goals consist of pragmatic goals (i.e., effectiveness and efficiency) and

hedonic goals (i.e., stimulation, identification, and evocation), whereas consequences include pleasure, likability and comfort, and trust. For Morville (2004), UX encapsulates how useful, usable, findable, credible, accessible, desirable, and valuable the system/product is.

The ideographic nature of UX results in different UX dimensions and interpretations. There are many different UX dimensions/models (Følstad, 2010; Hussain *et al*., 2021). Each model/dimension presents and defines UX within the scope of the concerned model/dimension. Hassenzahl's UX model (Han *et al*., 2018) has been widely used to assess UX. This model is premised on the user, the product and the interaction between the product and the user. For this study, the UX attributes identified by Schrepp *et al*. (2017) are considered determinants of product UX, as the accompanying User Experience Questionnaire (UEQ) has been extensively validated (Izabal *et al*., 2018; Kusumo and Hartono, 2019; Isnainiyah and Triwahyono, 2021; Martono, 2021). These attributes consist of attractiveness, perspicuity, novelty, stimulation, dependability, and efficiency. The identified attributes emanate from pragmatic and hedonic qualities from Hassenzahl's Model.

CONTINUANCE USE OF AN INFORMATION SYSTEM PRODUCT

The success of a product depends on its continuance use beyond the first encounter (Wangpipatwong *et al*., 2008). Even more critical is the prolonged use of an information system (IS) product *(Wu et al*., 2022). The continuance use mainly depends on how much the product meets the users' needs. It is also seen as an extension of customer loyalty.

Customer loyalty results from inertia, where the bond between the customer and the product is tied and indistinguishable, such that the user has no appetite to use or try alternative products. According to Wang *et al*. (2019), inertia is an attitudinal tendency where the user does not see the need to try available alternatives. In a non-competitive environment such as e-government, continuance use is a more applicable term and very important for IS success (Alanazi, 2013).

While the continuance use concept did not originate from the information systems discipline, the concept has been incorporated into the information systems field through models like the Expectation-Confirmation Model (ECM).

In the ECM (see Figure 1), perceived usefulness relates to the first phase of the continuance intention. The critical part of the ECM is its confirmation

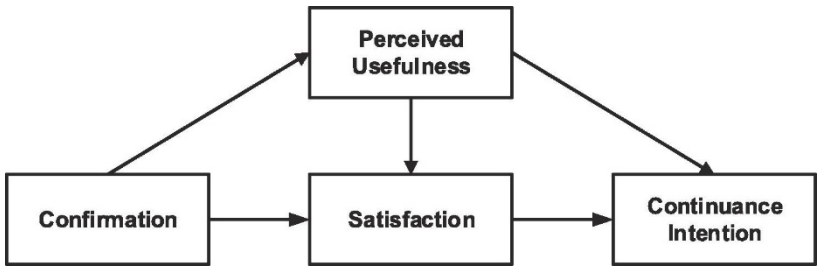

Figure 1: Expectation confirmation model (Ambalov, 2021).

aspect. In terms of confirmation, the user may have used the IS to be in a better position to determine whether the expectations are met or the extent to which they are met.

METHOD

This study followed a mixed-methods approach. The quantitative phase of this study was descriptive, whereas the qualitative phase further explained the descriptive results. This latter phase was used to overcome the shortcoming of the quantitative approach. For instance, quantification does not provide an explanation and/or understanding of the results beyond the visual presentation of numerical data (Leedy and Ormrod, 2021). A better understanding of behavioural patterns and establishing a deeper meaning of the phenomenon are achieved using a qualitative approach (Babbie, 2021).

Participants

The units of analysis for this study consisted of the existing users a mobile application and an online portal of a South African organization responsible for company, cooperative, and intellectual property registration, and maintenance. The inclusion criteria for this study were the following: participants should be at least 18 years old and must have used the organization mobile application and online portal within the past 12 months.

Procedure

Two data collection tools were used: a self-administered questionnaire and a semi-structured interview protocol. The questionnaire consisted of close-ended questions to obtain UX and continuance use data from the participants' viewpoint for the organization's mobile application and their online portal. It was administered online through the online survey hosting provider (questionpro.com) from 01 July to 27 August 2021. An e-mail invitation containing an introduction to and overview of the study, ethical clearance information, and the organization permission letters was sent to the potential participants requesting them to complete the online questionnaire. Two hundred and nine fully completed questionnaires were received, accounting for a 39% response rate.

The follow-up semi-structured interviews were conducted with 13 participants in October 2021 to solicit further explanation for a deeper understanding of participants' UX and continuance use opinions of the organization mobile application and its online portal. The follow-up interviews allowed the researchers to gain meaning and insight into the unanticipated results from the quantitative analysis (Morgan, 2014; Williamson and Johanson, 2018).

RESULTS

Mobile Application and Online Portal User Experience

The findings indicated that participants had a negative experience with the mobile application, including all UX sub-constructs: attractiveness, dependability, efficiency, perspicuity, stimulation, and novelty. In contrast, the participants had a positive experience with the online portal, encompassing its UX sub-constructs, except for novelty. The comparison in Table 1 established if the differences between the mobile application and online portal UX were statistically significant.

The results indicated statistically significant differences between the online portal and mobile application UX ($t(208)=5.896$, $p < 0.05$). This shows that the difference between the online portal and mobile application UX did not happen by chance. Furthermore, the results indicated statistically significant differences between the online portal and mobile application attractiveness ($t(208) = 5.855$, $p < 0.05$), efficiency ($t(208) = 5.689$, $p < 0.05$), perspicuity ($t(208) = 5.162$, $p < 0.05$), dependability ($t(208) = 6.365$, $p < 0.05$), stimulation ($t(208) = 5.066$, $p < 0.05$), and novelty ($t(208) = 5.070$, $p < 0.05$).

The interview responses corroborated these findings as the participants were mainly negative about their experience with the mobile application. They cited efficiency, errors, business process, limited functionality, and the lack of user-friendliness of the mobile application as the root causes of their negative experience. Examples of the errors experienced included the system timeout due to prolonged processing time, business process-related errors where the application did not proceed without the user providing the related information, or the application did not show progress or successful transaction completion.

The online portal's efficiency, user-friendliness, full features, and understandability featured prominently in their positive experience. In addition, when the system was under maintenance, the participants indicated that they received notices on time and thus were not surprised by the online portal downtime.

Table 1. Comparing mobile application and online portal user experiences.

	x	$\sigma\bar{x}$	t	df	p
Online portal UX - mobile application UX	.606	.103	5.896	208	.000
Online portal attractiveness – mobile application attractiveness	.638	.109	5.855	208	.000
Online portal efficiency - mobile application efficiency	.626	.110	5.689	208	.000
Online portal perspicuity - mobile application perspicuity	.595	.115	5.162	208	.000
Online portal dependability - mobile application dependability	.642	.101	6.365	208	.000
Online portal stimulation - mobile application stimulation	.587	.116	5.066	208	.000
Online portal novelty - mobile application novelty	.548	.108	5.070	208	.000

Mobile Application and Online Portal Continuance Use

The composite mean score for the mobile application continuance intentions indicated that participants were less likely to use the mobile application in future than the online portal. In Table 2, the difference between the mobile application and online portal's continuance intentions was tested to determine whether the difference in mean scores was statistically significant.

Table 2. Comparing mobile application and online portal continuance intentions.

	x	$\sigma\bar{x}$	t	df	p
Online portal continuance intentions – Mobile application continuance intentions	.664	0.115	5.789	208	.000

The results indicated a statistically significant difference between the online portal and mobile application's continuance intentions ($t(208) = 5.789$, $p < 0.05$). One may conclude that participants were more likely to continue using the online portal than the mobile application. The standard error of the mean score for the online portal and mobile application continuance intentions was less than the corresponding mean score, suggesting that the mean score was a reliable measure of the population mean in relation to continuance intentions.

From the interviews, the participants identified limited features, efficiency, errors, and business processes as the aspects that should be reconsidered for improving the mobile application. They also identified the features, fast processing, and easy navigational design as the online portals' aspects that exceeded their expectations. Most participants indicated their interest in using the online portal in the future. The main reasons cited were the online portal's stability, efficiency, and effectiveness.

DISCUSSION

Mobile Application and Online Portal User Experience

The organization mobile application and online portal comparison in terms of UX were measured using the UEQ. The findings on the UX of the mobile application and online portal revealed that participants had a more positive experience with the online portal than with the mobile application. No known study has compared the UX of a mobile application and its associated online portal. However, previous studies on website UX pinpointed the importance of hedonic qualities in website UX (Wani *et al.*, 2017). For instance, Ritonummi (2020) found in their study that the company's website was usable, yet the UX was poor due to design problems. In contrast, this study saw the organization's online portal scoring high in both cases (i.e., usability and UX), notwithstanding that the relationship between product UX and usability does not arise naturally *(Haaksma et al.*, 2018). In particular, the online portal scored positively for the hedonic and pragmatic qualities, namely attractiveness, novelty, stimulation, perspicuity, dependability, and efficiency, respectively. However, this finding is contrary to the findings of Merčun and Žumer (2017), who established that, in respect of

UX, the pragmatic aspects of the product resonated more with the participants than the hedonic aspects. There was no evidence suggesting that the differences were attributed to to types of systems evaluated.

Unlike the mobile application, participants always had a positive experience with the online portal. The exception, however, was that some participants had a negative experience with the online portal, which later changed into a positive experience. The change to a positive experience arose from the fixed defects in the online portal that was problematic. The participants' experiences in terms of all the UX factors measured for the mobile application were negative in this study. In addition, the interview results corroborated these findings, as participants were mainly negative about their experience with the mobile application. Among the causes of these negative experiences were, to a larger extent, the mobile application's inefficiency, errors, limited functionality, and lack of user-friendliness. To a lesser extent, participants had concerns about the business processes (e.g., communication between the organization and its customers).

However, similar studies on mobile application UX contradicted this study's findings. Instead, the users portrayed a positive experience with the mobile applications investigated (Davidavičienė *et al.*, 2019; Wicahyono *et al.*, 2019; Setiaji *et al.*, 2020; Astuti *et al.*, 2021). Setiaji *et al.* (2020), in their study of a secured mobile exam application, associated its UX solely with its quality. In addition, despite obtaining positive UX ratings, Wicahyono *et al.* (2020) identified novelty and efficiency as areas of improvement for the Pregnancy Monitoring Mobile Application.

Mobile Application and Online Portal Continuance Use

The investigation of continuance intentions in this study involved comparing the organization online portal and mobile application, considering the participants' experience with these products. The findings on the mobile application and online portal's continuance intentions revealed that participants were more likely to consider using the online portal in future than the mobile application. This finding was supported by the interview results concerning the online portal. The prevailing reasons for future use of the online portal were its effectiveness, stability, efficiency, navigational ease and the availability of sufficient features, as opposed to the mobile application, which has limited features.

Various studies (Vatanasombut *et al.*, 2008; Ambalov, 2021) have identified trust in technology as a precursor for continuance intentions on web-based applications. In addition, subjective norms, enjoyment, usefulness, and ease of use significantly impacted the continuance intentions for information systems (Almutairi *et al.*, 2021). While other studies pin continuance intentions on user satisfaction (Franque *et al.*, 2020; Almutairi *et al.*, 2021), Zareravasan and Ashrafi (2019) established no correlation between satisfaction and continuance intentions for the future use of the learning management system. The latter resonates with this study's findings on online portal satisfaction. In addition, participants had misgivings about business processes (e.g., back-office communication and implemented business rules)

as the hindrance to their positive UX with the online portal, which relates to their dissatisfaction with it.

Regarding the mobile application, the interview results somewhat contradicted the questionnaire findings, as participants indicated their willingness to use it in the future owing to its efficiency and effectiveness. However, the mobile application's limited features, errors, and efficiency appeared prominently as areas of improvement for the mobile application's future use. In contrast, Mubarokah and Hidayanto (2020) identified user satisfaction as a determining factor for continuance use intentions of the Internal Activity Report Application.

CONCLUSION

The primary objective of this study was to compare the user experience and continuance use of a mobile application and online portal in terms of user satisfaction and continuance intentions. This study gave insight into the mobile application and online portal user experience and continuance use from its users' perspective. The findings showed that the participants had a more positive experience with the online portal than with the mobile application. Furthermore, the continuance use of the mobile application and online portal was somewhat linked to their experience with these products. Study participants were more likely to use the online portal in future, and not so for the mobile application. Therefore, this study gave insight into the fact that user experience and continuance use phenomena were applicable to mobile applications, as well as online portals (i.e., user experience and continuance use are as important for the mobile application as they are for the online portal). The UEQ has been used extensively to evaluate UX in previous studies. Its use, though, was mainly limited to individual products (i.e., mobile applications or online portals, with no comparison). The use of UEQ in comparing the mobile application and online portal confirmed its relevance in the comparison of mobile applications and online portals alike. This study further provided empirical evidence to extend the established importance of UX in products' continuance use through the comparison of a mobile application and an online portal. Practitioners may use the findings to re-examine the importance of developing products for user experience as part of product development, not as a standalone component irrespective whether it is for a mobile application or an online portal. The development of mobile applications, as compared to online portals, should take into account the pain points identified by the participants in relation to both usability and user experience, as continuance use hinges on these aspects.

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