M-Commerce Apps Usability: 
The Case of Mobile Hotel Booking Apps

D. Matlock, A. Rendell, B. Heath, and S. Swaid, Ph. D¹

¹Division of Natural and Physical Sciences 
Philander Smith College, Little Rock, AR

Abstract - Today, mobile users have a powerful portal to the web in their pockets. They use their mobile to book a hotel room, open a bank account, buy a new pair of shoes and search for entertainment events nearby. Un spuringly, software engineering now integrate usability testing in the development cycle of mobile apps. About one third of people use their mobile devices to book a hotel room. However, a study by Google found that 54% of travelers indicate that usability and limitations on mobile apps are the biggest reason to abandon hotel mobile apps. This paper presents a study to identify the usability heuristics to use when evaluating the usability of hotel booking mobile apps. An integrated approach is used considering the general usability heuristics of Nielsen, and the industry guidelines developed by Google Android and Apple. Based on empirical experimentation the study resulted in 13 heuristics: “Status”, “Matching-Real-World”, “Control”, “Error-Prevention”, “Recognition”, “Flexibility-and-Efficient Use”, “Design”, “Diagnose-and-Recover”, “Help”, “Performance”, “Information-and-Visual-Hierarchy”, “Natural-Interaction”, and “Dynamic-Engagement”. Four usability experts tested the usability of VirginHotels, and ExtendedStay mobile apps using the developed heuristics. The study highlights usability deficiencies and provides recommendations to improve usability of hotel booking mobile apps.

Keywords: Usability, Mobile, Apps, Heuristics, M-Commerce

1 Introduction

In parallel to the growth of ownership and use of mobile devices, mobile e-commerce is also growing. By 2020, it is estimated to have 189 billion US dollars via apps stores and in-app advertising [16]. The explosion of mobile apps is seen in just about every industry such as retail, media, travel, education, healthcare, finance and social. In 2017, consumers downloaded 178.1 billion mobile apps to their connected devices. In 2022, this figure is projected to grow to 258.2 billion app downloads [16] with social networking apps, m-commerce apps and mobile games among the most downloadable apps [16].

Mobile e-commerce, or m-commerce, as termed here, is defined as all activities related to a potential commercial transaction conducted through communications networks that interface with wireless or mobile devices [20]. Enabled by mobile devices, m-commerce possibilities range from browsing, searching, to purchasing items or services, and conducting online banking transactions. Users would download mobile apps to be able to conduct any of the activities related to m-commerce. Mobile applications are software programs developed for use on personal wireless devices such as smartphone which have different platforms (e.g., iOS, Android). Recently, and due to research on user experience and engagement, usability in mobile apps software engineering is integrated in the software development lifecycle. Moreover, software developers’ community of mobile apps has developed a list of guidelines to ensure smooth user experience, regardless of platform use or mobile application type. However, the research on usability is fragmented, incomprehensive, far lesser focus on real user context, and lacks clarity on what rules usability experts to apply when evaluating mobile apps usability [11]. Moreover, as heuristics evaluation becomes more popular in usability studies, it may miss domain specific problems. This study develops a set of usability heuristics to identify usability deficiencies in hotel booking mobile apps.

2 Literature Review

Usability of a system is a key factor that contributes to the effectiveness, efficiency and satisfaction in which specified users achieve specified goals when using the product [9]. Likewise, usability of mobile apps contributes to positive user experience, where users achieve their goals easily and quickly. Industry reports show that users expect mobile pages to load in two seconds and search results to be accurate with great functionality and varying features. Usability and usability evaluation have received increased attention in e-commerce and m-commerce due to the high cost of customer acquisition and retention [23].

One way to usability evaluation is expert-based techniques such as cognitive walkthrough and heuristics inspection. An advantage of such expert-based methods is that they can
identify more usability problems in short time, making heuristics evaluation a cost-effective method allowing more than 60% usability deficiencies to be identified [12]. One set of usability heuristics that has been widely adopted is the one developed by Nielsen [12], including rules of: Visibility of system status, Match between system and real world; User control, Consistency, Error prevention, Recognition, Flexibility and efficiency of use; Aesthetics and minimal design, Help user diagnose and recover errors, and Help and documentation. The process of usability heuristics evaluation starts with engaging a small set of evaluators as many as five to examine the interface or software and judge its compliance with usability heuristic. Next, evaluators aggregate the usability evaluation results in a corresponding list of usability deficiencies and its corresponding violated heuristics. Then, usability deficiencies are ranked in terms of severity from zero, where zero is considered ‘cosmetic’ issue, to four, a ‘usability catastrophe’ that is imperative to fix. Considerable number of research studies applied usability heuristics to evaluate medical devices, online learning systems, scientific software, websites, and virtual reality systems [1][5][6][7][14][17][19].

3. The Study

Heuristic evaluation is applied in step-wise approach with the help of a small number of usability evaluators[12] to identify the largest number of deficiencies. Each evaluator inspects the mobile apps individually, several times and tests the various dialogue elements and compares them with the list of recognized usability principles. Then, after completing the usability evaluation task by each evaluator, they meet to communicate their findings, aggregate results, rank deficiencies and generate written reports. As usability heuristics is challenging with emerging information technology [20] an integrative approach is applied by considering Nielsen’s heuristics [12], the Google Android [2] design guidelines and Apple human interface guidelines [4].

In this study we focused on mobile apps for hotel booking and we selected two apps the VirginHotel.com app [22] and the StayConnected.com [15] app. The VirginHotels app, Lucy, is a personal assistant app that helps fulfilling requests for services and amenities, functioning as the room thermostat, streaming personal content and more. The app, Lucy, “will put guests in the captain’s chair. The technology will be smart and intuitive, and light the way to a more immersive experience within the hotel” [10]. On the other hand, the ExtendedStay app is similar in functionality to the website of ExtendedStayAmerica.com (ESA). The app provides features of booking a room, explore hotels, find reservations, keep track of previous and future booking transactions. Total of four usability evaluators inspected the usability of the m-commerce apps [18]. Usability evaluators had training on human-computer interaction theories, user-centered design and usability. Nevertheless, a training session on usability heuristics and Nielsen’s heuristics in particular, was provided in form of research experience for two semesters focusing on apps of retailing, hotel booking, online banking, social gaming and social networking, among others. All evaluators downloaded the two apps on smartphones that are operated with Android and iOS. Each evaluator inspected the elements of each app against Nielsen’s heuristics. Then, evaluators conducted the correlational-stage, “to identify the characteristics that the usability heuristics for specific applications should have” [21], based on Nielsen’s heuristics [12] and usability guidelines provided by Android [2], and Apple developers design team [4]. Finally, the evaluators met to discuss and compile the list of heuristics that fit hotel booking mobile apps (see Table 1). The study revealed a number of usability violation to the 13 usability heuristics suggested by the study. In an experimental stage, the evaluators conducted usability inspection on VirginHotels, Lucy, mobile app and ESA mobile app. Results reveled that both apps have usability problems varied in terms of severity. For example, VirginHotel app was found a couple of times showing a blank screen at the on-boarding stage. Also, evaluators found in spite of the vivid pictures the app employs, the app does not show dots or similar, to inform users of slides or pictures totals in the gallery. Lucy, the mobile app, violates the rule of “Systems Visibility”, when users check for room availability, no progress bar is displayed to users to inform them that the app is working to find rooms based on the inserted criteria. In the case of ExtendedStayAmerica, several usability issues were identified as well.. None was with high severity, but the issues found can cause users to abandon the app due to frustration. For example, at the reservation stage, after selecting the room, it is unclear how to advance to making the reservation. In some cases when “Special Note” is associated with some rooms, clicking “No Thanks” does not work, and cause the screen to flash. User has to accept, and then go back to change room selected. This violates “User Control” rule. Unlike the website of ExtendedStay, where users can share promotion they get via social media, the app does not fully support dynamic-engagement (Table 2).

<table>
<thead>
<tr>
<th>Table 1. Selected Usability Heuristic for Mobile Apps</th>
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<tr>
<td><strong>Usability Rule</strong></td>
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<tr>
<td>Information and Visual Hierarchy</td>
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<tr>
<td>Natural-Interaction</td>
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<td>Dynamic-Engagement</td>
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4. Conclusion and Implications

Mobile apps are changing the landscape of e-commerce in general and the lodging industry in particular. Mobile apps will be that main channel for hotel booking, but also a necessity strategy for strengthening customers relationships,

Table 2. Selected Usability Deficiencies

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<tr>
<th>ExtendedStay America App</th>
<th>Lucy, VirginHotels, App</th>
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<tr>
<td>advanced purchase notice</td>
<td></td>
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<tr>
<td>Please Note that in order to book this reservation, you need to agree to the following: 24 hours after submitting this booking, you will be billed for the non-refundable total cost (including tax) for the entire length of your stay. Guests who cancel their Advanced Purchase reservations more than 24 hours after booking, or fail to show, will forfeit their nonrefundable advance payment equal to the total cost of the reservation (including tax). Using direct bill account numbers as a method of payments is prohibited when booking advanced purchase rates.</td>
<td></td>
</tr>
<tr>
<td>accept</td>
<td></td>
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<tr>
<td>[Go Back, I'll select another rate plan]</td>
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Usability evaluation conducted in this study suggests a number of recommendations for mobile app usability designers and user experience researchers. Users of Mobile apps expect to complete their transactions with minimal efforts. Therefore, designers of mobile apps to provide the shortest path from launch to booking via straightforward navigation, step-wise directed path and clear call-to-action buttons. Also, mobile apps to provide search engines with filtering, sorting and zooming features to support user search. Users to be able to recognize rather than recall by providing visible information and features that are easy to access. Users of mobile apps to be engaged dynamically by utilizing location-based services such as GPS, weather forecast, and nearby attractions. Given the advanced of augmented reality technologies, mobile apps to apply augmented reality to open exciting opportunities for their users. To avoid users irritation, it is suggested that mobile apps to display a number of options for payment methods with easy to complete forms. Due to the limited features of mobile phones such as small screen size, it is important for content to be displayed as visual objects to support visual experience for the explored distention.

Acknowledgement
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3 References
[15] Stay Connected America.com


[22] VirginHotels.com