



# Application discoverability and user satisfaction in mobile application stores: An environmental psychology perspective

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## ABSTRACT

In order to appeal to consumers, mobile application stores face the challenge of finding ways to achieve the seemingly conflicting goals of providing a large quantity of applications and simultaneously making the specific applications that users desire easy to discover. Drawing on environmental psychology, this paper reports a study investigating how quantity-related facilitators and environment-related facilitators are related to application discoverability, which in turn impacts user satisfaction with the application store. We find that quantity-related facilitators (perceived quantity-sufficiency, perceived quantity-overload, and information specificity of search) and environment-related facilitators (application store coherence and user-generated reviews) all influence application discoverability, which affects user satisfaction. These facilitators play a role in managing the conflicting goals in mobile application stores.

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## 1. Introduction

An important trend in information technology (IT) innovation is the growing use of applications on mobile devices. A mobile application is a software application that runs on a smartphone or other portable device. Mobile applications provide value to users not only by enabling them to use Internet services that were previously only available on desktop or notebook computers, but also by offering functionality that is specific to mobile devices (examples include GPS navigation, location-based services, or QR-code scan product searches). As people adopt mobile applications for hand-held devices, the application stores where these applications can be obtained are becoming widely used in everyday life. For example, the Apple's App Store has over 700,000 applications, and surpassed 50 billion downloads in May of 2013. Approximately 15,000 new applications are submitted by developers to the App Store each week, and demand for mobile applications is expected to continue growing [52], with the number of global downloads anticipated to reach 76.9 billion in 2014, with a value of \$35 billion [37].

New smartphone users are attracted to application stores by the increasing numbers of applications, and the expanding user pool moti-

vates application developers to offer greater numbers of applications and higher-quality applications to tap this growing market. Nonetheless, with so many applications to sort through, finding the right ones to download can be a painstaking task for users. Application discoverability, which is the ease of finding the right application, is a serious concern for application users and developers on various mobile platforms. Therefore, there is a critical need to understand the determinants of application discoverability and the attendant level of user satisfaction.

The purpose of the present study is fourfold. First, we highlight the role of discoverability facilitators in ultimately promoting user satisfaction with mobile application stores, by identifying them as quantity-related and environment-related facilitators. Second, we examine whether quantity-related facilitators (perceived quantity sufficiency, perceived quantity overload, and information specificity of search) affect application discoverability in mobile application stores. Third, we investigate the supporting role of environment-related facilitators (application store coherence, providing user recommendation systems, and having different channels through which applications can be accessed) on application discoverability. Fourth, we explore whether there are cultural differences in the relationships between application discoverability and its facilitators, using two sub-samples collected from different countries, the United States and South Korea. In addressing these research goals, we draw on an environmental psychology perspective to develop our theoretical framework for explaining the conflicting goals of application discoverability and application quantity in mobile application stores.

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The paper is organized as follows. We first describe mobile application stores and then outline the environmental psychology perspective as a theoretical base underlying our research. We then propose our research model and pose several hypotheses regarding how application discoverability and its quantity-related and environment-related facilitators are related. We discuss the research methodology used in this study, and present the empirical results of our Partial Least Squares (PLS) analysis. We conclude by noting the implications of our findings, the limitations of our study, and directions for future research.

## 2. Background

### 2.1. The mobile application store

Mobile applications provide value to users by enabling them to live more productive and enjoyable lives as they gain near-instant access to the information and services that they desire [28]. Given the wide usage of mobile applications, researchers have studied many aspects of how people use mobile applications [10,19,46,67]. The number of applications for mobile devices is rapidly increasing and users who were traditionally passive consumers of information now play a more active role as prosumers with different usage patterns [10,67]. As a relatively new environment, mobile application stores are playing a critical role in revolutionizing the landscape of mobile applications [19]. A mobile application store is a service for users of mobile devices such as iPhones, Android phones, and BlackBerrys, allowing users to browse and download software applications for use on their mobile devices [19]. Applications are also available for tablet devices and personal computers. The most successful and best-known application stores are Apple's App Store, Android Market (rebranded as GooglePlay in 2012), and App World for BlackBerry users. Specifically, mobile application stores provide an environment in which application developers deliver their software applications and users consume the applications [46]. As the number of applications increases, the need to sift through a high number of applications can cause users to spend more time and effort to find the application they want [73]. Finding the appropriate application in a mobile application store can be regarded as a painstaking task for users. Therefore, application discoverability is becoming a serious concern for mobile application users, application stores, and application developers.

### 2.2. An environmental psychology perspective

In order to better understand the mobile application store phenomenon, we draw on the perspective of environmental psychology. Environmental psychology is the branch of psychology that is concerned with providing a systematic account of the relationship between person and environment [72]. From this perspective, human behavior is determined by the environment as a powerful and direct causal influence. The environment plays a critical role as more than an antecedent of human behavior; it also affords opportunities for future action [72]. The environmental psychology perspective is useful when interpreting human functioning in the presence of large amounts of information, such as when consumers are confronted with a vast number of applications that they may wish to purchase.

According to the environmental psychology perspective, one way in which humans cope with processing information is through the use of cognitive maps. As an accumulation or summary of experiences, people's cognitive maps can be used to make their way through an environment [70]. The cognitive map thus appears to be a promising concept in the study of the relationship between environment and cognition [42]. In addition, people are motivated to use and extend their cognitive maps through environments designed to take advantage of the maps. People appreciate and are motivated to use information, which helps them expand previous knowledge contained in their cognitive maps [42]. On the other hand, people have trouble

understanding information that is not connected to their cognitive maps, and thus, people are not motivated to use such information. That unconnected information contributes to cognitive overload is a central idea in environmental psychology [42,72]. Further, providing too much information creates an impediment to engaging the recipient's internal cognitive map [42]. Heavily information-laden environments are more likely to elicit unpleasant emotions, and they cause individuals to experience feelings that they have lost control over interaction with the environment [36].

The environmental psychology perspective emphasizes the importance of developing effective environments in which users can process information. Kaplan and Kaplan [42] developed a preference framework to describe how people use information to satisfy their need to make sense of and to explore an uncertain world. Their research proposes two cognitive processes crucial to human survival: making sense and involvement. They suggest that there is a natural tendency in humans to prefer those environments that are most favorable for promoting sense-making (that is, those that have coherence and legibility) and involvement (those that have complexity and mystery) [22]. Hence, environmental psychology explains how providing users with effective environments makes it easier for them to process information and function effectively [70].

We propose that offering effective environments to users plays a critical role in fostering user satisfaction and thereby sustaining the competitive advantage of a mobile application store. With the growth of mobile application stores, practitioners also regard the effective design of a viable environment as a key to success in the stores [55]. To simultaneously achieve the goals of increasing application quantity while improving application discoverability, the application store needs to provide users with the appropriate functionality in the form of "discoverability facilitators." These include quantity-related and environment-related facilitators of application discoverability in mobile application stores. We hypothesize that these facilitators increase discoverability and, thereby increase user satisfaction with the application store.

## 3. Research model and hypotheses

This study aims to investigate facilitators of application discoverability and their roles in addressing the conflicting goals of providing a large quantity of applications and making discoverable the specific applications that users desire. Fig. 1 shows the research model, including the major theoretical constructs and their hypothesized relationships.

In this section, we begin by explaining that application discoverability plays a critical role in enhancing user satisfaction with huge numbers of applications in mobile application stores. According to an environmental psychology perspective, individual preference can be framed in the context of an informational approach to human functioning [42]. It is applicable to a wide range of informational circumstances (e.g., application quantity), and it is also applicable to the environmental applications of these components (e.g., environmental facilitators). Therefore, we explain our hypotheses that application discoverability is influenced by quantity-related and environment-related facilitators. More specifically, we propose that quantity-related facilitators, including two distinct perceptions about quantity as well as users' information specificity of search, may influence application discoverability. After explaining these relationships, we then go on to propose three environment-related facilitators of mobile application stores that improve application discoverability – application store coherence, user-generated reviews, and multi-channel engagement. We argue that each of the aforementioned facilitators support users' efforts to find the applications they desire in mobile application stores, which in turn influences user satisfaction with the application store (see Fig. 1). Additionally, we include control variables (such as application store type and mobile application store usage) in our model.

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