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Determinants of adoption of mobile games under mobile broadband wireless access environment

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Abstract

Rapid advancements in technology and changes in cost have made the game industry a profitable area. Recently, Mobile Broadband Wireless Access technology-based (MBWA) games have been introduced into the marketplace. They are superior to current mobile games in terms of transmission speed and price and to older online games that have limited mobility. Since MBWA technologies, such as High Speed Downlink Packet Access (HSDPA), Wireless Broadband (WiBro), and Worldwide Interoperability for Microwave Access (WiMAX) have been developed, customers can enjoy games whenever and wherever they like. We decided to analyze the factors that influence potential users' adoption of MBWA games using an extension of TAM. Most previous game-related studies lack a comprehensive approach to both technological and psychological aspects of game adoption and do not reflect a variety of consumer preferences. We therefore extended TAM to include an emotion variable and measured the moderating effects of gender, age, and prior experience on game adoption. Overall, the results revealed that the effect of perceived enjoyment was very important but that usefulness did not influence an individual's attitude. In addition, we also find that age can be key moderator of game acceptance.

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1. Introduction

The game industry is growing as IT and the web develops. Its strong potential lies in the availability of a "one-source, multiuser" environment. Games started as arcade games or become available as video games and as the game gained popularity, its content was transferred to other platforms, such as online games (where tickets are purchased through a network of computer terminals located at retail outlets—including

lotto, keno and number games) and mobile games as processing speed and graphic processing ability of PCs developed. This market has been expanding very quickly, driven by increasing numbers of broadband infrastructure users, advancement in graphic engines, and the introduction of 3D games.

Mobile games are played on PDAs, cellular phone, or portable game device. As 2.5G and 3G services have spread, the sophistication of the games has increased. Because many mobile games use cell phones, they are more accessible, mobile, portable, and convenient than other game platforms. They allow users to enjoy games without interruption and their accessibility has attracted many to use mobile games. However, existing games have some limitations: the interface, which is simple

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(because most cell phone interfaces are optimized for making phone calls), limited storage capacity and data speed (which are insufficient for large-scale mobile games especially those with 3D visuals), and a relatively expensive service charge.

MBWA games, including HSDPA, WiBro, and WiMAX, are wireless IP network based; they can provide high-speed games with fast transmission, mobility, space availability, terminals and economy regardless of the device with which they are played. Thus MBWA resolves problems of mobility, price burden and network speed and service providers will have to adopt a business strategy that favors user adoption of games. In addition, it is important to determine factors important to users and providing them and identify problems and remove them to increase accessibility to games [21]. We therefore decided to analyze users' intentions to play MBWA games; i.e., investigate the factors that influence potential users' adoption of MBWA games.

In many prior studies, the main foci were technical and psychological aspects. Studies of effective methods to improve game technology included three-dimensional rendering of graphics and sound to make the game more realistic; and algorithms to make artificial intelligence control characters more effectively. In studying psychological aspects, Sweetser and Wyeth [18] suggested a model that included player enjoyment. Choi et al. [5] analyzed gamers' preferences and important design elements using four factors: interest, curiosity, control, and concentration. However, all studies have overlooked major psychological influences. Therefore, we added material reflect the emotional aspect of games to TAM. Other influences depend on individual or group differences. Therefore, we considered gender, age, and prior experience as moderator variables on user characteristics, dividing the population into subgroups according to each moderator.

2. Theoretical background

Perceived usefulness (PU) and perceived ease of use (PEU) have been shown to be factors in explaining user acceptance behavior toward using a system (Fig. 1) [7].
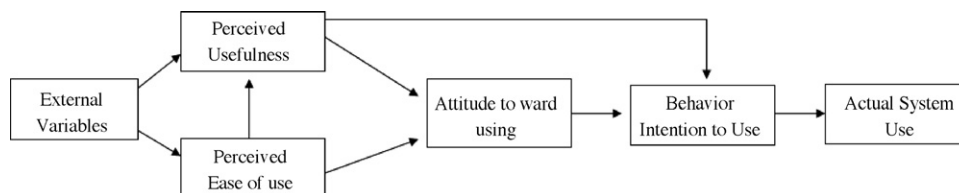
In the adoption model of games, Hsu and Lu [11] examined customer intention to use online games. They incorporated social influence and flow experience as belief-related constructs to predict users' acceptance of online games. Their study empirically showed that PU did not motivate users to play online games, but directly affected user attitude. They also showed that social influences, including perceived critical mass and social norms, significantly, directly, and separately, affected attitudes and intentions. Consequently, PEU was demonstrated to play a dominant role when people play online games. Kwang and Kim [14] investigated the factors influencing the usage and acceptance of mobile games and showed that PU and ease of use were the major determinants for mobile game users. Four factors (ease of use, self-expression, visibility, and innovativeness) were empirically shown to determine the level of PU. In addition, innovativeness and facilitating conditions were found to affect ease of use directly.

Researchers have also been interested in the moderating effect of experience, voluntariness, gender, and age on the relationship between the independent and dependent variables. Venkatesh and Davis [22] showed that age and gender were key modifiers of the individual's activity. Such differences were also shown to influence wireless internet adoption [12]. Several studies have investigsted experience as a moderator but called it "prior experience" [19], "past usage" [1], or "habit" [20]. but most studies have used *period* and *frequency of use* as their experience index, thus dealing more with quantity than quality. Behavioral intentions of experienced and inexperienced users at a computing resources center have been studied and the influence factors were surveyed; some variables influenced outcomes. The inexperienced group was more affected by the behavioral intentions of PU, subjective norm, and PEU than the experienced group. Influence of Perceived Behavior Control affected the inexperienced more than the experienced. Potential customers considered perceived enjoyment as the most important among all significant factors that affected their attitude and intention toward T-commerce [25]. They compared

Fig. 1. Technology Acceptance Model (Davis et al.).