Acceptance of Mobile Entertainment by Chinese Rural People

Jun Liu[1], Ying Liu[2], Hui Li[1], Dingjun Li[1], and Pei-Luen Patrick Rau[1]

[1] Institute of Human Factors & Ergonomics, Department of Industrial Engineering, Tsinghua University, Beijing 100084, China
[2] Nokia Research Center, No. 5, Donghuan Zhonglu, Beijing Economic & Technological Development Area, Beijing 100176, China
liu-jun08@mails.tsinghua.edu.cn, ying.y.liu@nokia.com, hli.sunshine@gmail.com, ldj@mails.tsinghua.edu.cn, rpl@mail.tsinghua.edu.cn

Abstract. This study explores and analyzes contributing factors of mobile entertainment acceptance by Chinese rural people. First, 27 factors were drawn from literatures. Then a new factor "cost" was found through interview. After that, a survey was built based on the 28 factors. From the data collected in Chinese rural area, seven factors were extracted through explorative factor analysis: social influence, technology and service quality, entertainment utility, simpleness and certainty, self-efficacy, perceived novelty, and cost. Finally, a comprehensive model was provided involving the seven factors as well as their importance rank. This research provides a comprehensive approach in technology acceptance theory. It can also help practitioners to better understand the rural user group and improve their products accordingly.

Keywords: Technology acceptance; mobile entertainment; rural people.

1 Introduction

Mobile technologies and applicants are rapidly and widely developed for entertainment. However, entertainment related services are far from fully accepted by mobile phone users, especially in emerging markets. Therefore, to study the emerging market users' perception and acceptance of mobile entertainment is a great demand for business, technology and social practice.

The objectives of this research include: 1) to build a comprehensive model for the acceptance of mobile phone entertainment by Chinese rural people, considering users, technologies and the environment; and 2) to generate design and ecosystem suggestions for improving the acceptability of mobile entertainment services..

The research is creative and significant from two aspects: the first by its comprehensive modeling paradigm, and the second by its special focus on mobile entertainment issue. Mobile entertainment acceptance is a sub-question of technology acceptance. Since 1975, much has been done in investigating the technology acceptance [1]. Several models have been developed to describe contributing variables of technology acceptance. However, there is no comprehensive model considering users,

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technologies and the environment. Some of the proposed models seem to be comprehensive, but if the measuring items are examined, they are still only focusing on technology itself, or the users [2]. So a comprehensive model which can analyze and predict better is vital to build.

On the other hand, although there are lots of researches in the topic of technology acceptance, few have been focused on the special issue of mobile entertainment acceptance. Since mobile entertainment is different from other technologies for its mobility, legerity, emotionality, and personalization, the contributing variables of mobile entertainment acceptance should act differently from those of technology acceptance. Therefore, there is a great demand researching factors influencing user's acceptance of this particular mobile service, and models describing how those influences happen.

To achieve those objectives, a four-phase study was conducted. Phase I was background research. As mobile entertainment acceptance is a sub-issue of technology acceptance, researches on the latter topic are reviewed. From literatures, factors contributing to technology acceptance were concluded as the basis of following study. Phase II was user study by in-depth phone interviews. A new factor that is not included in former literatures was found during the interview analysis. In Phase III, survey and modeling, all the factors were validated and modeled together. Phase IV was to discuss design and ecosystem suggestions based on the model.

2 Background Research

2.1 Mobile Entertainment Definition

According to Mobile Entertainment Forum 2003, the term "mobile entertainment" refers to "entertainment products that run on wirelessly networked, portable, personal devices, which includes downloadable mobile phone games, images and ring tones, as well as MP3 players and radio receivers built into mobile handsets." The term excludes mobile communication like person-to person SMS and voicemail, as well as mobile commerce applications like auctions or ticket purchasing [3]. In this research, we adopt this definition, and encapsulate the device scope to mobile phone.

2.2 Technology Acceptance Theories

Information technology acceptance is relatively well studied with many models and researches. The most widely used four models are the theory of reasoned action (TRA), the technology acceptance model (TAM), the theory of planned behavior (TPB) and the innovation diffusion theory (IDT).

The TRA, developed by Fishbein and Ajzen[1], shows that a person's specific behavior is determined by the behavioral intention. In turn, behavior intention is determined by the person's attitude and subjective norm. The TAM, developed by Davis [4], is adapted from TRA, and is specially focus on the behavior of information system acceptance. In this model, "perceived usefulness" and "perceived ease of use" are primarily relevant to the acceptance behaviors. The TPB is a theory of planned behavior developed by Ajzen who is also the developer of TRA [5]. It is an extension of TRA by adding the variable of "perceived behavior control". The IDT, developed by Rogers [6], explains the behavior of innovation adoption. There are strong affiliations

among the four models. First of all, TPB extends TRA with the additional factor of "perceived behavior control". Then, TAM is based on TRA, and is focus on information technology acceptance. For the two theories of TAM and IDT, the core constructions are very similar: "perceived usefulness" is very like "relative advantage" and "perceived ease of use" has similar meaning with "complexity" [2][7].

Based on the theories and related researches, totally 27 factors contributing to technology acceptance are concluded. The related measure items for each factor are collected as well. For example, to measure "perceived ease of use", there are items like "learning to operate information technology would be easy for me" [8]. The 27 factors are listed as below.

1. Perceived usefulness [7][9]
2. Perceived ease of use [4][7][8][9]
3. Perceived complexity [6][10]
4. Perceived enjoyment/fun [11][12]
5. Output quality [9]
6. Relative advantage [7][6]
7. Compatibility [13][7][6][14]
8. Perceived behavioral control [5][12][14]
9. Subjective norm [5][14]
10. Peer influence [14]
11. Word-of-mouth [15][16]
12. Job relevance [17][18][9]
13. Voluntariness [7][12][9]
14. Innovativeness [19]
15. Self-efficacy [20][14][12]
16. Computer anxiety [12]
17. Computer playfulness [12]
18. Technology facilitating conditions [14]
19. Organizational support [10]
20. Visibility [6]
21. Trialability [6]
22. Being-younger [21][22]
23. Perceived modernness [23]
24. Perceived Risk [24]
25. Communication facilitating [21]
26. Perceived novelty
27. Image [7][9]

3 Research Questions

The research was aimed to build a comprehensive model for the acceptance of mobile entertainment by Chinese rural people. Two research questions are: 1) what variables can affect the acceptance of mobile entertainment by Chinese rural people? And 2) what are the relationships between these variables and rural people's mobile entertainment acceptance intention?

The previous 27 variables extracted from literatures were generated in the context of information technology. In this study, they are supposed to affect the acceptance of mobile entertainment as well. Besides, new variables are also supposed to be found in this specific technology area. All these variables could have different impact in users' acceptance, and we are asking which are crucial, and which are not so related. Therefore, the model not only structures all the variables into a few dimensions, but also describing the weights and importance of them, so that the model can be more predictive and more practical.

4 Methodology

The study has two steps. Firstly, qualitative user study using in-depth phone interview was adopted to explore the factors contributing to the acceptance of mobile entertainment by Chinese rural people. As the 27 technology acceptance factors extracted from literatures are also supposed to have effects in this study. The aim of the interview was to check if there are factors lost besides the theoretical based 27 factors. Secondly, quantitative survey data were collected to model the relationships between these variables and rural people's mobile entertainment acceptance intention.

4.1 In-Depth Phone Interview

Interview Questions. To explore factors, the open end explorative questions were formulated. The questions were mainly about participants' experiences using mobile services including entertainment services, their entertainment life, and the behaviors of surrounding people. A question example is "what things happened will promote you to use the mobile phone services, or why do you want to use it?"

Participants. Three Chinese rural people, two male and one female, with their ages ranged from 28 to 50 took part in the interview. They all had mobile phones and had mobile entertainment experiences. They were recruited from two provinces of China (Shandong and Shanxi), where the economic and life patterns are different.

Procedure. The whole interview was taken by mobile phone with a loudhailer, and recorded on PC. The interview time for each participant was 30~45 minutes. During interview, the dialect of each district was used.

Data analysis. Following the Long Table Approach [25], the transcripts from phone interview were printed out, followed with a series of cutting and categorizing of the transcripts. At the end, citations reflecting the same factor were pasted together, and the factor was named and written beside.

4.2 Survey

Questionnaire Construction. Twenty-nine items were designed based on the factors found from the interview. All the items were attitude statements concerning mobile entertainment acceptance. For example, from the factor of "perceived usefulness", an item was designed like "I often need to use mobile entertainment in my daily work and life." Three of the items were inversed to help excluding the invalid samples during the analysis phase. The 7-point Likert scales were used with different levels of

agreement to the statements from "1=totally disagree" to "7=totally agree". The definition of "mobile entertainment" was given in front of every page to help the participant to remember. For further analysis, questions about personal information, mobile phone and related technology experience were included in the questionnaire.

Participants. The sample size was designed according to Gorsuch [26], who recommended that the subject to item ratio should be larger than 5. Therefore, at least 145 participants should fill in the questionnaire. We finally got 150 valid questionnaires in the research. All the participants were from the rural areas of Dezhou City in Shandong province of China. Their ages ranged from 16 to 56, with an average of 33.39. Most (51.3%) participants have an education level of junior high school. All the participants had mobile phones, with 87.3% had used more than one mobile before. The prices of most (51.4%) participants' mobiles were in the range of 500-1000RMB.

Procedure. As most rural people are not familiar with web-based questionnaires, paper-based questionnaires were given to them face to face. In order to keep the validity of each questionnaire, the entire process of answering the questions were assisted by the survey conductor. After filling the survey, each participant got 20 RMB reward.

Data Analysis. Among the 29 items of the questionnaire, 3 of them were reversed items aiming to identify invalid samples. They were excluded for further analysis. Therefore, 26 items were utilized in this phase of data analysis. The data analysis was conducted by three steps. Firstly, the internal consistency of the questionnaire could be tested by Cronbach Alpha calculation [27]. Secondly, exploratory factor analysis was used to find the structural characteristics among the items. We used the Kaiser-Meyer-Olkin (KMO) testing to analyze if the items had enough common information. Then the "principal component analysis" method for factor extraction was adopted, and the rotation method "Varimax with Kaiser Normalization" was used to further interpret these extracted factors. After the factor extraction, some of the original items were eliminated or grouped. And each factor was named by its included items. Finally, a visualized model was build to describe the results comprehensively.

5 Results

5.1 Interview Results

Eighteen factors were explored from the interviews. Seventeen among them are matched with those concluded from literatures. They are: 1) perceived usefulness; 2) perceived ease of use; 3) perceived complexity; 4) perceived enjoyment/fun; 5) output quality; 6) relative advantage; 7) compatibility; 8) perceived behavioral control; 9) job relevance; 10) voluntariness; 11) innovativeness; 12) technology facilitating conditions; 13) organizational support; 14) visibility; 15) perceived risk; 16) communication facilitating; and 17) perceived novelty. One new factor which cannot match any one from the literatures was named as "cost". "Cost" means the charges of a particular service which could influence users' acceptance. Citation examples are like: "*Is listening to music for free?*"and "*I hope the function/service totally for free.*"

Although there are other 10 factors which were obtained from literatures were not explored from the phone interview, we cannot delete them at this step, for the limit of

sample size. The aim of the interview was achieved to check if there are factors lost besides theoretical based 27 technical acceptance factors. Therefore, all those 28 factors were tested and analyzed quantitatively in the next phase of survey.

5.2 Survey Results

Firstly, the Cronbach's alpha of the 26 items is 0.812. For each item, this index can not increase significantly if the item is deleted. From literatures, an alpha (α) value of 0.70 or above is considered to indicate strong internal consistency [28]. For exploratory research, an alpha value of 0.60 or above is also considered significant [29]. This indicates that all the 26 items in our study has a high internal consistency, therefore they were all included for further analysis.

Secondly, two iterates of exploratory factor analysis were conducted. After the first run, according to the criteria from literatures [29][30], we eliminated a single-item factor (item 21), and an item (item 19) with factor loadings significantly less than 0.45. In the second run, seven factors were extracted from the left 24 items, with 61.79% of variance be explained. For both iterates, the exploratory factor analysis method is appropriate because the KMO were 0.783 for the initial 26 items, and 0.793 after eliminating the two items, both more than 0.7.

The extracted factors were named by the common meanings of the items included (Table 1). The first factor **social influence** shows that others' suggestion and social norms can influence the users' acceptance for mobile entertainment. Also people like to accept the products that promote their social image or enhance social communication. This factor is related with the theoretical factors of being-younger, peer influence, subjective norm, word-of-mouth, and organizational support. The second factor **technology and service quality** is about the quality and convenience of mobile entertainment technology and service. It includes the former theoretical factors of trialability, technology facilitating conditions, output quality, innovativeness, and visibility. The third factor **entertainment utility** means the emotional and entertainment utility of mobile entertainment. It is related with the theoretical factors of perceived enjoyment/fun, voluntariness, perceived usefulness, and perceived modernness. The fourth factor is the users' perceived **simpleness and certainty** of the interaction with the product. People tend to accept the products when the interaction is simple and the consequences are certain. It is formed by two theoretical factors of perceived ease of use and perceived risk. The fifth factor **self-efficacy** is self perception of being able to use the service or product. It is related with theoretical factors of self-efficacy, perceived complexity, and perceived behavioral control. The sixth factor **perceived novelty** indicates that people are like to accept novel products and services. And the last factor is the **cost** of familiar or unfamiliar mobile entertainment services.

The reliability and validity of a questionnaire's construction are confirmed. The internal consistency methods are adopted to establish reliability in this study. After eliminating two items during factor analysis, the Cronbach's alpha of this measuring instrument is 0.814, which indicates strong reliability according to former discussion. The seven factors account for 61.79% of the total variance and factor loadings range from 0.44 to 0.81. So the construct validity of the instrument is acceptable.

Table 1. Factor naming

Factor Name	Questions involved
Social influence	12. Mobile entertainment can make me feel younger. 14. If my friends think I should use mobile entertainment, I will try it. 20. I feel that people around (family member, friends, etc.) think I should use some mobile entertainment. 18. If my friends tell me some mobile entertainment service, I will try it. 17. I think mobile entertainment provide me more chances to communicate with others (family member, friends, etc.).
Technology and service quality	29. I hope I can try a ring tone before download it. 27. If some problem happens during the mobile entertainment process, I hope to get help and instruction easily. 22. If the mobile phone can take clear and good-quality photos and videos, I would like to use the function. 28. I like novel mobile games rather than those people are familiar with. 15. Many people around me use mobile entertainment.
Entertainment utility	5. I find mobile entertainment enjoyable. 7. I like to take mobile as an entertainment tool, and play with it voluntarily. 1. In daily work and life, I often need to use mobile entertainment. 8. Mobile entertainment can keep me up with the times.
Simpleness and certainty	2. I will give up a mobile entertainment if it's too hard to use. *(negative loading)* 25. I concern a lot of mobile monthly tariff. 9. I think there are risks in some mobile entertainment process. *(negative loading)*
Self-efficacy	10. I can use mobile entertainment without any help. 16. I don't feel trouble in using mobile entertainment. 6. I'm capable enough to use mobile entertainment.
Perceived novelty	11. Mobile entertainment is novel to me. 26. I decide whether to use a mobile entertainment by it's price. *(negative loading)*
Cost	24. A low price is very important for me to buy a mobile. 23. I think it's more convenient to take photos/videos using a mobile than using a particular camera. *(negative loading)*

Finally, according to the results of factor analysis, the mobile entertainment acceptance (MEA) model for Chinese rural people was built (Figure 1). The model has two main aspects:

First, seven factors that influence Chinese rural people's mobile entertainment acceptance, represented by seven ellipses in the visualized model (Figure 1).

Second, the importance order of each factor, which is ranked by the factor eigenvalue: social influence (3.170), technology and service quality (2.875), entertainment utility (2.524), simpleness and certainty (1.713), self-efficacy (1.644), perceived novelty (1.510), and cost (1.394). Factor eigenvalue is the measurement of explained variance. For each factor, the higher the eigenvalue is, the more variance it can explain, therefore in the model the more important the factor is. In our visualized model (Figure 1), the area of each ellipse represents the importance grade, for example, the first ranked factor "social influence" has the largest area.

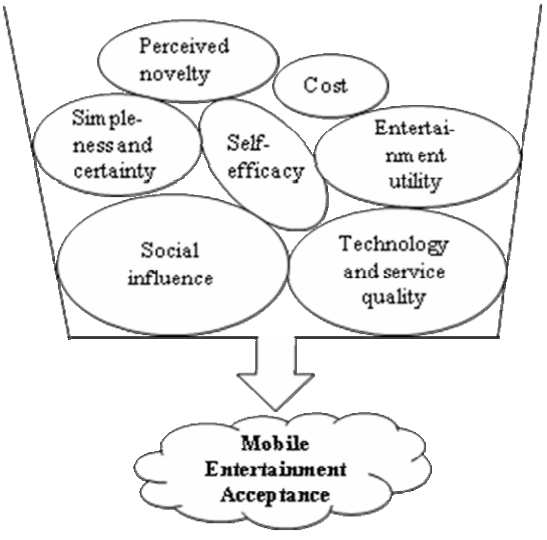


Fig. 1. Mobile entertainment acceptance (MEA) model for Chinese rural people

6 Discussion and Conclusion

In the research, the MEA model considers users, technologies and the environment comprehensively. It not only involves most of the theoretical factors that have been proved to influence users' technology acceptance, but also structures them into seven main factors and gives the importance weights of each one. As a result, a whole picture is provided for technology acceptance theory. Additionally, a new factor "cost" was found to effect users' acceptance, at least for rural people's mobile entertainment acceptance. It suggests a novel point of view and makes the theory more comprehensive.

Based on the comprehensive model, we can easily draw a series of practical suggestions for mobile entertainment service and ecosystem design. From the empirical index, practitioners can also get references for which is more important and which is less. For example, the model shows that Chinese rural people are most influenced by social factors when considering whether to accept a new technology, so designers and marketers can put social strategies first priority.

However, the model still needs to be refined to be more predictive. First is because all the seven factors are compared and weighted by the factor eigenvalue. This method simply puts them in the same level and ignores the internal relationships among factors. Therefore, further analysis, like path analysis or regression is needed to explore their real relationships. Second, the sample is from a single rural area of China. However, several different types of rural society exist all around the world, varying in economics, culture, education, weather, and so on. All these may influence people's technology acceptance pattern. A more systematic sample will be explored to verify the model.

In conclusion, through both qualitative and quantitative research, a factor-based model is built to invest the mobile entertainment acceptance by Chinese rural people.

Seven factors are involved as well as their importance index. This research provides a comprehensive approach in technology acceptance theory. It can also help practitioners to better understand the rural user group and improve their products accordingly.

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