AN EMPIRICAL STUDY ON INFLUENCING FACTORS OF CUSTOMER SATISFACTION TO ELIMINATION MOBILE GAME

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Thematic Certificate

To

JIQI HE

This Independent Study has been approved as a Partial Fulfillment of the Requirement of International Master of Business Administration in International Business Management

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Abstract

Title: An Empirical Study on Influencing Factors of Customer Satisfaction to Elimination Mobile Game

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With the rapid development of times and continuous progresses of technologies in the era of internet, mobile phone has become an essential part of people's daily life. People's life becomes dramatic convenience because of diversified mobile applications. Elimination mobile game applications are highly appreciated as soon as they are launched. Compared to computer games, elimination mobile game integrates convenience and interestingness of mobile games. It has attracted massive users, covering users from all sectors of the society and users of all ages.

As a fragmentary time game application, the game time is mainly controlled in 30min, which realizes convenience and interestingness truly. Existing studies on elimination mobile game applications are not comprehensive yet. In this paper, key attentions are paid to customer satisfaction (CS) to elimination mobile game applications. The concept of satisfaction is often used to study traditional products and services. It is one of important factors that reflect quality of various mobile applications at present. Here, it is studied by combining questionnaire survey and data analysis. The research model is established according to hypotheses. Influencing factors of CS to elimination mobile game applications are disclosed.

Based on survey results and analysis, general features, game content, and economic efficiency and interaction are three major influencing factors of elimination mobile game applications. Some rationalization suggestions are proposed according to

conclusions. This paper is hoped to provide references for development of elimination mobile game applications.

Keywords: Elimination mobile game application, customer satisfaction, empirical analysis, influencing factors

摘 要

题目: 消除类手机游戏用户满意度影响因素实证研究

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2017 / 12 / 24

随着时代的快速发展，科技的不断进步，互联网时代已经到来，手机成为人们日常生活不可缺少的组成部分，多种多样的手机应用给人们的生活带来便利，消除类手机游戏应用更是一经推出便广受好评，相比较电脑上的游戏类型，这类游戏兼具了手机游戏的便利性与趣味性。其拥有巨大的用户群，从学生到上班族，从青年人到中年人，无不对其着迷。

作为一款碎片时间游戏应用，游戏时间大多在半小时以内，可谓真正做到了方便快捷，且具有趣味性。目前对消除类手机游戏应用的研究还不全面，本文主要对消除类手机游戏应用的用户满意度进行研究，满意度这一概念常被用于研究传统产品和服务等领域，是目前反映各类手机应用质量的重要因素之一。本文采用问卷调查与数据分析结合的方式进行研究，并根据假设建立研究模型，对影响消除类手机游戏应用用户满意度的因素进行探究。

根据本文调研结果及分析得出影响消除类手机游戏应用的因素主要为基础性能、游戏内容项、经济性及互动性三方面。并就结论提出合理化建议，希望本文的研究可以对消除类手机游戏应用的发展提供参考价值。

关键词： 消除类手机游戏应用 用户满意度 实证分析 影响因素

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I'd like to give my sincere thanks to SIAM University for giving me a learning opportunity in this thesis design. My tutor not only gave me thorough guidance from selection of title, framework design and details correction, but also proposed many valuable opinions and suggestions. His strict academic attitude, highly professional dedication, cautious work style and audacious entrepreneurial spirit have affected me significantly. Moreover, I'm enlightened by his profound knowledge, broad vision and sharp thought. This thesis is accomplished under careful guidance and strong supports of my tutor.

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Finally, sincere gratitude shall be given to all reviewers for their time in reading my thesis.

Sincerely yours,

JIQI HE

Siam University

Catalogue

CHAPTER 1

INTRODUCTION

1.1 Research background

With continuous progresses of the times and continuous development of technologies, people pay more and more attentions to novel products of the age, such as smart phone. The prevalence of smart phone not only promotes development of Internet, but also brings a leapfrog development of mobile applications. Driven by multiple factors like network operators and smart phones, mobile game rises suddenly as a new force and develops dramatically. Some overwhelming games have broke regional and cultural boundaries, and conquered the global market.

On August 4th, 2017, China Internet Network Information Center (CNNIC) issued the 40th Report of China Internet Development Statistics in Beijing. It is reported that the mobile netizen population in China reached 724 millions by June, 2017, which increased by 28.30 millions than that in 2016. The proportion of netizens surfing the Internet with cell phone increased from 95.1% at the end of 2016 to 96.3%. This proportion kept an increasing trend in past years (Fig.1.1).

Fig. 1.1

The customer scale of cell phone network game in 2017 was 385 millions, which accounted for 53.3% of cellphone netizens and 33.80 millions higher than that at the end of 2016 (Fig.1.2). According to statistical data, more than 50% of cellphone netizens were playing mobile games. Such data was increasing year by year. Many PC game fans threw themselves into mobile games for their convenience and

specificity of operation mode. More importantly, development of mobile game has become a trend. Competitive games on mobile end have maintained considerable revenues in the first half year of 2017. Surrounding industrial ecology like competition activities which are derived on this basis was prosperous.

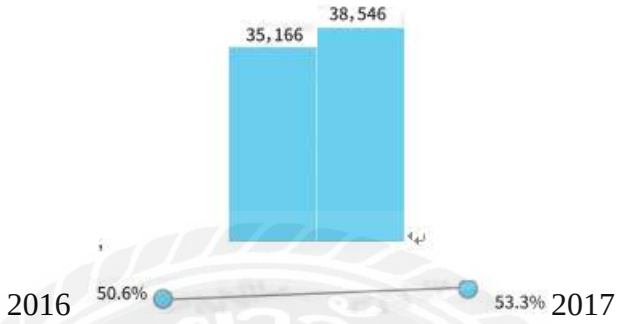

Fig. 1.2

Then, what is the cause of annual growth of mobile game users and growth of user proportions? With respect to one mobile game application, CS is the principal purpose. In other words, CS of mobile applications is an important index that determines their survival. In this paper, influencing factors of CS are discussed deeply.

1.2 Research objective

With the accelerating pace of life, mobile phone is not a simple communication tool any more, but becomes a personal portable terminal integrating communication, music, film, game and entertainment. Currently, the mobile game industry develops rapidly, manifested by annual growth of user proportions and prosperous development trend. In mobile game application market with intensifying competitions, CS of applications is attracting more and more attentions. CS of mobile game applications becomes an important reference that influences user experience and usage. In this paper, influencing factors of CS to elimination mobile game applications are discussed. Businessmen of mobile game applications can formulate

programs to improve CS according to research conclusions, and further attract rest users of mobile phone and PC users by centering at improving CS.

In this paper, influencing factors of CS to elimination mobile games are explored by questionnaire survey and empirical analysis. It aims to propose reasonable suggestions to development of elimination mobile games and increase quality of elimination mobile games. Relationships of different factors and their influence degrees are analyzed, and a model is constructed.

1.3 Research significance

As the mobile phone industry making progresses continuously, mobile game applications achieve an outstanding development. People's life becomes more and more symbiotic with diversified and interesting mobile game application. Elimination mobile games are highly appreciated once they are launched into the market. These games occupy most of China's mobile game market shares for simple design and rich playability. Development of mobile game industry in China is attributed to favorable environment and cordial pursuit of people. However, it encounters many restraints during the development. For further prosperity of elimination mobile game, restraints are analyzed based on state of the art and the concept of CS is proposed, aiming to fill in blank of researches on CS to elimination mobile games and expand research range of elimination mobile game applications.

1.4 Theoretical framework

In this paper, key attentions are paid to influencing factors of CS to elimination mobile games. Satisfaction is sensitive to many factors which are related with users and games to some extent. Therefore, possible influencing factors shall be collected by different ways and then analyzed. Proper hypotheses of CS to elimination mobile games shall be made, based on which the major theoretical framework of this paper is established. These are conducive for the structural design and empirical study.

CHAPTER 2
LITERATURE REVIEW

2.1 Literature review concerning elimination mobile games

2.1.1 State of the art

Nowadays, the third industrial revolution and big data era bring a prosperous development of smart phone industry. Mobile games can free people from time and spatial restrictions in entertainment. They not only can enrich spiritual life and practical life of people, but also are widely accepted as spiritual relaxation and enjoyment. The increasing games become an important component in people's daily life and entertainment. With popularization of 4G network in the world, a great deal of high-quality mobile games are developed, which offer people diversified choices. Although mobile games are developing prosperously as a sunrise industry, it is not so optimistic to the development status. Due to shortage of high-quality game development companies and related talents, existing popular games are not very satisfying. Most of them follow the same pattern and has no novel ideas. There's serious copy in game market. Many games steel character setting or stories of some successful games, which are easy to arouse sense of playing weariness of users. Many mobile game developers make low-cost and low-quality mobile games for pursuing profits blindly, without consideration to satisfaction of user experience.

2.1.2 Elimination mobile games

Elimination mobile game is one kind of puzzle game. Sometimes, it is called "triple town". The problem that players have to think and solve is to adjust game elements which are in chaos and random order into arranges of three or more same game elements according to certain laws through movement, transposition or pairing, finally eliminating them.

Elimination mobile games can be played by dragging. They are characteristic of playing in fragmentary time, low requirement on external environment and killing time. They are one of games which can be played on mobile phones. Compared to difficult operation of RPG on mobile phones, time-consuming

and difficult continuity of SLG, low interesting in puzzle games at agitation and losing interesting after first completion and boring of fruit cutting, the combination of elimination game and mobile phone is perfect and unassailable. It can be played everywhere at any time, such as carriage waggling in cold winter, coffee shop after noon and warm bed.

Elimination games are highly appreciated by people for following features:

Moderate or optional difficulties. Games which are too difficult or too easy will make players lose interest.

Comfortable sound effect.

Sensitive reaction of touch screen and cheerful visual effect of elimination

Delicate and beautiful game pictures.

2.1.3 Characteristics of elimination mobile games ------ heavy pressure

What are unique characteristics of elimination games from other types of games? Characteristics of elimination games are introduced in the following text.

Firstly, they are endless.

Almost no elimination game will popup “Game Clear” in the middle of playing and shall start all over again. Even there is, it is other type of games which copy characteristics of elimination.

Secondly, they have fast pace.

Indeed, some elimination games require careful thinking to eliminate all elements in the screen. However, most of them have time limits.

Technicians deem that the integration of above two characteristics is the largest feature of elimination game: “heavy pressure”. The most distinctive key of elimination games at design is to maintain fast input and output of massive heavy pressures during playing, and thereby increase playability of games.

Creation of heavy pressure of elimination games mainly depends on follows:

Create a stressful atmosphere

To input massive pressures, it is necessary to create a stressful atmosphere in playing. Firstly, background music shall change from slow to quick and maintain a strong rhythm sensation. Secondly, time bar can be used to intensify the stressful atmosphere, especially as approaching to the end of game time. Changes of

background elements also bring players a strong feeling of tension. Such feeling of tension is one of the greatest charms of elimination games.

Proper arrangement of tension and relaxation

Although it is necessary to create a stressful atmosphere, technicians disagree to keep players operate under heavy pressure for a long time, because this will cause great psychological and physical burdens to players and thereby arouse their fatigue and boring of the game. They prefer to design elimination games rich of rhythms. For example, it shall display the elimination animation after eliminating one group of elements or before entering into the next level to give players a short rest. In this way, players will feel tense and relax alternatively and enjoy themselves in playing the game.

Distinct modules

There's one famous saying in consciousness of psychology: "eyes like shortcut". Under high stresses, players will classify modules on screen quickly. Therefore, different types of modules shall have distinct visual difference, including color, shape and pattern. In particular, technicians recommended not to using the same color system for different types of modules.

Exaggerated visual effect

Several years ago, some games which were poplar on mobile platforms, such as the Angry Birds and Fruit Ninja were analyzed. It was found that they have one common characteristic ------ exaggerated visual effect. For example, the exaggerated separation effect at fruit cutting gives players a great sense of satisfaction. This is extremely important to elimination game since exaggerated visual effect at module elimination is one of important ways to help players to release pressure. However, the specific effect varies for different players.

"Sound effect! Sound effect"

Technicians use two exclamation marks for emphasizing the extremely important position of sound effect in elimination games. Elimination is a stereoscopic sensation. Losing sound effect is just like projecting a three-dimensional image into a two-dimensional one. With respect to design skills of sound effect, the famous elimination game "PopCap Games" shall be learned. For example, increasing music scales are used to enhance the sound effect.

Typological creation

The last one is typological creation. With simple operation and high popularity, many famous elimination games have been developed. The key to standing out lies in typological creation. There are great potentials in integration with other types of games.

2.1.4 Playing classification of elimination mobile games

Story-based traditional elimination games

Just as the name implies, story-based traditional elimination game is to add stories and background stories into the game. Players can understand more about the story by passing levels and collecting goods. This increases game contents and enriches the game background. Generally, players are asked to collect goods in games to enter into next level. Goods are collected by eliminating game elements to let goods fall off from the bottom. This often has time limitation. Energies in the prop slot will increase by eliminating multiple game elements simultaneously. The prop slot which collects energy to a certain value can be used to pass the game. Background music of such game is characteristic of period feeling. They can let players be personally on the scene and play the role completely.

Collection-oriented elimination games

Collection-oriented elimination games are a derivative of story-oriented elimination games. Some of them have complete and even fantastic stories, while some haven't. Compared to story-oriented elimination games, this type is more challenging because it emphasizes on collecting different elements or winning high scores.

Generally, some hints will be offered in the beginning, such as winning high scores and pass the game by eliminating specific type of goods, or passing the game by eliminating a certain amount of a specific type of goods. This type often has no time limitation, but has limitations on operation steps. Players have to calculate carefully to achieve the maximum benefits from each elimination step in order to overcome the challenge. This type of game requires players to think thoroughly on eliminating elements rather than depending on luck.

Strategy-oriented elimination games

Strategy-oriented elimination games are a type of interesting game. They focus on realize a goal by eliminating elements instead of how eliminate, so sound effect falls to the second position. For instance, moving every good to specific positions or move some specific goods together in order to pass the game. Playability and creativity are vital to this type of games. Since it is a brain-storming game, players will gain huge sense of achievement when passing a level.

Score-oriented elimination games

Score-oriented elimination games have very high playability for challenging higher scores. They have no limitations in time and elimination steps. Players can play until all goods are eliminated. Similarly, this type of games can prolong play time by using props reasonably to challenge higher scores. For high playability, players will play them over and over again, aiming to achieve higher scores.

2.2 Literature review on customer satisfaction

2.2.1 Definition of customer satisfaction

Customer satisfaction (CS) was introduced into the marketing field by Cardozo for the first time in 1965. It has been studied for nearly 40 years. In 1986, an American psychologist evaluated demand satisfaction of consumers by CS, thus evolving it from a living concept into a scientific concept. Specifically, enterprises evaluate customer satisfaction comprehensively and objectively in order to make customers satisfy their products or services completely, and integrate products, service and culture comprehensively according to investigation results. CS has developed from a simple business slogan and business objective into a relatively mature operating management mode. With the enhancing sovereignty consciousness of CS, market orientation and development of information management technologies, “CS” has attracted unprecedented attentions from the government, enterprises and consumers.

At present, there are many theoretical interpretations to CS. Howard&Sheth believed that satisfaction is the psychological state that consumers evaluate the reasonability of balance between cost and earnings. Pfaff deemed that satisfaction reflects the difference between ideal and actual situations of product mix. Kotler, a marketing authority, pointed out that satisfaction is the level of human’s sense. It comes from the comparison between designed performance or output of one product

or one service and people's expectation. However, CS describes one psychological experience of people no matter what definition is used. Kotler even expressed such psychological experience by the function of difference between consumers' expectation and consumers' perception.

Hence, the definition of CS can be summarized. CS is the actual psychological disparity between the commodity or service value and consumers' expectation. Lower psychological disparity implies higher CS.

2.2.2 Composition of CS

CS is the quantitative expression of users' satisfaction degree to the purchased product or services. It is a comprehensive index and covers three successive hierarchies:

Material satisfaction: it is the core hierarchy of users to products, including satisfaction degrees to functions, quality, design and category of the product.

Spiritual satisfaction: it is the form and derivative of users to products, including satisfaction degrees to appearance, color, package, taste and service of the products.

Social satisfaction: it refers to social benefit protection that users experienced in product and service consumption. Social satisfaction mainly focuses on overall social satisfaction degree of users. It requires protecting priori values, political values and ecological values of the overall social benefit during product and service consumption.

According to CS index model of the United States, CS is mainly manifested in perceived quality, expected quality, perceived value, overall satisfaction, customer complaints and customer loyalty.

Expected quality: It refers to expectations of consumers to quality of a commodity or service before purchase.

Perceived quality: It refers to customers' assessments to quality of a commodity or service after the purchase or use.

Perceived value: It refers to customers' perception to the value of a commodity or service after the purchase or use.

Overall satisfaction: it is the overall satisfaction degree of customers to a commodity and service.

Customer complaints: Customers complaint about the commodity or service to manufacturers or dealers through letters, telephones and other ways.

Customer loyalty: it refers to possibility of customers to buy products of the same brand in future.

Relationships of these six aspects are shown in Fig.2.1.

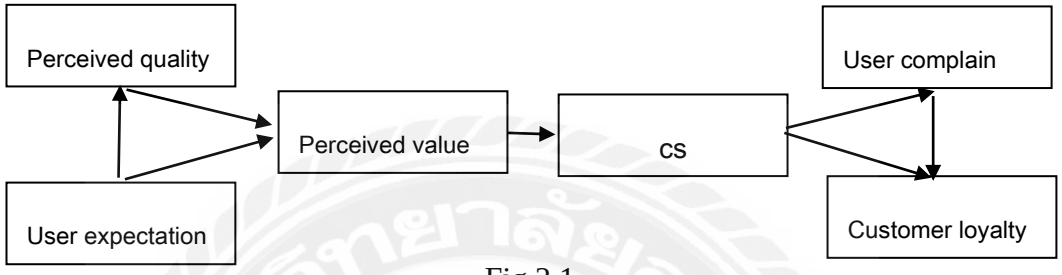

Fig.2.1

2.2.3 Influencing factors of CS

2.2.3.1 Regional income difference

Income level determines customers' selection of products and services. Customers with high income level generally possess certain brand awareness. They will pay attentions to brand image and quality level of products when evaluating satisfaction degree. On the contrary, customers with low income level regard price as the primary factor of consumption. Therefore, customers with different income levels have different evaluation standards to the same product or service.

2.2.3.2 Inharmony of information industry structure

Information industry covers the manufacturing industry of information technology products and the service industry of information content supply. In China, information industry is the basically sum of electronic industry, post and telecommunications industry and information consulting industry. Due to historical reasons and imperfect systems, departments of information industry in China scatter around rather than tied up. Such inharmony is even intensified by administrative separation of department management. Hence, the information industry is difficult to adapt to requirements of information technology integration and internal industrial evolution laws. Such inharmony is mainly reflected in following two aspects:

Information service industry lags behind computer industry and telecommunications industry, resulting in information equipments unused and low

utilization of communication facilities. According to statistics, the utilization of communication networks is only about 15% at present. There are considerable resources held off from consumers.

The business volume ratio between information service industry and computer manufacturing industry is relatively low. This reflects the serious lag of industrialization and commercialization of China's information service industry. The complete information consumption market has been established yet. All of these will affect CS level.

2.2.3.3 Product quality and service concept

CS is equal to psychological feelings of customers. Customers can get a sense of satisfaction from not only product functions, but also purchase and use of products or services. To increase CS level, enterprises shall offer good after-sales services while protecting quality assurances.

2.2.3.4 Quality of customers

Customers with different education backgrounds with have different psychological feelings and aesthetic tastes. Therefore, they will give different assessments to the same product or service. Viewed from general conditions of consumer demands, material consumption focuses on purchasing power of consumers, whereas information consumption emphasizes on ability of information acquisition. The ability of information acquisition is determined by cognitive competence and occupation capability. Without cognitive competence and occupation capability, consumers wouldn't purchase the information even though they need it very much. Customers' cognition to information production, use and mastering of information technology and their comprehensive quality have become one of dominant factors that will influence consumption depth and breadth of information commodities directly.

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CHAPTER 3
RESEARCH METHODOLOGY

3.1 Research design

Investigation and literature review are used in this paper.

Investigation: questionnaire survey is adopted. Survey data are analyzed and related data are screened according to research contents. Later, hypotheses are deduced and proved based on selected survey data, thus realizing the research objective.

Literature review: associated literatures are collected, read and analyzed. This is conducive to deduction of hypotheses. Besides, the concept of satisfaction is comprehended through literature review and then used in studying elimination mobile game applications.

3.2 Research hypotheses

This paper is to disclose influencing factors of CS to elimination mobile game applications. Based on literature review, experiences of use and questionnaire survey, some conclusions are gained:

According to author's experiences of use, animation entry will attract the author to play it. Player wouldn't become bored or fatigue when there's rhythm background music in game playing. The elimination sound effect can bring players stronger sense of satisfaction.

Based on literature review, each elimination mobile game has some unique characteristics. Different types of elimination mobile game can be developed from different playing methods. These games have different playing methods and advantages.

The questionnaire survey reveals that most players concern highly on game quality and playability. Some players will pay attention to ways of charge, software size, updating speed and type of games.

According to above analysis results and research direction of this paper, five influencing factors of CS to elimination mobile game applications are proposed, namely, general features, response, playability, economic efficiency and interaction.

These five factors are analyzed thoroughly in the following text.

General features

Elimination mobile game is a mobile game application. Software package size, application program size, fluency of game, updating rate of game content as well as personalization factors and advertisement of the game will influence user selection and experience. Therefore, the first hypothesis is proposed:

H1: General features of elimination mobile game applications have positive impact on CS.

Response

Mobile phone is the symbol of convenience. Cellphone applications shall be convenient since it is the most distinctive feature of practicability of mobile phone. In particular, elimination mobile game applications are widely used to kill fragmentary time. Therefore, loading speed and running speed will influence user experience directly. The second hypothesis is proposed:

H2: Response of elimination mobile game applications has positive impact on CS.

Playability

Playability of elimination mobile game will surely be concerned by players. Some playability features and their influences are introduced in the following text.

Image quality: it is face of a mobile game and the most direct element which is displayed to players. Generally, bright and beautiful images or images with distinctive styles are easier to attract players. Image quality will affect players' assessment to the game directly. It can speculate that image quality of elimination mobile games is one of important influencing factors of CS.

Background music: elimination game requires players to make similar operations for a long time according to the same rule, which is easy to arouse fatigue and boring of players. Therefore, appropriate background music shall be employed to maintain their interests. Background music with strong rhythms is often used to make

players addicted to the game context. It can infer that background music is one of influencing factors of CS.

Model characters and elimination sound effect: elimination games prefer cute styles very much. Elimination elements are designed into lovely animals or popular foods, aiming to enhance the intimacy of games. Elimination sound effect is the music which is triggered at elimination acts. There are diversified elimination sound effects. They are used to bring players a sense of pleasure and achievement, and stimulate their interests. Hence, it is inferred that remarkable combination of module design and elimination sound effect will influence CS directly.

Based on above analyses, the third hypothesis is proposed:

H3: Playability of elimination mobile game applications has positive impact on CS.

Economic efficiency

For elimination games on mobile platforms, the most important thing after attracting players is how to retain them. Appropriate reward system is one of method to retain players and strengthen charms of the game. As a mobile application, elimination mobile games have different profit modes. Some manufacturers gain profits from charged download of the game. In other words, players pay for the game at download and can play the game freely later. Some manufacturers offer free download, but pay props. Players can download the game freely, but have to pay for some props. Charges are different according to players' demands and type of props. Some manufacturers provide pay unlocking service of game contents. Players can experience more game contents at payment compared to common users. Different profit modes all gain profits from payment of players. Players concern whether these charges are reasonable or whether they are willing to pay for the game.

The fourth hypothesis is proposed:

H4: Economic efficiency of elimination mobile game applications has positive impact on CS.

Interaction

In the internet society nowadays, people communicate through cellphone. Interaction is also needed in games. Although elimination games are mainly single games, they can be played on internet, thus realizing the goal of players sharing scores.

Some operators even add the concept of “physical power” in games. Players have to consume some physical power for each game and can make friends with other players. Friends can give physical power mutually as gifts to continue to play games. These will influence game experience of players to some extent. The fifth hypothesis is proposed:

H5: Interaction of elimination mobile game applications has positive impact on CS.

These five hypotheses are listed in Table 3.1.

Research hypotheses	
Hypothesis 1 (H1)	General features of elimination mobile game applications have positive impact on CS.
Hypothesis 2 (H2)	Response of elimination mobile game applications has positive impact on CS.
Hypothesis 3 (H3)	Playability of elimination mobile game applications has positive impact on CS.
Hypothesis 4 (H4)	Economic efficiency of elimination mobile game applications has positive impact on CS.
Hypothesis 5 (H5)	Interaction of elimination mobile game applications has positive impact on CS.

Table 3.1 Assumptions

3.3 Establishment of model

In above five hypotheses, five influencing factors of CS to elimination mobile game applications are concluded, namely, general features, response, playability, economic efficiency and interaction. A CS model of elimination mobile game application is established (Fig.3.1).

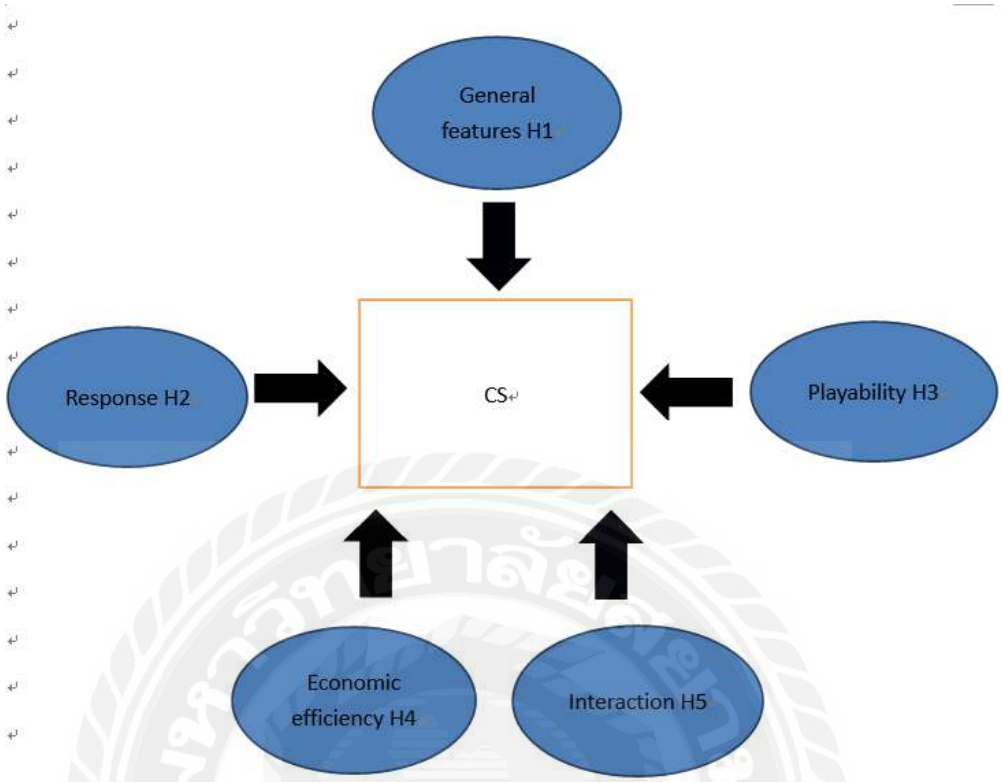

Fig.3.1 CS model of elimination mobile game applications

3.4 Questionnaire design and data collection

3.4.1 Questionnaire structure

To determine research objects, influencing factor of CS to elimination mobile game applications are measured by questionnaire survey after the model is established. Questionnaire survey is one investigation method which is highly appreciated by scholars of social sciences to collect research data. It collects information and data by sending questionnaires to specific respondents. Questions in the questionnaire are designed by researchers. Respondents shall answer them according to the design thought. Questionnaire survey determines accuracy and authenticity of investigation results. Questionnaire generally has following characteristics:

Rationality. Questionnaire must be closely related with the research topic.

Generality. Question setting has universal significance and no common mistakes are allowed.

Logicality. Questionnaire design must have a sense of wholeness. There must be logics between questions and settings shall be closely correlated.

Definition. Question settings must be standard, explicit and easy to be answered. Ambiguity shall be prevented.

Non-inductivity. Question settings shouldn't abandon the principle of objectivity in order to get some conclusion.

For the convenience of analysis, questionnaire data can be accumulated. Relative counting data are significant and can be processed and analyzed.

After the learning of questionnaire design principle, relevant information is consulted for questionnaire design. Questionnaire in this paper consists of four parts.

The first part is specification of questionnaire. This part introduces that the author is a graduate student. It points out clearly that this questionnaire is completely for the purpose of academic study and no personal information of respondents will be disclosed. Besides, the concept of elimination mobile games is introduced, so that respondents can comprehend research objects. It is emphasized that users who haven't used associated products don't need to fill the questionnaire. Finally, it reminds respondents that there are no standard answers to questions. Respondents just have to fill the questionnaire according to real experiences and feelings from games.

The second part is statistics on general information of respondents. A total of 9 questions are designed, including gender, age, education background, job, income, favorite elimination mobile game, play frequency, mobile phone operator and operating system of mobile phone. In the question of favorite elimination mobile game, several elimination mobile game applications with big downloads are listed. Besides, the item of "Others" is set to let respondents list other elimination mobile application.

The third part is measurement scale of elimination mobile applications. Based on other satisfaction measurement scales and combining characteristics of elimination mobile applications as well as influencing factors of satisfaction, questions and verbal trick of the research scale are designed under assistances of tutor and classmates. Measurement items are graded by the international popular Likert

Scale. Each question is given with five choices: “Strongly satisfying”, “Satisfying”, “Acceptable”, “Unsatisfying” and “Strongly unsatisfying”, corresponding to “5”, “4”, “3”, “2” and “1” scores, respectively.

3.4.2 Measurement items

In this research design, CS to elimination mobile game applications is sensitive to five influencing factors. Different quantities of measurement items are designed to these five factors.

General features

Measurement items of general features mainly focus on software package size, application program size, fluency of game, updating rate of game content, personalization factors and advertisement of the game.

Measurement factor	Measurement items
1. General features	Software package of elimination mobile game applications is small.
	The application program of elimination mobile games occupies a small proportion of phone memory.
	The elimination mobile game applications run fluently.
	The elimination mobile game applications update quickly.
	The elimination mobile game applications have many individualization templates.
	The elimination mobile game applications are hardly disturbed from advertisement.

Table 3.2 General features

Response

Response of elimination mobile game application is mainly reflected in start speed, operating speed, reaction speed to operation, and instantaneity of prop use and pay items

Measurement factor	Measurement items
2. Response	Elimination mobile game applications can start quickly.
	Elimination mobile game applications can be operated quickly.
	Elimination mobile game applications have quick reaction to operations.

	Elimination mobile game applications have high instantaneity of prop use and pay items

Table 3.3 Response

Playability

Playability of elimination mobile game applications is evaluated by image quality, background music, model quality and elimination sound effect.

Measurement factor	Measurement items
3. Playability	Elimination mobile game applications have high image quality.
	Elimination mobile game applications have good background music effect.
	Elimination mobile game applications have high model quality.
	Elimination mobile game applications have good elimination sound effect.

Table 3.4 Playability

Economic efficiency

Economic efficiency of elimination mobile game applications is measured by quality of pay items, rationality of game price, reward system, and payment-gains ratio of players.

Measurement factor	Measurement items
4. Economic efficiency	Elimination mobile game applications have high-quality pay items.
	Elimination mobile game applications have low price.
	Players of elimination mobile game applications have can gain reward items by signing in or festival activities.
	All players of elimination mobile game applications have gains ≥ payment.

Table 3.5 Economic efficiency

Interaction

Interaction of elimination mobile game applications is assessed by game data exchange of players, cooperation of players, and player information feedback.

Measurement factor	Measurement items
5. Interaction	Players of elimination mobile game applications can exchange data.
	Players of elimination mobile game applications cooperate in playing the game online.
	Players of elimination mobile game applications can feedback game BUG timely.

Table 3.6 Interaction

These five parts introduce all measurement items in scale of the questionnaire.

A total of 250 questionnaires were designed and sent randomly according to above hypotheses and data analysis.

3.4.3 Data collection

A total of 250 open questionnaires were designed and sent. Among them, 214 were collected in four days. Finally, 209 effective questionnaires were selected.

Total questionnaires (250)					
	Effective questionnaires	Ineffective questionnaires	Total	Recovery rate	Effective rate
Collected questionnaires	209	5	214	85.6%	97.7%

Table 3.7 Questionnaire sending and receiving situation

3.5 Research procedures

The research procedures are:

Existing studies on elimination mobile games. Concepts are introduced. Classifications, contents, quality and characteristics of elimination mobile game applications are analyzed and summarized. State of the art is discussed. Shortcomings are identified and CS is determined as the research object.

Literature review. Literatures related with elimination mobile games and the concept of satisfaction are reviewed. State of the art concerning elimination mobile games is summarized, which is conducive to understand the development and popularization of elimination mobile games to some extent.

Propose of hypotheses. Influencing factors of CS to elimination mobile game applications are determined preliminarily through field investigation, online investigation and data analysis. On this basis, hypotheses are proposed.

Empirical study. Influencing factors of CS to elimination mobile game applications are explored by designing a questionnaire. The model is established. Hypotheses are verified by data analysis and the model is corrected.

Suggestions. The accurate model and conclusions are gained. Main influencing factors of CS to elimination mobile game applications are disclosed by analyzing conclusions. On this basis, some reasonable suggestions for future development of elimination mobile games are put forward.

The research flowchart is:

Fig.3.2 Research flow chart

CHAPTER 4

RESEARCH RESULTS

4.1 Analysis of general data

General data are shown in the following table.

Statistics on general data			
Questions	Items	Frequency	Proportions
Gender	Male	91	43.54%
	Female	118	56.46%
Age	<18	19	9.09%
	19~30	116	55.50%
	31~40	35	16.75%
	41~50	25	11.96%
	>50	14	6.70%
Education background	High school and higher	28	13.40%
	Junior college	31	14.83%
	Bachelor	80	38.28%
	Master	67	32.06%
	PhD and higher	3	1.44%
Job	Government personnel	38	18.18%
	Company/enterprise workers	36	17.22%
	Self-employed businessmen	23	11%
	Students	72	34.45%
	Others	40	19.14%
Monthly income	<2000	73	34.93%
	2000~5000	61	29.19%
	5000~8000	42	20.10%
	8000~11000	11	5.26%
	11000~15000	9	4.31%
	>15000	13	6.22%

Favorite elimination mobile game	Bingo	26	12.44%
	Happyxiaoxiaole	72	34.45%
	Puzzle Bobble	10	4.78%
	WeMatch	17	8.13%
	Candy Crush Saga	8	3.83%
	Tiantian Xiaoxiaole	15	7.18%
	Others	61	29.19%
Play time	<30min	100	47.85%
	30min~1h	51	24.40%
	1h~2h	35	16.75%
	2h~3h	9	4.31%
	>3h	14	6.70%
mobile phone operator	China Unicom	41	19.62%
	China Mobile	95	45.45%
	China Telecom	37	17.70%
	DTAC	15	7.18%
	TRUE	14	6.70%
	Others	7	3.35%
Operating system of mobile phone	Android	92	44.02%
	IOS	100	47.85%
	Symbian	2	0.96%
	Windows Phone	9	4.31%
	Firefox OS	0	0%
	Others	6	2.87%

Table 4.1 Basic items collected results

Data in the above table are analyzed.

Females account for 56.46% of total players of elimination mobile games, while males account for 43.54%, showing no significant difference. In other words, elimination mobile games are suitable to both men and women. The population of women players is slightly bigger than that of men players.

Most players (55.5%) age from 19~30. Therefore, elimination mobile games feed to hobbies of the youth better. Most players are young. This agrees with development trend of contemporary mobile games.

Education background, job and income reflect that most users of elimination mobile applications are students and office workers who are relatively familiar with internet and mobile applications. They are more likely to contact elimination mobile games.

Favorite game and play time reveal that most players play games less than half an hour every day. This is caused by heavy life burden, heavy workload and tremendous household affairs of people nowadays. These are in consistent with statistical conclusions.

According to statistical analysis on operators and operating system of mobile phone, people mainly use mainstream operating systems like Android and ISO. These operating systems are used mostly by elimination mobile game applications.

In a word, statistics on general information are reasonable and conform to actual experiences. They have relatively high reliability.

4.2 Data analysis of measurement items

Collected data of measurement items are listed in the following table.

Questions	Options	Frequency	Percentage	Mean	Standard deviation (SD)
1. How satisfied are you with the proportion of elimination mobile game application in phone memory?	Strongly unsatisfying	17	8.13%	3.17	0.95
	Unsatisfying	16	7.66%		
	Acceptable	102	48.80%		
	Satisfying	62	29.67%		

	Strongly satisfying	12	5.74%		
2. How satisfied are you with software package size of elimination mobile game applications?	Strongly unsatisfying	8	3.83%	3.25	0.852
	Unsatisfying	18	8.61%		
	Acceptable	111	53.11%		
	Satisfying	58	27.75%		
	Strongly satisfying	14	6.70%		
3. How satisfied are you with running fluency of elimination mobile game applications?	Strongly unsatisfying	6	2.87%	3.51	0.855
	Unsatisfying	8	3.83%		
	Acceptable	92	44.02%		
	Satisfying	79	37.80%		
	Strongly satisfying	24	11.48%		
4. How satisfied are you with updating rate of elimination mobile game applications?	Strongly unsatisfying	9	4.31%	3.32	0.907
	Unsatisfying	19	9.09%		
	Acceptable	95	45.45%		
	Satisfying	69	33.01%		
	Strongly satisfying	17	8.13%		
5. How satisfied are you with individualization template (e.g. individualized interface, elimination mode and sound effect) of elimination mobile game applications?	Strongly unsatisfying	6	2.87%	3.45	0.865
	Unsatisfying	13	6.22%		
	Acceptable	92	44.02%		
	Satisfying	77	36.84%		
	Strongly satisfying	21	10.05%		
	Strongly unsatisfying	23	11%	3.05	1.088
	Unsatisfying	29	13.88%		

6. How satisfied are you with advertisement effect of elimination mobile game applications?	Acceptable	91	43.54%		
	Satisfying	46	22.01%		
	Strongly satisfying	20	9.57%		
7. How satisfied are you with start speed of elimination mobile game applications?	Strongly unsatisfying	13	6.22%	3.28	0.975
	Unsatisfying	20	9.57%		
	Acceptable	91	43.54%		
	Satisfying	66	31.58%		
	Strongly satisfying	19	9.09%		
8. How satisfied are you with running speed of elimination mobile game applications?	Strongly unsatisfying	7	3.35%	3.47	0.872
	Unsatisfying	12	5.74%		
	Acceptable	85	40.67%		
	Satisfying	85	40.67%		
	Strongly satisfying	20	9.57%		
9. How satisfied are you with response speed of elimination mobile game applications to elimination acts?	Strongly unsatisfying	8	3.83%	3.5	0.899
	Unsatisfying	11	5.26%		
	Acceptable	82	39.23%		
	Satisfying	85	40.67%		
	Strongly satisfying	23	11%		
10. How satisfied are you with instantaneity (how long props take effect after the purchase and how soon the purchased props will be delivered to the account) of prop use and pay props of elimination mobile game applications?	Strongly unsatisfying	14	6.70%	3.23	0.955
	Unsatisfying	19	9.09%		
	Acceptable	95	45.45%		
	Satisfying	66	31.58%		
	Strongly satisfying	15	7.18%		

11. How satisfied are you with image quality of elimination mobile game applications?	Strongly unsatisfying	10	4.78%	3.49	0.91
	Unsatisfying	10	4.78%		
	Acceptable	77	36.84%		
	Satisfying	92	44.02%		
	Strongly satisfying	20	9.57%		
12. How satisfied are you with background music of elimination mobile game applications?	Strongly unsatisfying	10	4.78%	3.42	0.963
	Unsatisfying	18	8.61%		
	Acceptable	79	37.80%		
	Satisfying	79	37.80%		
	Strongly satisfying	23	11%		
13. How satisfied are you with model quality (elimination model) of elimination mobile game applications?	Strongly unsatisfying	8	3.83%	3.44	0.875
	Unsatisfying	9	4.31%		
	Acceptable	97	46.41%		
	Satisfying	74	35.41%		
	Strongly satisfying	21	10.05%		
14. How satisfied are you with elimination sound effect of elimination mobile game applications?	Strongly unsatisfying	9	4.31%	3.5	0.915
	Unsatisfying	7	3.35%		
	Acceptable	90	43.06%		
	Satisfying	76	36.36%		
	Strongly satisfying	27	12.92%		
15. How satisfied are you with quality of pay items of elimination mobile game applications?	Strongly unsatisfying	14	6.70%	3.14	1.017
	Unsatisfying	34	16.27%		
	Acceptable	89	42.58%		
	Satisfying	53	25.36%		

	Strongly satisfying	19	9.09%		
16. How satisfied are you with price of pay items of elimination mobile game applications?	Strongly unsatisfying	19	9.09%	3.01	1.035
	Unsatisfying	39	18.66%		
	Acceptable	85	40.67%		
	Satisfying	52	24.88%		
	Strongly satisfying	14	6.70%		
17. How satisfied are you with reward system of elimination mobile game applications?	Strongly unsatisfying	9	4.31%	3.45	0.945
	Unsatisfying	16	7.66%		
	Acceptable	79	37.80%		
	Satisfying	81	38.76%		
	Strongly satisfying	24	11.48%		
18. How satisfied are you with the payment (money and time) and gains of elimination mobile game applications?	Strongly unsatisfying	12	5.74%	3.22	0.977
	Unsatisfying	25	11.96%		
	Acceptable	96	45.93%		
	Satisfying	56	26.79%		
	Strongly satisfying	20	9.57%		
19. How satisfied are you with data exchange ability among players in elimination mobile game applications?	Strongly unsatisfying	15	7.18%	3.25	0.973
	Unsatisfying	16	7.66%		
	Acceptable	98	46.89%		
	Satisfying	62	29.67%		
	Strongly satisfying	18	8.61%		
20. How satisfied are you with online playing of elimination mobile game	Strongly unsatisfying	12	5.74%	3.23	0.939
	Unsatisfying	22	10.53%		

applications?	Acceptable	95	45.45%		
	Satisfying	65	31.10%		
	Strongly satisfying	15	7.18%		
21. How satisfied are you with feedback service of elimination mobile game applications?	Strongly unsatisfying	13	6.22%	3.33	0.99
	Unsatisfying	17	8.13%		
	Acceptable	91	43.54%		
	Satisfying	65	31.10%		
	Strongly satisfying	23	11%		
22. How satisfied are you with the elimination mobile game application?	Strongly unsatisfying	7	3.35%	3.46	0.855
	Unsatisfying	10	4.78%		
	Acceptable	90	43.06%		
	Satisfying	83	39.71%		
	Strongly satisfying	19	9.09%		

Table 4.2 Measurement items collected results

	Mean	Minimum	Maximum	Range	Max /min	Variance	Number of items
Mean	3.326	3.014	3.512	.498	1.165	.023	22

Table 4.3 Statistics on abstract item

Viewed from statistical data of measurement items in questionnaire, measurement results range between 3~4 scores.

4.3 Reliability analysis

Reliability is an index that reflects authenticity of tested characteristics according to consistency or stability of results which are gained by test tools. Rationality and validity of scale compilation determine credibility and usability of

evaluation results. Rationality of scale means whether evaluation items are comprehensive and complete in content and whether they are reasonable in overall structure. Validity of scale means that evaluation items for a specific characteristic only reflect the characteristic partially. It is reasonable and necessary to update evaluation items in actual investigation duly. An effective scale shall be able to ensure high correlation of evaluation results before and after the item updating. If there's great error, the evaluation items might not be the measurement of the same characteristic and thereby fail to realize the expected investigation objective. If one characteristic is measured by many items, the test results shall be highly consistent.

Cronbach's Alpha is used to measure internal consistency of the scale. It can be used to evaluate internal reliability. According to experiences, if Cronbach's Alpha is higher than 0.9, the scale has high internal reliability. If Cronbach's Alpha ranges between 0.7 and 0.8, the scale might have some design problems, but it still has certain reference values. If Cronbach's Alpha is lower than 0.7, the scale has big design problems and shall designed again.

The overall reliability of measurement items is shown in the following table.

Cronbach's Alpha	Number of items
.957	22

Table 4.4 Reliability statistics

Data after the deletion of one item are listed in the following table.

	Scale mean after item deletion	Scale variance after item deletion	Total correlation of corrected items	Cronbach's Alpha after item deletion
1. How satisfied are you with the proportion of elimination mobile game application in phone memory?	70.01	204.336	.662	.955
2. How satisfied are you with software package size of elimination mobile game applications?	69.93	205.842	.681	.955

3. How satisfied are you with running fluency of elimination mobile game applications?	69.67	206.857	.635	.955
4. How satisfied are you with updating rate of elimination mobile game applications?	69.87	204.501	.690	.955
5. How satisfied are you with individualization template (e.g. individualized interface, elimination mode and sound effect) of elimination mobile game applications?	69.73	205.216	.696	.955
6. How satisfied are you with advertisement effect of elimination mobile game applications?	70.13	203.276	.605	.956
7. How satisfied are you with start speed of elimination mobile game applications?	69.90	201.173	.763	.954
8. How satisfied are you with running speed of elimination mobile game applications?	69.71	203.660	.756	.954
9. How satisfied are you with response speed of elimination mobile game applications to elimination acts?	69.68	203.361	.743	.954
10. How satisfied are you with instantaneity (how long props take effect after the purchase and how soon the purchased props will be delivered to the account) of prop use and pay props of elimination mobile game applications?	69.95	203.098	.706	.954
11. How satisfied are you with image quality of elimination mobile game applications?	69.69	204.473	.689	.955
12. How satisfied are you with background music of elimination mobile game applications?	69.77	203.315	.691	.955

13. How satisfied are you with model quality (elimination model) of elimination mobile game applications?	69.75	203.863	.744	.954
14. How satisfied are you with elimination sound effect of elimination mobile game applications?	69.68	204.180	.696	.955
15. How satisfied are you with quality of pay items of elimination mobile game applications?	70.04	201.551	.715	.954
16. How satisfied are you with price of pay items of elimination mobile game applications?	70.17	202.496	.667	.955
17. How satisfied are you with reward system of elimination mobile game applications?	69.73	204.901	.644	.955
18. How satisfied are you with the payment (money and time) and gains of elimination mobile game applications?	69.96	202.532	.710	.954
19. How satisfied are you with data exchange ability among players in elimination mobile game applications?	69.93	203.467	.677	.955
20. How satisfied are you with online playing of elimination mobile game applications?	69.95	204.012	.683	.955
21. How satisfied are you with feedback service of elimination mobile game applications?	69.86	202.325	.707	.954
22. How satisfied are you with the elimination mobile game application?	69.72	205.492	.694	.955

Table 4.5 Overall statistics

Measurement items are numbered. Cronbachα values of different variables are calculated.

Variables	No. of measurement items	Cronbachα values of variables
General features	1	0.884
	2	
	3	
	4	
	5	
	6	
Response	7	0.878
	8	
	9	
	10	
Playability	11	0.874
	12	
	13	
	14	
Economic efficiency	15	0.849
	16	
	17	
	18	
Interaction	19	0.84
	20	
	21	

Table 4.6 Cronbachα for each variable

Based on above data analysis, Cronbach α of the scale is 0.957 (>0.9). Meanwhile, Cronbach α of all five influencing factors is higher than 0.8. This reflects that the designed scale has high reliability.

4.4 Analysis of validity

To put it simply, validity refers to effectiveness of measuring results, or means that a measurement activity can detect the desired characteristic by the gauger. Validity is related with measurement goal. Same measurement tool has high validity in some measurements, but might have poor validity in other measurements. Validity is divided into content validity, criterion-related validity and structure validity. Factor analysis is a common validity analysis method. It can extract common factors of variables, represent the original complicated structure with few dimensions, and converts multiple measurement items into several complementary factors.

Kaiser-Meyer-Olykin measure of sampling adequacy (KMO) and Bartlett test of sphericity have to be performed before factor analysis. For criterion, factor analysis is more applicable to the variable when KMO approaches to 1. If KMO is over 0.9, this variable is very suitable to factor analysis, If KMO ranges from 0.8 to 0.9, the variable is relatively suitable to factor analysis. If KMO ranges between 0.7 and 0/8, the variable is generally suitable to factor analysis. If KMO is lower than 0.7, the variable is not suitable to factor analysis. Bartlett test of sphericity is applicable to test whether variables are independent from each other. It requires that the test value shall be smaller than the specified significance level.

In this paper, validity of measurement scale was tested by factor analysis. KMO results and Bartlett test of sphericity are shown in the following table.

Kaiser-Meyer-Olkin results of sufficient samples		.921
Bartlett test of sphericity	Approximate chi-square	3326.028
	df	210
	Sig.	.000

Table 4.7 KMO and Bartlett test of sphericity

KMO is 0.921, indicating that the variable is very suitable to factor analysis.

Factor analysis of measurement items was carried out. The rotational component matrix is shown in the following table.

Rotational component matrix [a]

	Components		
	1	2	3

1 How satisfied are you with the proportion of elimination mobile game application in phone memory?			.691
2 How satisfied are you with software package size of elimination mobile game applications?			.741
3 How satisfied are you with running fluency of elimination mobile game applications?			.754
4 How satisfied are you with updating rate of elimination mobile game applications?			.780
5 How satisfied are you with individualization template of elimination mobile game applications?			.717
6 How satisfied are you with advertisement effect of elimination mobile game applications?	.506		.536
7 How satisfied are you with start speed of elimination mobile game applications			.562
8 How satisfied are you with running speed of elimination mobile game applications?		.612	
9 How satisfied are you with response speed of elimination mobile game applications to elimination acts?		.630	
10 How satisfied are you with instantaneity of prop use and pay props of elimination mobile game applications?		.522	
11 How satisfied are you with image quality of elimination mobile game applications?		.746	
12 How satisfied are you with background music of elimination mobile game applications?		.704	
13 How satisfied are you with model quality of elimination mobile game applications?		.715	
14 How satisfied are you with elimination sound effect of elimination mobile game applications?		.712	
15 How satisfied are you with quality of pay items of elimination mobile game applications?	.761		
16 How satisfied are you with price of pay items of elimination mobile game applications?	.783		
17 How satisfied are you with reward system of elimination mobile game applications?		.594	
18 How satisfied are you with the payment (money and time) and gains of elimination mobile game applications?	.720		
19 How satisfied are you with data exchange ability among players in elimination mobile game applications?	.768		
20 How satisfied are you with online playing of elimination mobile game applications?	.711		
21 How satisfied are you with feedback service of elimination mobile game applications?	.632		

Extraction method: principal component analysis (PCA)

Rotation method: orthogonal rotation method with Kaiser standardization.

a. Converging after the 7th iteration.

Table 4.8 Rotational component matrix [a]

Data smaller than 0.5 are deleted. It found that some measurement items have multiple large data (>0.5). They are deleted and another factor analysis is performed. Results are shown in the following table.

Rotational component matrix [a]

	Components		
	1	2	3
1 How satisfied are you with the proportion of elimination mobile game application in phone memory?		.719	
2 How satisfied are you with software package size of elimination mobile game applications?		.765	
3 How satisfied are you with running fluency of elimination mobile game applications?		.785	
4 How satisfied are you with updating rate of elimination mobile game applications?		.756	
5 How satisfied are you with individualization template of elimination mobile game applications?		.717	
6 How satisfied are you with advertisement effect of elimination mobile game applications?		.571	
7 How satisfied are you with start speed of elimination mobile game applications		.508	.559
8 How satisfied are you with running speed of elimination mobile game applications?		.517	.555
9 How satisfied are you with response speed of elimination mobile game applications to elimination acts?			.517
10 How satisfied are you with instantaneity of prop use and pay props of elimination mobile game applications?			.741
11 How satisfied are you with image quality of elimination mobile game applications?			.745
12 How satisfied are you with background music of elimination mobile game applications?			.720

13 How satisfied are you with model quality of elimination mobile game applications?			.724
14 How satisfied are you with elimination sound effect of elimination mobile game applications?	.750		
15 How satisfied are you with quality of pay items of elimination mobile game applications?	.785		
16 How satisfied are you with price of pay items of elimination mobile game applications?			.550
17 How satisfied are you with reward system of elimination mobile game applications?	.738		
18 How satisfied are you with the payment (money and time) and gains of elimination mobile game applications?	.786		
19 How satisfied are you with data exchange ability among players in elimination mobile game applications?	.737		
20 How satisfied are you with online playing of elimination mobile game applications?	.631		

Extraction method: principal component analysis (PCA)

Rotation method: orthogonal rotation method with Kaiser standardization.

a. Converging after the 6th iteration.

Table 4.9 Rotational component matrix [a]（2）

Repeat the above process. Results are shown in the following table

Rotational component matrix [a]

	Components		
	1	2	3
1 How satisfied are you with the proportion of elimination mobile game application in phone memory?		.723	
2 How satisfied are you with software package size of elimination mobile game applications?		.773	
3 How satisfied are you with running fluency of elimination mobile game applications?		.790	
4 How satisfied are you with updating rate of elimination mobile game applications?		.758	
5 How satisfied are you with individualization template of elimination mobile game applications?		.729	
6 How satisfied are you with advertisement effect of elimination mobile game applications?	.519	.553	
7 How satisfied are you with start speed of elimination mobile game applications			.518

8 How satisfied are you with running speed of elimination mobile game applications?			.740
9 How satisfied are you with response speed of elimination mobile game applications to elimination acts?			.763
10 How satisfied are you with instantaneity of prop use and pay props of elimination mobile game applications?			.724
11 How satisfied are you with image quality of elimination mobile game applications?			.727
12 How satisfied are you with background music of elimination mobile game applications?	.729		
13 How satisfied are you with model quality of elimination mobile game applications?	.766		
14 How satisfied are you with elimination sound effect of elimination mobile game applications?			.506
15 How satisfied are you with quality of pay items of elimination mobile game applications?	.747		
16 How satisfied are you with price of pay items of elimination mobile game applications?	.794		
17 How satisfied are you with reward system of elimination mobile game applications?	.762		
18 How satisfied are you with the payment (money and time) and gains of elimination mobile game applications?	.646		

Extraction method: principal component analysis (PCA)

Rotation method: orthogonal rotation method with Kaiser standardization.

a. Converging after the 6th iteration.

Table 4.10 Rotational component matrix [a]（3）

Repeat the above process again. Results are shown in the following table.

Rotational component matrix [a]

	Components		
	1	2	3
1 How satisfied are you with the proportion of elimination mobile game application in phone memory?		.746	
2 How satisfied are you with software package size of elimination mobile game applications?		.783	

3 How satisfied are you with running fluency of elimination mobile game applications?		.787	
4 How satisfied are you with updating rate of elimination mobile game applications?		.746	
5 How satisfied are you with individualization template of elimination mobile game applications?		.720	
6 How satisfied are you with advertisement effect of elimination mobile game applications?			.523
7 How satisfied are you with start speed of elimination mobile game applications			.734
8 How satisfied are you with running speed of elimination mobile game applications?			.769
9 How satisfied are you with response speed of elimination mobile game applications to elimination acts?			.724
10 How satisfied are you with instantaneity of prop use and pay props of elimination mobile game applications?			.734
11 How satisfied are you with image quality of elimination mobile game applications?	.734		
12 How satisfied are you with background music of elimination mobile game applications?	.773		
13 How satisfied are you with model quality of elimination mobile game applications?			.506
14 How satisfied are you with elimination sound effect of elimination mobile game applications?	.754		
15 How satisfied are you with quality of pay items of elimination mobile game applications?	.795		
16 How satisfied are you with price of pay items of elimination mobile game applications?	.761		
17 How satisfied are you with reward system of elimination mobile game applications?	.644		

Extraction method: principal component analysis (PCA)

Rotation method: orthogonal rotation method with Kaiser standardization.

a. Converging after the 6th iteration.

Table 4.11 Rotational component matrix[a]（4）

It finds from factor analysis that a total of three factors are extracted. Test results of each item are higher than 0.5. It proves that the designed questionnaire has high structure validity. Influencing factors and measurement items which are designed in this paper are confirmed.

Measurement items are organized based on above analysis results, screening three influencing factors.

General features	How satisfied are you with the proportion of elimination mobile game application in phone memory?
	How satisfied are you with software package size of elimination mobile game applications?
	How satisfied are you with running fluency of elimination mobile game applications?
	How satisfied are you with updating rate of elimination mobile game applications?
	How satisfied are you with individualization template of elimination mobile game applications?
Game content	How satisfied are you with instantaneity of prop use and pay props of elimination mobile game applications?
	How satisfied are you with image quality of elimination mobile game applications?
	How satisfied are you with background music of elimination mobile game applications?
	How satisfied are you with model quality (elimination model) of elimination mobile game applications?
	How satisfied are you with elimination sound effect of elimination mobile game applications?
	How satisfied are you with reward system of elimination mobile game applications?
Economic efficiency and interaction	How satisfied are you with quality of pay items of elimination mobile game applications?
	How satisfied are you with price of pay items of elimination mobile game applications?
	How satisfied are you with the payment (money and time) and gains of elimination mobile game applications?
	How satisfied are you with data exchange ability among players in elimination mobile game applications?
	How satisfied are you with online playing of elimination mobile game applications?
	How satisfied are you with feedback service of elimination mobile game applications?

Table 4.12 get the factor

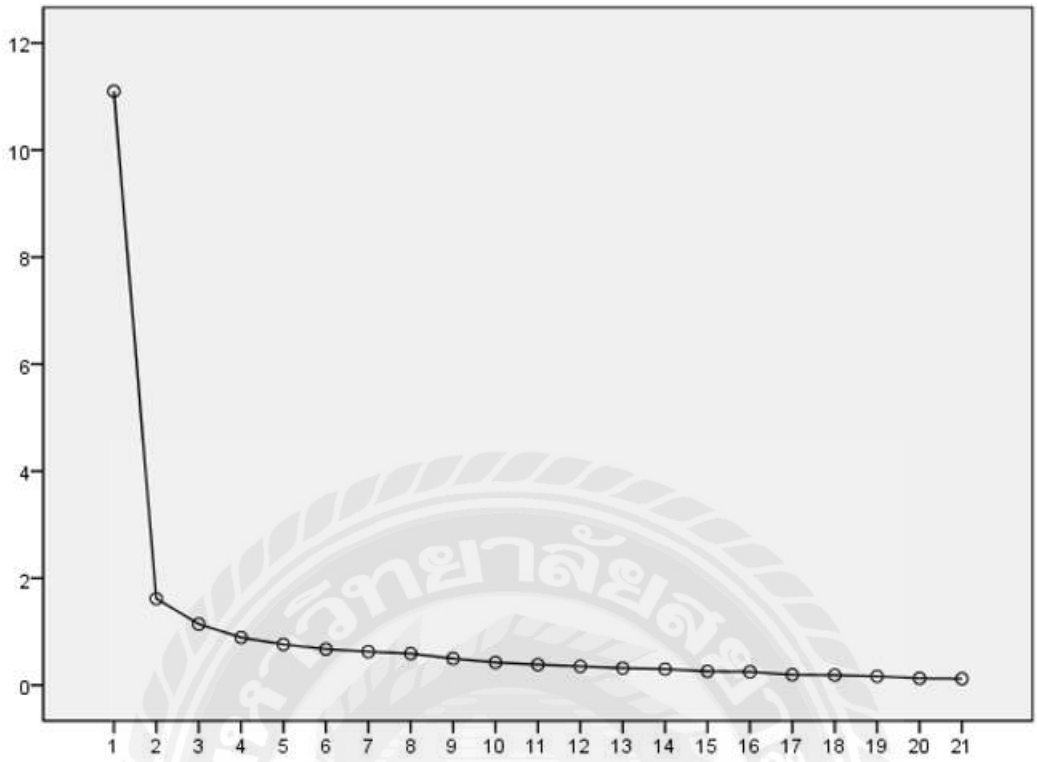

Table 4.13 Gravel map

It can be seen from the ScreePlot that eigenvalues of 1-4 on the horizontal axis are higher than 1, but eigenvalues since then begin to be lower than 1 and finally become stable. This agrees with factor analysis results.

4.5 Correlation analysis

Correlation analysis is to analyze two or more correlated variables, thus enabling to measure correlation between two variables. Relationship or probability of elements is the premise of correlation analysis. When two continuous variables have a linear correlation, the Pearson product moment correlation coefficient is used.

In this paper, 17 measurement items are retained after screened. Three factors, namely, general features, game content and economic efficiency and interaction, are gained through analysis. All measurement items are classified into these three factors. Pearson simple correlation coefficient is used to measure correlation between factors and between factor and overall satisfaction.

Correlation

		General features	Game content	Economic efficiency and interaction	22 How satisfied are you with the elimination mobile game application?
General features	Pearson correlation	1	.000	.000	.463**
	Significance (bilateral)		1.000	1.000	.000
	N	209	209	209	209
Game content	Pearson correlation	.000	1	.000	.309**
	Significance (bilateral)	1.000		1.000	.000
	N	209	209	209	209
Economic efficiency and interaction	Pearson correlation	.000	.000	1	.411**
	Significance (bilateral)	1.000	1.000		.000
	N	209	209	209	209
22 How satisfied are you with the elimination mobile game application?	Pearson correlation	.463**	.309**	.411**	1
	Significance (bilateral)	.000	.000	.000	
	N	209	209	209	209
**. reflects significant correlation on the 0.01 level (bilateral).					

Table 4.14 Correlation analysis

Person correlation coefficient of general features in relative to CS to elimination mobile game applications is 0.463**, indicating that general features have a strong positive relationship with the overall CS. The Person correlation coefficient of game content is 0.309**, indicating that game content has a strong positive relationship with the overall CS. The Person correlation coefficient of economic efficiency and interaction is 0.411**, indicating that it has a strong positive relationship with the overall CS. Viewed from correlation:

General features 0.463** **>** economic efficiency and interaction 0.411** **>** game content 0.309**.

To sum up, all three influencing factors have strong positive correlations with the overall CS to elimination mobile game applications. They have positive impacts on CS. On this basis, a regression equation is established and it is reasonable to make regression analysis.

4.6 Regression analysis

Regression analysis is to make mathematical process of massive statistical data based on the data statistical principle and determine the correlations between the dependent variable and some independent variables. It establishes a regression equation (function expression) with high correlation and extrapolates it for change predictions of dependent variables in future.

In this paper, five factors are used as independent variables and the overall CS to elimination mobile game applications is used as the dependent variable in regression analysis. The equation is:

$$Y = \alpha 1x1 + \alpha 2x2 + \alpha 3x3 + \varepsilon$$

where Y is the overall CS to elimination mobile games and ε is a constant.

a_1, a_2 and a_3 are regression coefficients of x_1 (general features), x_2 (game content) and (economic efficiency and interaction). They reflect influence degrees of independent variables on the dependent variable. Regression coefficient refers to the change rate of the dependent variable caused by one independent variable when rest independent variables are fixed. In this paper, multiple linear regression of variables is carried out by SPSS22.0. Results are shown in the following table.

Model results

Model	R	R^2	adjusted R^2	Error of standard estimation
1	.692[a]	.478	.471	.622

a. predictive variable: (constant), economic efficiency and interaction, game content and general features.

Table 4.15 Model results

In the above table, R is the multiple correlation coefficient between dependent variable and independent variables, R2 is the coefficient of determination, adjusted R2 is the adjusted coefficient of determination, and error of standard estimation is the error of regression equation. In multiple regression, R2 is used to explain proportion of variation of independent variables in variation of dependent variables in the regression model. Here, R2=0.478 and the adjusted R2=0.471. Three hypothesized influencing factors can explain 47.1% variations of the dependent variable. Therefore, number and direction of proposed hypotheses have certain shortages.

The table of ANOVA[a] is as follows:

Anova[a]

Model		Quadratic sum	df	Mean square	F	Sig.
1	Regression	72.681	3	24.227	62.630	.000[b]
	Residual error	79.300	205	.387		
	Total	151.981	208			

a. Dependent variable: 22. How satisfied are you with the elimination mobile game application?

b. Predictive variable: (constant), economic efficiency and interaction, game content and general features.

Table 4.16 Anova[a]

Data in the above table reflect variation source of dependent variables, sum of squares of deviations, degree of freedom (DOF), variance, observed value and significance value of F-test statistics in regression significance test. Obviously, the total sum of squares of deviations of the independent variable is 208, the regression sum of squares is 72.681 and the regression variance of mean is 24.227. The residual sum of squares is 79.300 and the residual variance of mean is 0.387. The observed value and significance value of F-test statistics in regression significance test are 62.630 and 0.000, lower than the 0.01 significance level. These imply that the overall explained variation of regression equation has reached significance level. The dependent variable has a linear relationship with independent variables, accompanied with high fitting degree. A linear model can be established.

The multiple regression coefficients are listed in the following table.

Coefficients [a]

Model		Non-standardized technique		Standard coefficient	t	Sig.
		B	Standard error	Trial version		
1	(Constant)	3.464	.043		80.520	.000
	General features	.396	.043	.463	9.175	.000
	Game content	.264	.043	.309	6.118	.000
	Economic efficiency and interaction	.351	.043	.411	8.141	.000

a. Dependent variable: How satisfied are you with the elimination mobile game application?

Table 4.17 Coefficients [a]

Based on the above table, P values of all three independent variables are 0.000 (<0.05). Therefore, all three independent variables have significantly positive impacts on CS to elimination mobile game applications. The non-standardized regression coefficients of three independent variables are 0.396, 0.264 and 0.351. The constant is 3.464. Bring them into the equation, and it can get:

$$Y = 0.396 * x1 + 0.264 * x2 + 0.351 * x3 + 3.464$$

Therefore, CS to elimination mobile game applications=0.396* general features +0.264*game content+0.351* economic efficiency and interaction +3.464.

4.7 Verification of hypotheses

Based on above analysis, all three hypotheses are proved true.

Research hypotheses	**Results**
General features of elimination mobile game application have positive impact on CS.	True
Game contents of elimination mobile game application have positive impact on CS.	True
Economic efficiency and interaction of elimination mobile game application have positive impact on CS.	True

Table 4.18 The remaining assumptions

The CS model is established according to the above table.

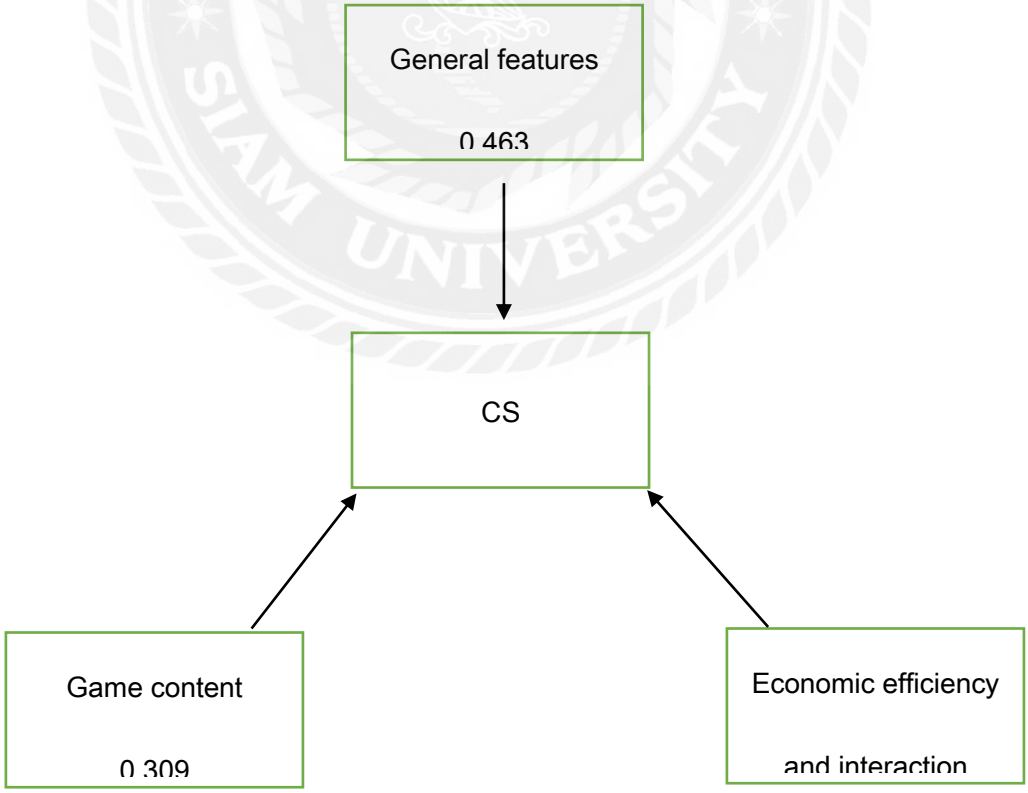

Fig.4.1 CS model

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CHAPTER 5
CONCLUSIONS AND PROSPECTS

5.1 Conclusions

The CS model of elimination mobile game applications is constructed based on questionnaire survey and data analysis. New conclusions are gained after correction of original hypotheses:

Elimination mobile game applications are mainly used by the age group of 19~30. Users cover students and office workers. Women users account for a slightly higher proportion. Most users play games less than 30min every day. Android and IOS are two major operating system of mobile phone. Players play many types of games, mainly including “Happy Xiaoxiaole” and other game applications. China Mobile is the first operator of mobile phone.

General features, game content and economic efficiency and interaction are three main influencing factors of CS to elimination mobile game applications. All of them have positive impacts on CS.

5.2 Suggestions

Some suggestions are proposed with respect to conclusions:

Optimization of general features

Effects of general features on CS are manifested by details. For example, increasing fluency of elimination mobile games can shorten waiting time and improve operation interest of users. The proportion of game in phone memory shall be decreased as much as possible while protecting the performance of games. Reducing the software package size can shorten download time and proportion in phone memory. Quick updating can give users experiences of fresh game contents and satisfy their curiosity. More individualization modules can offer users more options. Users can choose the favorite game template freely.

Improvement of playability and game content

As a type of game, quality of elimination mobile game applications will influence experience and evaluation of users directly. To increase playability of elimination mobile game applications, key attentions shall be paid to following points:

Image quality: image is the element that is displayed to players most directly. High-quality images often can attract attentions of players at the first sight and is difficult to cause sore eyes. Image quality can be increased by improving game engine and refining image edition, thus enabling to improve CS. Background music is also an important influencing factor of CS. Long time of one level is easy to make players tired, but appropriate background music can relieve nerves and fatigue. It is suggested to offer several background songs with strong rhythms. Model quality and elimination sound effect of game can affect CS significantly. Clear and special models are easier to be found and eliminated by players. Therefore, lovely animal patterns or daily living items are suggested to improve intimacy. Elimination sound effect can give players a sense of achievement. Short and high sound effects shall be used to stimulate interests of users and increase CS.

Game content: it contains game content and service content. Enthusiasm of players can be aroused by adding some activities and rewards in games, such as festival promotion and signing in. furthermore, service quality of the game shall be improved. For example, purchased goods shall be delivered immediately to players, so that they can enjoy them timely.

Improvement of economic efficiency and interaction

Economic efficiency of games is expressed in experiences of pay items and feelings of payment and gains. To increase economic efficiency, price of pay items shall be lowered properly. Meanwhile, more payment methods shall be added. Quality of pay items shall be improved to let players experience excellent quality at a relatively low price and stimulate their further consumption behaviors. Level design shall not be too difficult to prevent players to be bored or disgusted with the game.

Interaction of games includes interaction between players and between the player and merchant. Specifically, data exchange between players shall be increased, such as developing various exchange ways (e.g. message and e-mail), inviting friends and sharing scores. Competitions for speed between players or cooperative fight can be offered to increase interaction between players. Moreover, merchant shall response

to feedback and message of players positively and listen to players' opinions for further improvement, thus increasing user experiences.

5.3 Contributions and innovations

Contributions

In this paper, the concept of satisfaction is added to study elimination mobile game applications. Based on hypotheses and verification, three important influencing factors of CS to elimination mobile game applications are concluded, namely, general features, game content, and economic efficiency and interaction. This study enriches relevant studies of elimination mobile game applications and expands the relevant research range.

Research contents can provide some references to other studies of elimination mobile game applications and satisfaction to relevant mobile applications.

Innovations

This is an empirical study of CS to elimination mobile game applications. Satisfaction model was generally used to study traditional products and services. Only few researches on satisfaction to elimination mobile game applications have been reported. This study is a bold attempt to apply satisfaction factors to discuss mobile applications. It can provide some references for future studies on other mobile applications and satisfaction.

5.4 Limitations

The criterion of scientific research is followed as much as possible in this paper. Due to inadequate time, effort, expenses and references, this paper still has some limitations.

Limitations in sample size

Mobile phone is a daily necessity of people nowadays. Elimination mobile game applications cover a large user population. However, only sampling investigation based on questionnaire is applied in this paper. A total of 250 questionnaires are sent, which is inadequate to cover all types of users. Therefore,

survey data and conclusions might be inaccurate. Validity and reliability of data are made after questionnaires are collected in order to verify authenticity and reflection of data. These can decrease probability of above problems.

Limitations in hypotheses and conclusions

Hypotheses are based on author's experience of elimination mobile game applications, investigation and literature review. However, the author's experience is relatively subjective, literature review might be biased, and investigation might be unstable. The proposed hypotheses might not be comprehensive. Not all influencing factors are listed, thus resulting in analysis shortages.

Limitations in literature review

The author has reviewed many literatures, but only few researches related with the research direction have been found. To prevent research bias and analyze more references, the author read research reports and articles which are associated with research contents, which is conducive to writing of this paper. However, there are still limited researches. It is hoped that this study can further enrich relevant studies.

5.5 Prospects

Elimination mobile game application is a mobile application with a development space. It possesses massive users and potential users. With the continuous technologic progresses and continuous progresses in cellphone performances, development of elimination mobile games becomes more and more perfect and can meet the mass requirements better. In future, there must be more researches on elimination mobile game applications. It is hoped that this study can promote development of elimination mobile game application industry and provide some references to other researchers.

With considerations to limitations, some prospects are put forward:

Prospect in sample size

I wish researchers can find better research and sampling methods in similar studies, reduce error caused by cardinal number, increase sample size as much as possible and increase authenticity of data.

Prospect in hypotheses and conclusions

More considerations shall be paid to influencing, direction and contents factors of hypotheses. Possible hypothesis shall be listed as much as possible in order to increase reliability, validity and comprehensiveness of the research conclusions.

Prospect in literature review

Inadequate related references will restrict discussion and study of one topic. Given few relevant researches or data, it is suggested to get inspirations by existing understanding and reviewing similar researches. However, it is recommended not to search for similar researches to prevent research bias. It has to learn to find problems in limited resources and propose hypotheses, thus enriching related studies and providing references for other researchers.

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Customer Satisfaction Questionnaire of Elimination Mobile Game

Applications

Ladies and gentlemen,

I's a graduate student from SIAM University. I'm investigating customer satisfaction to elimination mobile game applications. This is a questionnaire about influencing factors of customer satisfaction to elimination mobile game applications. If you have used relevant applications, please take some time to fill in the questionnaire. If not, please ignore it. There's no standard answer. You can answer them according to your actual experiences. Thanks for your help and support. This is anonymous questionnaire and your personnel information will be protected absolutely. All data are for the purpose of academic research only. Thanks again for your cooperation and help!

1. Gender:
   A. Male B. Female
2. Age
   A.<18 B.19~30 C.31~40 D.41~50 E.>50
3. Education background
   A. Senior high school and higher B. Junior college C. Bachelor D. Master E. PhD and higher
4. Job:
   A. Government personnel B. Company/enterprise workers C. Self-employed businessmen D. Student E. Others
5. Income level
   A. <2000 B.2000~5000 C.5000~8000 D.8000~11000 E.11000~15000 F.>15000
6. Favorite elimination game:
   A. Bingo B. Happyxiaoxiaole C. Puzzle Bobble D. WeMatch E. Candy Crush Saga F. Tiantian Xiaoxiaole G. Others
7. Time for game every day:
   A. <0.5h B. 0.5h~1h C.1h~2h D.2h~3h E.>3h
8. Operator of mobile phone:
   A. China Unicom B. China Mobile C. China Telecom D.DTAC E.TRUE F. Others
9. Operating system on your mobile phone:
   A. Android B.IOS C.Symbian D.Windows Phone
   E.FirefoxOS F. Others

Please answer the following questions according to your actual experiences in elimination mobile game applications:

10. How satisfied are you with the proportion of elimination mobile game application in phone memory?

A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

11. How satisfied are you with software package size of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

12. How satisfied are you with running fluency of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

13. How satisfied are you with updating rate of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

14. How satisfied are you with individualization template (e.g. individualized interface, elimination mode and sound effect) of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

15. How satisfied are you with advertisement effect of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

16. How satisfied are you with start speed of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

17. How satisfied are you with running speed of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

18. How satisfied are you with response speed of elimination mobile game applications to elimination acts?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

19. How satisfied are you with instantaneity (how long props take effect after the purchase and how soon the purchased props will be delivered to the account) of prop use and pay props of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

20. How satisfied are you with image quality of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

21. How satisfied are you with background music of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

22. How satisfied are you with model quality (elimination model) of elimination mobile game

applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

23. How satisfied are you with elimination sound effect of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

24. How satisfied are you with quality of pay items of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

25. How satisfied are you with price of pay items of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

26. How satisfied are you with reward system of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

27. How satisfied are you with the payment (money and time) and gains of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

28. How satisfied are you with data exchange ability among players in elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

29. How satisfied are you with online playing of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

30. How satisfied are you with feedback service of elimination mobile game applications?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

31. How satisfied are you with the elimination mobile game application?
A. Strongly unsatisfying B. Unsatisfying C. Acceptable D. Satisfying E. Strongly satisfying

Thanks for your time!

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