

國立交通大學

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碩士論文

免費多人線上角色扮演遊戲(F2P MMORPG)之
遊戲設計屬性吸引力與玩家忠誠度之研究

The Study on the Relationship between F2P MMORPGs'
Attractiveness of Game Design Elements and Gamer Loyalty

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摘要

近年來，金融風暴的影響導致許多產業陷入困境，利潤下滑，線上遊戲產業卻在此不景氣的經濟中不斷的成長。多人線上角色扮演遊戲(MMORPG)的遊戲類別是最受歡迎的線上遊戲，其中，免費(F2P)多人線上角色扮演遊戲已經成為了新的趨勢且利潤最高。許多業者看到了商機，陸續進入了此產業。因此研究此類網路遊戲之遊戲設計屬性吸引力與玩家忠誠度之間的關連也就成為了一個重要的課題。本研究方法維網路問卷調查法，針對在台北市國立大學研究生裡有遊玩免費多人線上角色扮演遊戲的玩家做調查，並以電子郵件與網路連結方式寄發問卷消息，有效問卷數為394份。此研究利用統計分析方法之因素分析，T檢定，變異數分析及回歸分析進行資料分析與驗證研究假說。

研究結果顯示，人口統計變數之平均月收入與視覺程現和互動性有顯著的關係。免費多人線上角色扮演遊戲之遊戲設計屬性吸引力與玩家滿意度有顯著的相關性；其相關性以互動性最為顯著，其次為故事性，角色設定和視覺程現。而玩家滿意度與玩家忠誠度有高度的顯著關係。這代表著，免費多人線上角色扮演遊戲之遊戲設計屬性吸引力與玩家忠誠度有顯著的關係。

關鍵字：線上遊戲、多人線上角色扮演遊戲、遊戲設計、滿意度、忠誠度

The Study the Relationship between F2P MMORPGs' Attractiveness of Game Design Elements and Gamer Loyalty

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Abstract

In recent years, the impact of the financial crisis left most firms and enterprises across industries in despair and profits shrunk. The online game industry, however, continued to grow in this economic downturn. Of the many genres of the online games-the Massively Multiplayer Online Role Playing Game (MMORPG)- is deemed to be the most popular. A new branch of the MMORPG, the Free-to-Play (F2P) MMORPG has become the leading trend due to its profitability. This is a business opportunity that attracted many entrepreneurs and eager to enter the industry. Thus, the study on F2P MMORPG and its attractiveness of game design elements became an important issue to discuss. This study utilizes online questionnaire survey method, focused on Taipei city's national university graduate students who have experience in playing this genre of online game. The surveys were distributed by means of email and link directing, and the total number of effective surveys is 394 copies. This research uses statistical analysis methods including factor analysis, T-test, ANOVA, and regression analysis to process and analyze the data and test the proposed research hypotheses.

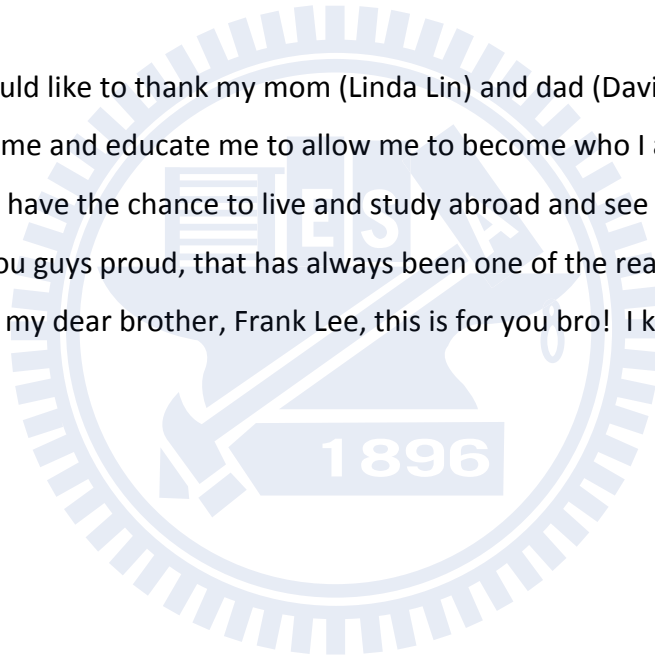
Research results show, the demographic variable of monthly income has significant relationship with game design elements of visual presentation and interaction. Significant relationship is found between F2P MMORPGs' attractiveness of game design elements and gamer satisfaction. In the order of relative correlation power: interaction ranks highest, then the story, character setting, and visual presentation. Gamer satisfaction and gamer loyalty have a highly significant relationship. This translates to a significant relationship between F2P MMORPGs' attractiveness of game design elements and gamer loyalty.

Keywords: online game, MMORPG, game design, satisfaction, loyalty

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Gavin Chien-Yu Lee
National Chiao Tung University
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Chapter I

Introduction

1.1 Research Background & Motivation

The research motivation for this thesis lies from the undeniable truth that online gaming, especially its most popular genre- the MMORPG (Massively Multiplayer Online Role-Playing Games), is a multi-billion dollar industry (Armstrong & Hagel, 1996). In a statistics revealed by marketingstats.com, in the year 2009, worldwide online game industry generates approximately US\$8.3 billion in revenue, and the figure is forecasted to reach US\$11.9 billion in two years (Figure 1-1). In a study on “examining the leisure activities of online surfers”, result shows that approximately 64% of them use online gaming as their primary method of leisure. And out of them, the MMORPG are their favourite to pass time and get connected with the mass online communities.

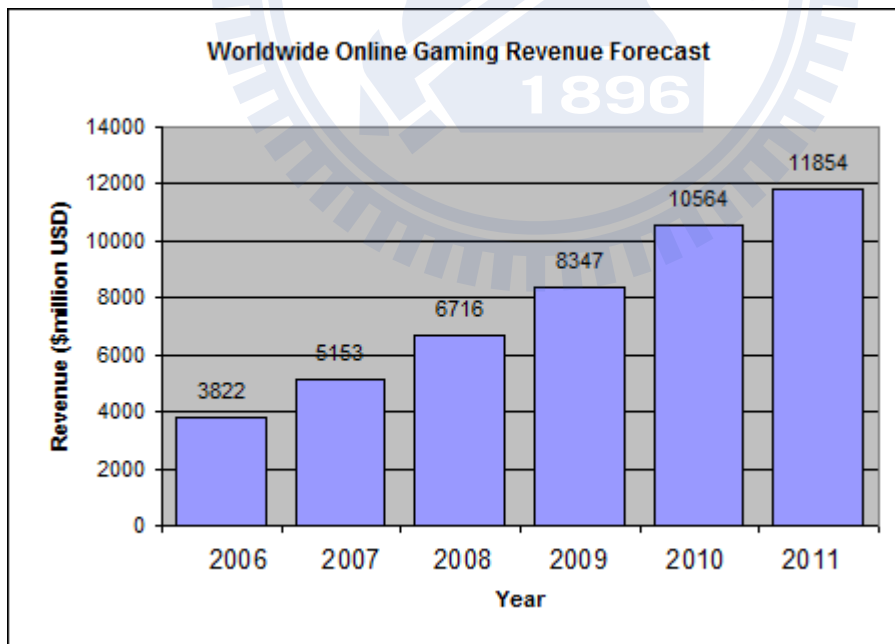


Figure 1-1 Worldwide Online Gaming Revenue Forecast

Source: www.marketingstats.com

Compared to the regular Role-Playing games on gaming consoles, MMORPG stress interactions between players around the world. Of the many facets of a MMORPG, there are several distinctive features that stood them out from most other types of games, and they include: creative themes, progression, social interaction & teamwork, role-playing, culture, and economy.

Unlike most other researches, however, this research focuses on a specific type of MMORPG that is getting more and more popular in recent years- the free-to-play (F2P) MMORPG. Although gamers have free access to the games, the companies making this type of MMORPG earn high profits from advertising and players making purchases of in-game items. In economic downturns, more and more players playing the regular type MMORPG (which users to pay weekly, monthly, play-by-play fees to play, such as the World of Warcraft) are switching to free-to-play ones due to financial constraints.

Trying out a game is one thing, but staying loyal to the game is another. And this has inevitable relationship on the earning potential for game developers to grasp profits from the players. There are tons of free-to-play MMORPG out there on the market, and the design of the games is often the key factor in attracting potential players. Thus, it is worthwhile to examine just what kind of gaming features gamers are looking for when they choose their next free-to-play MMORPG for their leisure for game developers to create games that are addictive enough for the players to keep on playing them, and this opens up big potential profits for the firms.

1.2 Purpose of Research

The purposes of this research are listed as follows:

1. To find out whether there is a significant relationship between demographic variables and F2P MMORPG's attractiveness of game design elements.
2. To find out whether there is a significant relationship between demographic variables and F2P MMORPG's gamer satisfaction level.
3. To find out whether there is a significant relationship between demographic variables and F2P MMORPG's gamer loyalty level.

4. To find out whether the defined F2P MMORPG's attractiveness of game design elements can significantly affect gamer satisfaction level; and also see the relative predictive power of each of the attractiveness of game design elements on the satisfaction level for management purposes regarding resource allocation.
5. Finally, to find out whether there is a significant relationship between F2P MMORPG's players' gamer satisfaction level and gamer loyalty level.

1.3 Research Target & Scope

This research's focus is on gamers' satisfaction levels towards the various free-to-play MMORPG. The most popular free-to-plays on the market right now include: Maple Story, GE online, Silk Road, Rohan: Blood Feud, etc. The research target in this study will be the Taipei's national university graduate students who are also online gamers who have had experience in playing F2P MMORPG. The research scope of the study then examines the relationship between attractiveness of F2P MMORPG design elements and gamers' loyalty of Taipei national university graduate students. After that, the respondents' ideas of a "good game" will be gathered and analysed, and another aspect, whether they are willing to spend real money to purchase in-game items will also be examined in detail.

1.4 Research Framework

The research framework is created Figureically as shown below; later on, appropriate marketing strategies will be suggested to offer free-to-play MMORPG developers related strategic marketing references:

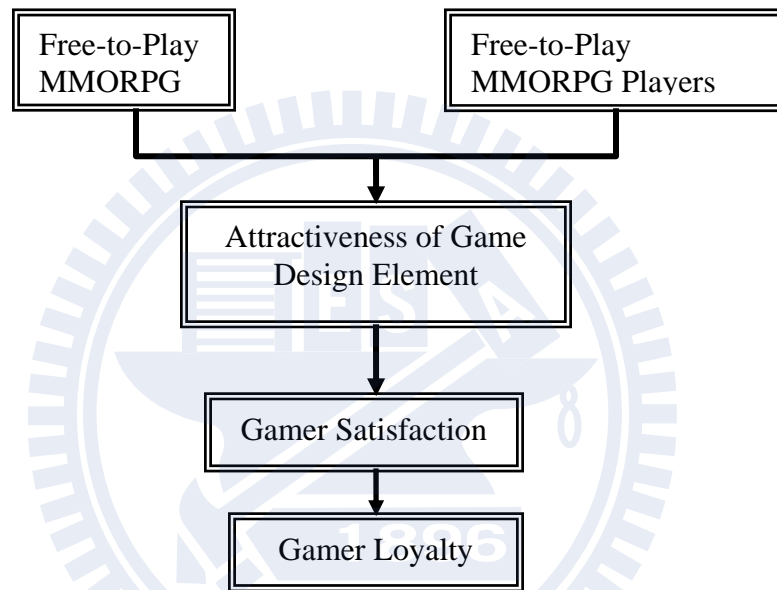


Figure 1-2 Research Framework

1.5 Flow of Research

This research progresses following the steps shown in (Figure 1-3). The first step of the research is to gain a deeper understanding regarding the F2P MMORPG to develop research problem and scope. Then, through related literature reviews, develop research framework and hypotheses for the study. After collection of data and analysis to get the test results, the study will end with research conclusion and suggestions. Hence the flow of research as shown as follows (Figure 1-3):

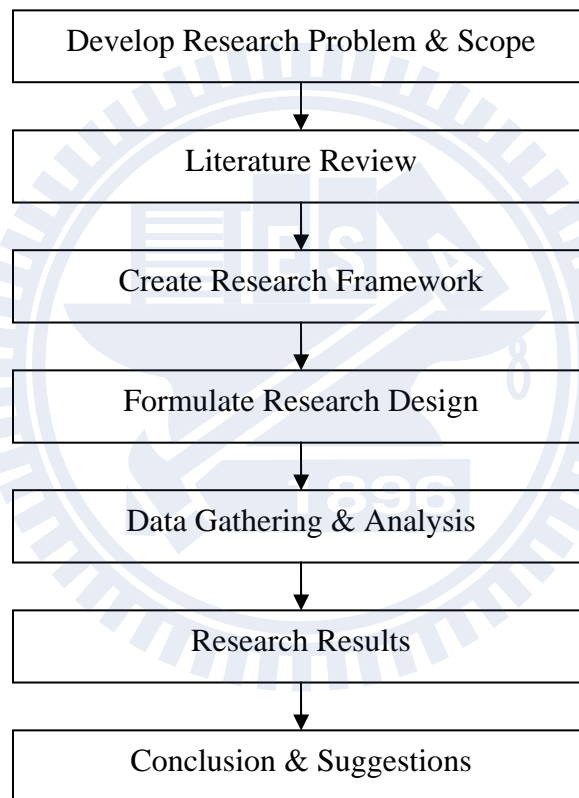


Figure 1-3 Research Flow Chart

Chapter II

Literature Review

2.1 The Origin and Development of MMORPG

MUD (Multi-User Dungeon Dimension) can be said to be the ancestor of the modern MMORPG. MUD is first developed in 1979, England, by two students in University of Essex, Roy Trubshaw and Richard Bartle, as an adventure game. The interface of this adventure game is based heavily on words, can allow multiple users to connect and play, gives them the ability to role-play, and the game character can walk within a given environment. In this virtual environment, players kill monsters to gain experience points to gain more power during play (Yang, 2007).

Through time, games with word descriptions and basic Figureics such as MOO (MUD Object Oriented), MUSE (Multiple User Simulated Environment), MUSH (Multi-User Shared Hallucination) emerged with enhanced interfaces (Kim et al., 2002). Therefore, it can be said that the definition of MUD is: A virtual environment that allows people in different time zone and different areas to join together as role-play characters.

It was not until 1997 that MMORPG start to gain popularity. A game created by Electronic Arts (EA), *Ultima Online*, began the whole MMORPG market (Zhang, 2006). In year 2000, NcSoft, a Korean game company, developed one of the most popular MMORPG of all time- *Lineage*. Today, games like World of Warcraft, Ragnark Online, Final Fantasy XI are among the top MMORPG in recent years ranked by worldwide players.

2.2 Definition of MMORPG

2.2.1 Traditional MMORPG

How can one really define MMORPG? A Wikipedia definition describes it as a “genre of computer role-playing games in which a large number of players interact with

one another in a virtual world” (Wikipedia.org, 2008). Players take on a role of a fictional character and have the ability to control over many of that character’s actions (Yoon, 2005; Lee, 2007). In later generations of MMORPG, players can actually have social actions such as hand shakes, nod, sit, waving, kiss, dance... etc. which adds to the social interaction sphere of the MMORPG. A major difference between a MMORPG from single-player games is the existence of the game’s persistent world, meaning that the virtual world will continue to exist and evolve even if one or a few or all player are away from the game.

A MMORPG can be played by connecting to the internet, and can allow thousands and even tens of thousand players around the world to play together. People can create their own characters (deciding on the name, gender, skin color, hair style, clothing, ability, and class); make friends and interact with them in the virtual environment in real time; fight monsters for experience and money; use money gained to purchase equipments and items for their characters either from virtual shops or exchange with other players (barter system); and can participate in in-game events (Hsu & Lu, 2004). Therefore, compared to the traditional MUD games, a MMORPG has a lot more playability and entertainment values to the players.

2.2.2 Free-to-Play (F2P) MMORPG

According to Jessie (2008) on her revenue model innovations in the online game market, she separates the traditional MMORPG (which she calls it the time-based revenue model or P2P (pay-to-play) model) from the next generation free-to-play MMORPG (the item-based revenue model) (Jessie, 2008; Lai, 2005). Whereas the time-based model generates revenue by gamers paying subscription fees or by purchasing pre-paid cards (point cards) to continue playing, the item-based model offers free-to-play for all gamers but generates revenue from sales of virtual items to the gamers. Therefore, even though the free-to-play MMORPGs are free for all players, for the players who want more (for instance, better equipments for their characters or items for easier levelling), those players will have to use real money to pay for the virtual items (Guo & Barnes, 2007).

This free-to-play MMORPG, or the item-based revenue model, emerged in 2004 in Korea, and later became popular because of its revenue generating potentials (Oh &

Ryu, 2007; Shapiro & Hal, 1999). According to IDC China's 2007 figures, more than 80% of online games are now adopting this model. As of now, approximately 13% of the players play P2P games, but as many as 87% of players are playing free-to-play (IDC China, 2007). Shi Yu Zhu, CEO of Giant, stated that the whole industry market revenue increased by 70% annually during the past three years due mainly to the transformation from P2P to the item-based revenue model (Jessie, Q.R., 2008). Here is a view of the IDC 2005 Greater China Online Gaming 2006-2011 revenue forecast figure (Figure 2-1):

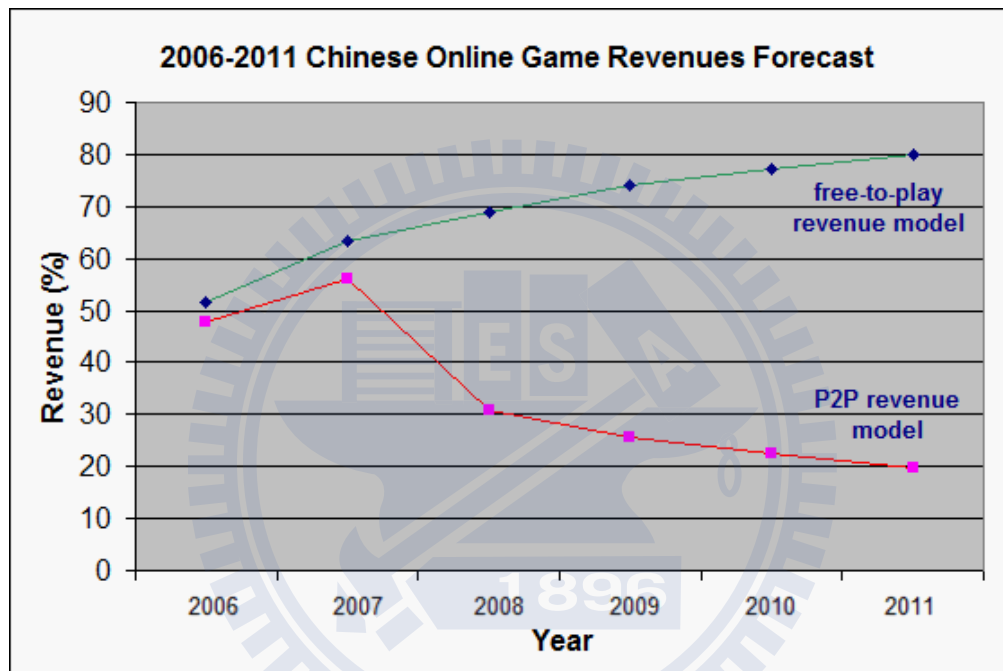


Figure 2-1 2006-2011 Chinese Online Game Revenues Forecast

Source: IDC China (2005)

2.3 Attractiveness of Game Design Elements

Through previous literatures about the online gaming industry, specifically, the free-to-play MMORPGs, even when the game is free for the gamers to play, in order to retain the players to continue playing the game, the game development companies have to find ways to design their games to attract those gamers (Wu et al., 2008). If the companies are capable of retaining the old players and attracting the new players, then they can continue ripping profits from the advertising companies and through virtual item purchases with real money by the gamers. In today's society, and the upward rising

trend of free-to-play MMORPGs, a well-designed game in the field translates to maintaining competitive advantage in the already competitive environment (Zeschuk & Muzyka, 2004). Therefore, designing an attractive free-to-play MMORPG becomes an important topic to examine, and is also the focus of this study. In this section, literatures related to the issue of game design will be discussed and examined:

2.3.1 Definition of Game Design

Chen, Jia-Ping (1994) suggests that game software design includes story/plot design, effect design (background design, sound/music design, and animation design) and overall flow design. Most multimedia game software development follows the processes shown below:

1. Color template: color template is the basics of diagrams and image storages.
2. Diagram & Image: diagram includes style, background, character, setting, etc.
3. Music & Sound.
4. Plot: plot is the soul of a game software. A good plot has climaxes, attractive plot connections, and animation effects to produce a good game software.
5. Method of overcoming difficulty: in the story, the protagonist often has to beat the challenges the designer designs in the game. And the method of overcoming these challenges is separated into active and passive methods. Active method is the type in which, for instance, players have to fight and kill monsters under some battle system. And passive method is the type in which players solve puzzles and progress through the game.
6. User Interface: user interface is the interface between the user and the software. The tools of such interface include: keyboard, mouse, joystick, etc. The communication within the interface include diagrams, function tables, hotkeys, etc. No matter which type of interface the player uses, the ones that are most easy to control and handle and can help progress through the game most easily will be the better interface design.

Zhang, Wu-Cheng (2002), in his extensive study on his thesis in the field of online game design, identifies 7 main attractiveness of game design elements as his game design model:

1. Story Design: the game's editing plan, overall framework, and the development of events; for instance, story content, character traits, effect design, and game progression.
2. Art Design: artistic style, background setup, character, and item setup.
3. Music & Sound: how well the music and song go along with each other and their role as an important way to express the game atmospheres.
4. Animation Design: the positioning, location, timing, and expression methods.
5. Entertainment Design: the feelings the game progression brings to the users.
6. Game Rules: the set of rules the game progresses.
7. User Interface Design: A good interface makes the game easy to handle and control and can make the gamers more easily connect with the game.

(1). Story

Interesting stories and plots can motivate players to explore the game, and return to the game to play through the story (Pearce, 2003). Character development can also trigger curiosity in players and immerse themselves into the story. Building in-game characters makes players feel like they can determine their fate in a virtual environment in ways they might not be capable of doing in reality (Ryan, 2001). It has been shown that when the story has a clear background and world view, is interesting in plot with side stories, is continuously expandable, and original, gamers will show higher interest in the game and will be more willing to continue playing the game (Tsai, 2006).

(2). Visual Presentation

The visuals of the game, including pictures, images, modeling can be a major factor in attracting players to try out the game. The definition of Figureics, or the polygon rendering, can create realistic virtual game worlds and also create nuanced characters with more precise action details (Smith, 2002). The visual presentation of a game can act as a signifier to the richness of the cinematic scenes in the game. People enjoy playing a game when facial features, actions, and expressions of an avatar are carefully designed with great detail (Pearce, 2002). The visuals do not only include avatar or character designs, but also includes background designs, equipment designs (weapons and armors), item designs, and monster designs. When the visual designs and the art style of these aspects of visuals are consistent and appealing, players have been shown to have a higher interest in the game (Tsai, 2004).

(3). Sound & Music

It is not only the visuals, but auditory cues can convey a sense of time of space of a fictional world (Ward, 2002). Sound and music can expand the concept of a game's virtual world, and have been shown to draw players forward through the sequence of game play (Whalen, 2004). And when visual objects are combined with sounds, it can increase perceived real and alive experience (Cohen, 2000). In other world, sound and music can help create a sense of real physical space which has been proven to have a positive relationship with player satisfactions (Whalen, 2004).

(4). Character Setting

The character setting part of design is the one of the basis of making a RPG, and this is especially true in a MMORPG, including free-to-play MMORPGs. Since there are so many players each player will meet and have contact with one another, it is important for the game developers to design the characters in a way that each race or job classes are distinguishable yet balanced with other races/job classes or else players will shy away from the game due to inequalities (Tsai, 2006). Thus, making discrete, yet balanced job classes/races is very important in designing a game where many people are playing in the same game environment. The skills and magics and equipments each job classes and races can use add in to this character setting equation (Eskelinen, 2001). All in all, many studies on games have come to similar conclusions that when the design of character setting are balanced that no one setting is superior to another, and different setting have its own discrete elements can greatly enhance gamers' playing experience and satisfaction towards playing the game (Cohen, 2000).

(5). Control

Game controls are the mechanisms that allow players to manage and direct online game progression by keyboard or mouse (Juul, 2001). Control can be thought of as the interface between players (reality) and online games (virtual). Therefore, when players engage in battles or simply explore through the virtual world, being able to control the character easily becomes extremely important. In reality, the sense of control is one of the most important aspects of design players look for when playing a game. A low sense of control can create frustration, while a high sense of control can increase attractiveness of the game (Eskelinen, 2001).

(6). Interaction

The interaction level of a game addresses the issue of the capability for gamers to be able to interact with other players. Since people playing an MMORPG are in fact playing a game with “massively multiplayer”, the contacts between the players, or the interaction between them become extremely important when game developers design their games. In every MMORPG, players can communicate with one another, make in-game transactions with in-game currency with one another, and team up or build parties with one another, in a way building a virtual community (Pearce, 2002). Evidence have found players to enjoy the game more, and can stay in a game longer, when the interaction mechanism of the game is excellent- meaning easy communications, transactions, and teaming up with one another (Juul, 2001).

2.3.2 Measuring Game Design

Mulligan J. & Patrovsky B. (2003), in their book “Gurus talk on Online Games” suggest that before and after a new MMORPG project has been decided to run, the game design team need to concentrate on various design elements in a design proposal. Since programming language related topics are out of the scope of this research, only attractiveness of game design elements related topics will be mentioned here:

When a game design team accepted a new MMORPG design project but before the project is in progress, these are the aspects the two scholars suggest the design teams should focus on: 1). Genre, 2). Polygonal presentation, 3). Style of interface, 4). Target group, 5). Customer platform, 6). Original design or Contract game 7). Method of gaming, and 8). Innovative player experience.

And after the team have had a thorough thought on the game design aspects mentioned above, and after the project is in progress, the team will have to turn their heads and focus on these game design aspect: 1). Story plot, 2). Player interface design, 3). Character race and class, 4). Character creation and growth, 5). World positioning and environment, 6). Game rules, 7). Polygonal design guide, 8). Item and tools list, 9). NPC type list, and 10). Monster type list.

Shen-Ling, Xu (2004), on his thesis paper, researches MMORPG design attractiveness based on Mulligan & Patrovsky's (2003) model, and simplified it into the following constructs for his model of MMORPG design influence customer satisfaction:

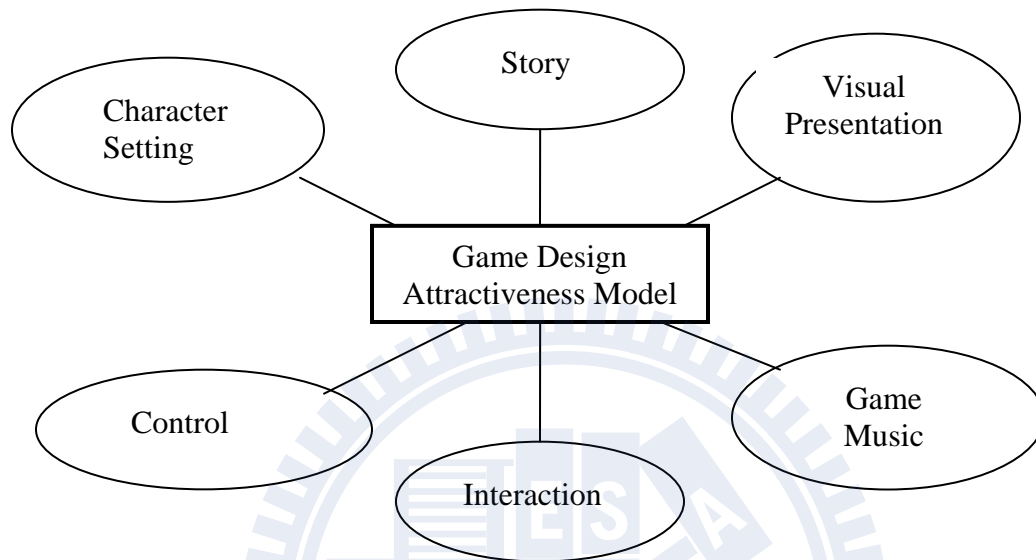


Figure 2-2 Xu's Game Design Attractiveness Model

Xu's game design attractiveness model, derived from Mulligan & Patrovsky's model, examines the attractiveness of the defined elements of game design for a MMORPG and uses them to test gamers' satisfaction towards the game. This study decides to refer to Xu's research framework model to measure online game, specifically, the F2P MMORPG attractiveness of game design elements' attractiveness, and based on online game characteristics to develop measurement constructs for the study.

There are many researches conducted on the matter of online gaming, and most of them have similar variables such as story, music, and visuals. However, what makes Xu's model distinct from other scholars' proposed models is due to his emphasis on a attractiveness of game design element- interaction, which differs from many of the scholars studying online gaming. Online gaming consists of many branches, and most of them are single player games, so the study of interaction is relatively unimportant, and thus is taken out of the picture when scholars conduct their experiments. However,

since interaction is been proven to be an important part, if not the most important, of the game genre of MMORPGs, the inclusion of this variable is critical to examine the effects of the new branch of the MMORPG, which is the focus of our study- the F2P MMORPGs. The above reasoning is the primary reason for this study to borrow Xu's model to progress with the later testing.

2.4 Customer Satisfaction

The 21st century is a society which contains high degrees of service activities. Product and service qualities determine whether a consumer will be satisfied with the purchase, and this is a key factor in determining a successful or a failing business. Therefore, customer satisfaction level is a widely used indicator for firms in the operation of their businesses.

When a consumer experiences the quality a product or service, either complaint or satisfactory emotion is formed, and this becomes a new experience. As a result, the customer will decide to repurchase, in this case, replay the game, or shift to another product or game.

It is thought by Engel, Blackwell and Miniard (1986) that the importance of customer satisfaction lies in 2 main events it might lead to:

- 1). Repurchase intention: the consumer having tried the product have higher than expected satisfaction towards the purchase. This positive feeling towards the product or service will likely create a repurchase intention.

- 2). Brand image creation: after a satisfactory usage of the product or service by a consumer, a reputation will be formed. This will be a very good channel to attract new customers because word-of-mouth advertising is thought to be the most effective form of advertising.

2.4.1 Definition of Customer Satisfaction

Customer satisfaction can be defined as the evaluation of conformity between the perceived and the actual value experienced by the consumer after using a product or service (Engel, Blackwell and Miniard, 1986). If the perceived value is higher than the actual value, the consumer is unsatisfied. On the contrary, if the perceived value conforms to the actual value, then the consumer is satisfied (Hausknecht, 1990).

Various scholars have different opinions on how to properly define customer satisfaction. Some of the most widely used definitions have been gathered and organized for use in this research, as shown below in Table 2-1:

Table 2-1 Definitions of Customer Satisfaction

Scholar (Year)	Definition
Anderson, Fornell & Lehman (1994)	The after-purchase evaluation on the user's experience of using the product or service.
Engel, Blackwell & Miniard (1986)	Comparison between the before and after usage of a certain product or service.
Fournier & Mick (1999)	The satisfaction level is conceptualized as the evaluation on the influence of the product on the user.
Kotler (1997)	The difference on the expected and actual performance of the product as observed by the consumer.
Ostrom & Iacobucci (1995)	Determining the opposing "Satisfy/Unsatisfied", and also taken into account the value received by the user.
Peter & Olson (2002)	The customer's expected value is on par or is surpassed from the usage of the product.
Woodruff (1993)	The response of a consumer after receiving the value of the product.

Summing up the above definitions of customer satisfaction, this research will define it as the evaluation of the experience playing a free-to-play MMORPG and

whether the game offers enough creative features that meet or go beyond players' expectations. If the features in the game are the ones the players want, then this will generate a positive emotion from the players toward the game. If the players' demands are not met, then they will likely feel unsatisfied and will stop playing and move on to try other free-to-play MMORPG made by other gaming companies.

2.4.2 Theories on Customer Satisfaction

1). *Expectancy - Uncertainty Theory*

Oliver (1993) suggests that customers will have a pre-purchase expected value of the product or service that s/he intends to buy; and this will be a determining factor on whether the customer will be satisfied or not after purchase. After the transaction is made, the customer will actually experience the product or service and compare the value received with the expected value in the pre-purchase stage. The difference between the two is the uncertainty aspect that the consumer faces. If the product's actual quality and value it offers is on par with the user's expected value, then certainty is created. If the actual value is less than the expected value, then negative uncertainty is formed. On the other hand, if the actual value exceeds the expected value of the user, then positive uncertainty is generated.

2). *Theory of Consumer Satisfaction*

LaTour & Peat (1979) suggest that consumers can observe the various attributes a product has to offer and form an expectancy level on each of those attributes. The difference between the result and the expected value can be positive or negative. Consumers will put different weight on what is most to least important features/attributes to them (each person differs in this aspect), and the evaluation of those features after usage will eventually form a certain consumer attitude towards the product.

3). *Equity Theory*

Oliver (1981) suggests that satisfaction is the ultimate result derived from whether the consumer feels s/he is being treated fairly or not from using the product.

The equity theory basically states that when the person feels a transaction is fair (input equates output) then s/he will be satisfied and vice versa. Therefore, if the input is relatively low (eg. Price of the product), then satisfaction level will rise; or if the output is relatively high (eg. Quality of the product), then it will produce the similar positive results.

The second theory, the theory of consumer satisfaction suggested by Latour & Peat (1979) is most suited for the F2P MMORPG design elements examination in this study. Since there are several design elements of focus in this study, and we are interested not only in which design elements contribute to the game satisfaction, and eventually, to gamer loyalty, but also the respective weights gamers place on these different design elements. It is through the different weights gamers place on various design elements that a real world F2P MMORPG development companies with limited resources can allocate those resources to the right places and with the right amounts. This is the job of product managers to strategically locate the limited resources to achieve maximum efficiency and profitability. Since F2P MMORPG is also a product, by the form of a virtual product, and that we are examining the weights or importance of different design factors on gamer satisfaction, the consumer satisfaction theory will be used in this paper (Szymanski & Hise, 2000).

2.4.3 Measuring Customer Satisfaction

There are various methods on measuring satisfaction, and each type of scale differs slightly (Peterson & Wilson, 1992). Some of the most widely used scales have been organized as shown below:

1). Simple Satisfaction Scale

This scale assumes that “not satisfied” or “rarely satisfied” as being unsatisfied. The most commonly used scale length from completely satisfied to not satisfied are 3, 5, and 7 scale points.

2). Mixed Scale

This type of scale assumes the extremely satisfied and extremely unsatisfied as the two polar extremes on a continuum. The scale between extremely satisfied and extremely unsatisfied can have 3, 5, or 7 scale points.

3). Expectational Scale

This scale weighs the product performance against consumer expectancy. If the performance is higher than expected, then consumer will be satisfied, and vice versa.

2.5 Customer Loyalty

2.5.1 Definition of Customer Loyalty

Customer loyalty means that a customer has come to enjoy and even rely on a company's staff, product, or service (Jones & Sasser, 1995). Past researches have shown that it would cost the firm 3~7 times more to seek new customers than retaining old customers (Geller, 1997). Not only it is cost effective, creation of customer loyalty brings high and steady profits for the company. By looking at it in a pure economic perspective, it is of utmost importance for companies to create customer loyalty. In addition, loyal customers is the most effective form of advertising to create even more potential customers who might become loyal themselves, and the positive cycle continues (Allen, et al, 1998).

Since this study is examining the gamer loyalty on free-to-play games, the definition of the ordinary loyalty as repurchase actions needs to be modified into-gamers' loyalty on free-to-play MMORPGs is the tendency for the gamer to continue playing the game. The gamer also shows signs of loyalty when she refers the free-to-play game to her friends or relatives.

2.5.2 Measuring Customer Loyalty

Customer loyalty is often explained by two kinds of behaviors- "personal attitude" and "repurchase intention". Expression of customer loyalty come in different shapes, Jones & Sasser (1995) classifies these behaviours in three main customer behaviours:

- 1) Repurchase Intention: the willingness for customers to make future purchases again on specific products or services.
- 2) Primary Behaviour: the information gathered from customer/business transactions is used to measure customer loyalty. These information uses the most recent shopping experience and behaviour for the examination- including purchase time, frequency of

purchase, amount of purchase, probability of repurchase, and length of keeping the products or services.

3) Secondary Behaviour: this is the behaviour of customers whether they are willing to recommend the company or its products/services to others.

Oliver (1999), on the other hand, classified loyalty into short run (recommending behaviour, and WOM), and long run (conscious, emotion, will, and purchase). And Griffin (1997) suggested that level of immunity from competitors is also an indicator of loyalty formation.

But, since we are measuring loyalty on F2P MMORPGs, we are not looking at repurchase behaviors per se. The attitudes of loyalty stay the same, but there need not be any purchases necessary. The gamer only needs to show a willingness to continue playing the game as an act of loyalty. Of course, the best form of loyalty for F2P MMORPGs is the gamers' willingness to pay for virtual items, which is the ultimate goal for the F2P model game developers.

2.6 Relationship between Customer Satisfaction & Loyalty

Goodman (1989) suggested that customers are in need for satisfaction, and this craving will lead to repeated usage of the product or service and prolonged loyalty. Thus, how to retain old customers, build long term relationship and increase customer loyalty is the main priority for businesses. Reichheld and Sasser (1990) proposed customer satisfaction is positively related to customer loyalty. This means by increasing customer satisfaction, the possibility of repurchase will increase, leading to higher profits for the companies. Day (1997) and Zeithaml & Bitner (1996) also had similar findings in their researches.

Many of the newer researches, including the ones Liu (2007) and Wansink (2003) published, all point to the importance of keeping customer satisfied in the long-run instead of short-run by means of promoting loyalty programs to enhance consumer purchase behaviour and loyalty, which will lead to higher profitability for the firms.

Therefore, there are strong theoretical and empirical backups as to the importance of generating not only customer satisfaction, but also customer loyalty as well, with the latter being the more important.

2.7 Organized Literature Reviews for the Study

The following tables (Table 2-2 & 2-3) are the organized literature reviews that are examined and taken into account in this study.

Table 2-2 Organized literature review- Attractiveness of game design elements

Author Concept	Lai, L. J. (2005)	Lee, W. Z. (2007)	Liang, C. H. (2007)	Tsai, C. Y. (2004)	Tsai, C. L. (2006)	This Study
Story	V	V	V	V	V	V
Visual Presentation	V	V	V	V	V	V
Sound & Music	V	V	V	V	V	V
Animation	V	V			V	
Character Setting	V		V		V	V
Rules			V			
Control		V		V	V	V
Interaction	V	V		V		V

Table 2-3 Organized literature review- Satisfaction

Author Concept	Cheng, J. C. (2003)	Liao, P. Y. (2003)	Guang, Z. F. (2004)	Lu, Y. M. (2004)	Lee, J. H. (2006)	This Study
Overall Satisfaction	V	V	V	V		V
Price	V	V		V	V	
Service Process		V		V		
Staff Quality		V		V	V	
Service Quality					V	
Product Quality					V	
Equipment Quality	V	V		V	V	
Environment Quality				V	V	

Chapter III

Research Methodology

This chapter will go through in detail the research method performed in the study, including the conceptual framework of the research model, explanations of the related variables, and base on the purpose of research, derive our research hypotheses. The development of the questionnaire and its contents, along with the sampling process will also be explained in depth.

3.1 Conceptual Framework

The purpose of the study is to look at how gamers' perceived quality on the various aspects of the attractiveness of game design elements (story, visual presentation, sound & music, character setting, control, and interaction) that might influence gamers' satisfaction toward the game, and how that will then relate to the gamers' loyalty towards the game. Most empirical studies have found significant evidence to support the conclusion in ordinary MMORPGs. Here, this study extends the conclusion to see if the same goes to the new profit-maximizing form of MMORPG- the free-to-play MMORPGs.

This section will introduce the conceptual framework and research variables to properly explain the framework of the study. From the research motivation, goal of the study, and the literatures found in Chapter 2, the following conceptual framework is generated (see Figure 3-1).

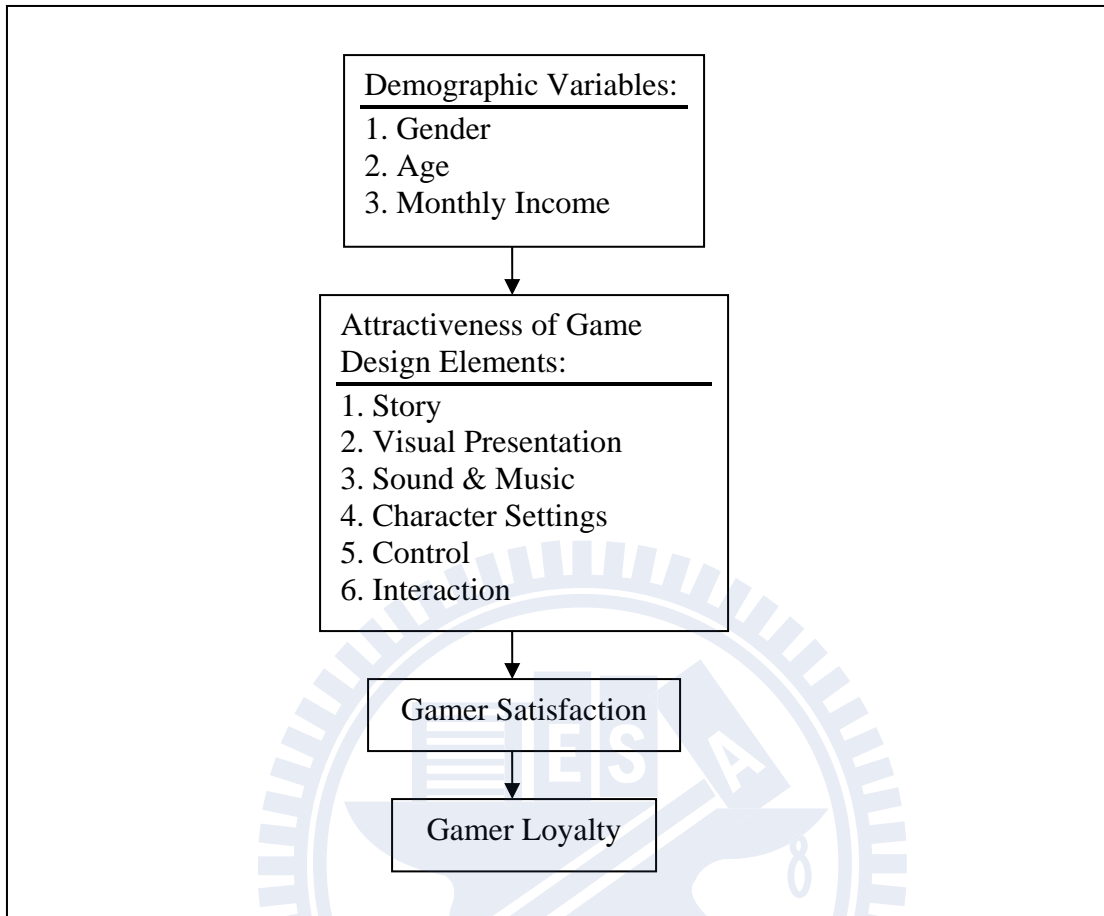


Figure 3-1 Conceptual framework

3.2 Research Variables

3.2.1 Demographic Variables

The demographic variables refer to the research objects' social and economic backgrounds. The variable is here to provide a deeper understanding towards the personal backgrounds of the respondents, thus bringing more meaning into the interpretation of the research results. Since the study controls the education level due to the focus on Taipei students who are currently participating in a graduate study, education level and occupation are left out of the demographic variables, making it a rather focused study group. The following three items are included in the demographic variable (Table 3-1):

Table 3-1 Demographic Variables

1.Gender	2.Age	3.Monthly Income
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3.2.2 Attractiveness of game design elements

The dimension of the attractiveness of game design element is based on Xu's model of game design attractiveness as specified from the literature review in chapter 2. Thus, the attractiveness of game design elements here will be the post-game perceived attractiveness of game design element (meaning that the answers and opinions the subjects give will be based on their post-game experience and perceived, instead of actual, attractiveness of the game elements). Game design is the structure of formal elements in a work of art- in this case, the free-to-play MMORPGs. From the past literatures and studies examining upon this topic, the core attractiveness of game design elements included in this study will be: story, visual presentation, sound & music, character setting, control, and interaction. Here will provide the definition of each of these variables that will be used as the basis of analysis in this study (Table 3-2):

Table 3-2 Defining Game Design Element Attractiveness Variables

Story	Through story writing and designing the story framework (including protagonist's destiny, virtual world concept, culture, character development, etc) that affects gamers' satisfaction during gaming
Visual Presentation	Using consistent art design to increase the level of quality and style of the game's visual and content (including background design, character design, weaponry design, ...etc.) that affects gamers' satisfaction during game
Sound & Music	Effectively including music, sound effects, or other potentially sounds that can promote the gaming atmosphere enjoyment that affects gamers' satisfaction during gaming
Character Settings	The balance and fair setting of the virtual characters' classes/races, techniques/magics, equipments/items, etc. that affects the gamers' satisfaction during gaming
Control	The ease of control of the character that allows the gamers to progress through the game smoothly which will in term affect the gamers' satisfaction during gaming.
Interaction	The setting of interaction with other players (including conversations, transactions, teaming up or build alliances) that affects the gamers' satisfaction during gaming.

3.2.3 Gamer (Customer) Satisfaction

As proposed by Engel and his colleagues (1986) and several other scholars later, this study will define customer satisfaction as the difference between expected and actual gaming experience based solely upon the design elements of the game. In other words, we are trying to compare to pre-game experience and post-game experience of the gamers, pre-game being the expected experience while post-game being the actual experience. If the actual experience is above the expected experience, then player satisfaction will be positive, and vice versa. Therefore, scoring high on perceived quality on certain aspects of game design element means the subject is attracted by that particular game design element. This study will examine and interpret the post game (actual) experience and draw results from this analysis.

3.2.4 Gamer (Customer) Loyalty

From the vast amount of past literatures studying on the matter of customer loyalty, this study will use this term as: The replay (continuous playing) intention, acts of primary and secondary behaviors from the gamers. Borrowing the concepts of the literatures of customer loyalty and applying on gamer loyalty, and in the field or game genre of Massively Multiplayer Role Playing Game (literatures from chapter 2) as: a gamer is defined here as loyal when s/he is willing to play the F2P MMORPG continuously, tempted to invite friends to join the gaming experience, feels a sense of belonging towards the game, and/or feels a certain level of uneasiness when s/he stopped engaging the game.

Bringing the concepts of the scholars suggested above and considering the nature of profit generation for free-to-play MMORPGs also mentioned prior in this chapter to the field of online gaming, and in this particular study, on F2P MMORPGs, we see that it is very fitting to consider testing satisfaction effects on loyalty under this case scenario. Thus, this research not only considers gamer satisfaction generated by various game design and services elements, but also how well those aspects can keep a gamer from defecting away from the game, in other words, generating gamer loyalty. Since F2P MMORPGs make money not from gamer satisfaction, but gamer loyalty for the players to willingly spend money on virtual items (they will only spend money when they value the virtual item is worth it, and with the longer gaming time intentions, this

value increases), this model of testing both satisfaction and loyalty best suits the needs of the study to examine the true effects of the various design elements on satisfaction which leads to loyalty.

3.3 Research Hypotheses

Base on the purpose of the study and the designed research framework, the following hypotheses are generated to be tested:

1). Test whether there are differences between gamers with different “demographic variables” and attractiveness of different game design elements:

Hypothesis 1-1 H₀: Gamers with different “gender” and attractiveness of different game design elements have no significant relationship.

Hypothesis 1-1-1 H₀: Gamers with different “gender” and attractiveness of game design element -“story” have no significant relationship.

Hypothesis 1-1-2 H₀: Gamers with different “gender” and attractiveness of game design element -“ visual presentation” have no significant relationship.

Hypothesis 1-1-3 H₀: Gamers with different “gender” and attractiveness of game design element -“sound & music” have no significant relationship.

Hypothesis 1-1-4 H₀: Gamers with different “gender” and attractiveness of game design element -“character settings” have no significant relationship.

Hypothesis 1-1-5 H₀: Gamers with different “gender” and attractiveness of game design element -“control” have no significant relationship.

Hypothesis 1-1-6 H₀: Gamers with different “gender” and attractiveness of game design element -“interaction” have no significant relationship.

Hypothesis 1-2 H₀: Gamers with different “age” and attractiveness of different game design elements have no significant relationship.

Hypothesis 1-2-1 H₀: Gamers with different “age” and attractiveness of game design element -“story” have no significant relationship.

Hypothesis 1-2-2 H₀: Gamers with different “age” and attractiveness of game design element -“visual presentation” have no significant relationship.

Hypothesis 1-2-3 H₀: Gamers with different “age” and attractiveness of game design element -“sound & music” have no significant relationship.

Hypothesis 1-2-4 H₀: Gamers with different “age” and attractiveness of game design element -“character settings” have no significant relationship.

Hypothesis 1-2-5 H₀: Gamers with different “age” and attractiveness of game design element -“control” have no significant relationship.

Hypothesis 1-2-6 H₀: Gamers with different “age” and attractiveness of game design element -“interaction” have no significant relationship.

Hypothesis 1-3 H₀: Gamers with different “monthly income” and attractiveness of different game design elements have no significant relationship.

Hypothesis 1-3-1 H₀: Gamers with different “monthly income” and attractiveness of game design element -“story” have no significant relationship.

Hypothesis 1-3-2 H₀: Gamers with different “monthly income” and attractiveness of game design element -“visual presentation” have no significant relationship.

Hypothesis 1-3-3 H₀: Gamers with different “monthly income” and attractiveness of game design element -“sound & music” have no significant relationship.

Hypothesis 1-3-4 H₀: Gamers with different “monthly income” and attractiveness of game design element -“character settings” have no significant relationship.

Hypothesis 1-3-5 H₀: Gamers with different “monthly income” and attractiveness of game design element -“control” have no significant relationship.

Hypothesis 1-3-6 H₀: Gamers with different “monthly income” and attractiveness of game design element -“interaction” have no significant relationship.

2). Test whether there are differences between gamers with different “demographic variables” and gamer satisfaction towards the game:

Hypothesis 2 H_0 : Gamers with different “demographic variables” and the gamer satisfaction towards the game have no significant relationship.

Hypothesis 2-1 H_0 : Gamers with different “gender” and the gamer satisfaction towards the game have no significant relationship.

Hypothesis 2-2 H_0 : Gamers with different “age” and the gamer satisfaction towards the game have no significant relationship.

Hypothesis 2-3 H_0 : Gamers with different “monthly income” and the gamer satisfaction towards the game have no significant relationship.

3). Test whether there are differences between gamers with different “demographic variables” and the gamer loyalty:

Hypothesis 3 H_0 : Gamers with different “demographic variables” and gamer loyalty towards the game have no significant relationship.

Hypothesis 3-1 H_0 : Gamers with different “gender” and gamer loyalty towards the game have no significant relationship.

Hypothesis 3-2 H_0 : Gamers with different “age” and gamer loyalty towards the game have no significant relationship.

Hypothesis 3-3 H_0 : Gamers with different “monthly income” and gamer loyalty towards the game have no significant relationship.

4). Test whether there are differences between attractiveness of different game design elements and gamer satisfaction towards the game:

Hypothesis 4 H_0 : Attractiveness of different game design elements and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-1 H_0 : Attractiveness of game design element - “story” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-2 H_0 : Attractiveness of game design element - “visual presentation” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-3 H_0 : Attractiveness of game design element - “sound & music” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-4 H_0 : Attractiveness of game design element - “character settings” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-5 H_0 : Attractiveness of game design element - “control” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-6 H_0 : Attractiveness of game design element - “interaction” and gamer satisfaction towards the game have no significant relationship.

5). Test whether there are differences between gamer satisfaction and gamer loyalty towards the game:

Hypothesis 5 H_0 : Gamer satisfaction towards the game and gamer loyalty has no significant relationship.

3.4 Questionnaire Design

This study’s questionnaire design process includes two main stages:

1. Pre-test

The initial design and pre-testing of the questionnaire is developed first to test whether the wordings and contents are understandable and clear for the subjects. Through 50 online gamers as the pre-test subjects, their opinions and suggestions were taken into account; and after making several adjustments, the final official questionnaire is developed.

2. Official Questionnaire

This questionnaire survey is divided into four main sections- perceived quality on attractiveness of game design elements, gamer satisfaction, gamer loyalty, and demographic variables. Section one through three will be using Likert five point scale, from 1 “strongly disagree” to 5 “strongly agree” (Table 3-3, 3-4 & 3-5).

Section 1: Attractiveness of attractiveness of game design element variables:

Table 3-3 Questionnaire Attractiveness of Game Design Element Variables

Variable Type	Name of Variable	Scales of Measurement	Questionnaire content
Dependent Variable		Likert 5 point Scale	
	Story		<ol style="list-style-type: none"> 1. The game delivers a storyline that clearly explains the plot of the game. 2. The game offers a rich and intriguing story content. 3. The events in the game are consistent with one another. 4. The characters show development throughout the progress of the game. 5. The game is expandable with lots of side stories & quests to accomplish.
	Visual Presentation		<ol style="list-style-type: none"> 1. The game delivers amazing style of visual arts. 2. The character module design in the game is unique and consistent. 3. The background design in the game is consistent.

			<p>4. The equipments (armors & weapons) in the game have unique artistic designs that are visually appealing.</p> <p>5. The actions and expressions of the characters are designed with great detail.</p>
	Sound & Music		<p>1. The background musics in the game make me feel comfortable.</p> <p>2. The musics in the game are chosen appropriately to fit the style of the game.</p> <p>3. The sound effects in the game allows me to enjoy the gaming atmosphere more.</p> <p>4. The sound effects and the background musics sync smoothly with one another.</p>
	Character Setting		<p>1. There are many job classes/races to choose from in the game.</p> <p>2. There are many techniques/maigcs available to use in the game.</p> <p>3. The sets of equipments (weapons and armors) each job class/race can wear are clearly different from one another.</p> <p>4. The job classes/races are balanced in a way that no one class/race is superior to another.</p>

	Control		<ol style="list-style-type: none"> 1. The control of the game is easy to handle. 2. The control of the game is easy to learn. 3. The control of the game is easy to memorize.
	Interaction		<ol style="list-style-type: none"> 1. The players can conveniently team up with other players for questing in the game. 2. The players can conveniently communicate with other players in the game. 3. The players can conveniently make in-game transactions with other players in the game. 4. I am meet new friends easily in the game.

Section 2: Overall gamer satisfaction & gamer loyalty.

Table 3-4 Questionnaire Customer Satisfaction & Loyalty Variables

Variable Type	Name of Variable	Scales of Measurement	Questionnaire Content
Dependent Variable		Likert 5 point Scale	
	Overall Satisfaction		<ol style="list-style-type: none"> 1. Overall, playing this free-to-play MMORPG satisfies me. 2. I am satisfied by the overall quality of the game. 3. The contents of the game fit my needs for gaming.

	Loyalty		1. I feel a strong sense of belonging towards the game. 2. I feel uneasy whenever I discontinue playing the game. 3. I will continue playing this game. 4. I will recommend my friends to join me in playing the game.
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Section 3: Personal information (demographic data)

Table 3-5 Questionnaire Demographic Variables

Variable Type	Name of Variable	Scales of Measurement	Questionnaire Content
Moderating Variable			
	Gender	Nominal Scale	1. Male 2. Female
	Age	Ordinal Scale	1. Below 16 2. 17 ~ 23 3. 24 ~ 30 4. 31 ~ 37 5. 38 ~ 44 6. Above 45
	Monthly Income (in NT dollars)	Ordinal Scale	1. Less than \$10,000 2. \$10,001 ~ \$20,000 3. \$30,001 ~ \$30,000 4. \$30,001 ~ \$40,000 5. \$40,001 ~ \$50,000 6. More than \$50,001

3.5 Sampling Design

The sampling process of this study is based on the following steps:

1. Defining population

This study's primary objects are online gamers, and the population of the study is then defined as the Taipei's graduate students who have some experience in playing F2P MMORPGs. Since various studies provide very different findings on the age profile of the gamers, an estimation from the past studies will be used, and players ages 17~23 will be the core mass of players, while stretching the figure to approximately age 44 to cover about 90% of players (GameSpot Audience Profile Study, June 2008; IDC, 2008).

2. Confirming the sampling framework

The sampling framework uses members of Taipei's various graduate students to participate in the questionnaire survey. The questionnaire surveys are sent out via email to the students currently participating in graduate studies and the link to the questionnaire survey (which is produced by an online survey maker- my3Q) is disclosed within the mails for the subjects to respond to the survey. Using this kind of sampling method means the samples are not completely randomly selected, which also means the representativeness of the sample might be biased. However, since the purpose of the research is to study the gamers' behavior and how perceived attractiveness of game design element on part of the gamers will affect their game loyalty level, selecting the samples from those who have actually played online games is still appropriate (since they must have experienced it themselves to give more accurate opinions) and should have a above average level of representativeness.

3. Choosing the sampling method

Due to the size of the population, and also limited by time, human & financial resources, this study will use systematic sampling method. Since the questionnaire survey is done on partly on the internet and partly by face-to-face, part of the entered answers are automatically stored and filed, this automation process not only reduces the potential human errors, but can also reduce cost and time of the research. In addition, by performing a portion of the survey online removes the need for excessive printing

hard copies of the questionnaires, which not only saves cost, but saves the environment at the same time.

4. Deciding on sample size

The decision on the sampling size is based on the principles Roscoe (1975) proposed:

- 1). A reasonable sampling size should be between 30 ~ 500 samples to be appropriate.
- 2). When samples are divided into sub-sample groups, each sub-sample groups need to have at least 30 samples.
- 3). In performing a multivariate study, number of samples need to be 10 times or more the size of research variables to be appropriate.

This study uses systematic sampling method to focus the study group to those who have actually played a F2P MMORPG before, and then uses random sampling ratio technique to estimate the minimum sample size for the study. This method randomly selects n samples from the N parent population. The chance of occurrence of error which the variance between ratio of the sample with a particular characteristic \hat{p} and the parent ratio p cannot be over an acceptable error limit d must not be smaller than $1 - \alpha$. And this can be represented by the equation as follows:

$$P(|\hat{p} - p| \leq d) \geq 1 - \alpha \dots\dots\dots (1)$$

Where: \hat{p} = sampling ratio, p = parent population ratio, d = level of acceptance of error, and $1 - \alpha$ = degree of reliability.

Then the size of the sample is big enough, the allocation of p can use normal distribution to come close to the actual value. Thus, using the above equation (1), we can get the minimum sample size, as shown in the following equation:

$$n \geq \frac{\left(\frac{Z_{\alpha/2}}{d}\right)^2 p(1-p)}{1 + \frac{1}{N-1} \left[\left(\frac{Z_{\alpha/2}}{d}\right)^2 p(1-p) - 1\right]} \dots\dots\dots (2)$$

Where: n = sample size, N = parent population

When the parent population is very large, (2) can be simplified as:

$$n \geq \left(\frac{Z_{\alpha/2}}{d} \right)^2 p(1-p) \dots\dots\dots (3)$$

Since p is unknown, the $p(1-p)$ in the above equation acts as an increasing function, and since $0 \leq p(1-p) \leq \frac{1}{4}$, we can use $p = \frac{1}{2}$ as our p in the equation, therefore getting the maximum value of $p(1-p)$ of $\frac{1}{4}$. Hence our equation will now look like this:

$$n = \frac{1}{4} \left(\frac{Z_{Z/2}}{d} \right) \dots\dots (4)$$

As described above, with the level of acceptance of error is $d = 0.05$ and with level of significance of $\alpha = 0.05$ (95% level of confidence), our sample size $n = 384.16$. Therefore, 385 will be the number of effective questionnaires retrieved for the samples to be representative.

5. Selecting sampling units

The questionnaire utilizes the online survey maker my3Q as the basis to produce the questionnaire survey. With a time frame of three weeks (from August 20th to September 10th of 2009 to distribute the surveys by means of e-mailing and link posting to various graduate students who have at least some experience in playing F2P MMORPGs in Taipei with help of classmates and friends. Also from September 15th to 30th of 2009, hard copies of the questionnaire survey were handed out to students.

6. Collecting Sample data

Since part of the survey questionnaire will be completed by the participants online via e-mails and links provided to the my3Q website, the sample data collection process is simplified since the input data are already stored on the website automatically as soon as they complete them

7. Assessing the sampling result:

The number of questionnaires retrieved is 406 copies. After the initial selection process, 12 copies are deemed to be invalid or incomplete, making the total number of valid questionnaires to 394 copies. The following provides an insight on the statistical distribution of the collected samples.

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	299	75.9	75.9	75.9
	Female	95	24.1	24.1	100.0
	Total	394	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17~23	211	53.6	53.6	53.6
	24~30	150	38.1	38.1	91.6
	31~37	26	6.6	6.6	98.2
	38~44	5	1.3	1.3	99.5
	Above 45	2	.5	.5	100.0
	Total	394	100.0	100.0	

Monthly Income (\$NT)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than \$10,000	283	71.8	71.8	71.8
	\$10,001~\$20,000	96	24.4	24.4	96.2
	\$20,001~\$30,000	13	3.3	3.3	99.5
	\$30,001~\$40,000	2	.5	.5	100.0
	Total	394	100.0	100.0	

3.6 Data Processing and Analysis Method

The study uses SPSS17.0 statistical software as the study analysis tool- it is used to store coded data, perform statistical analysis, and produce statistical results. The analysis framework of the study is shown below:

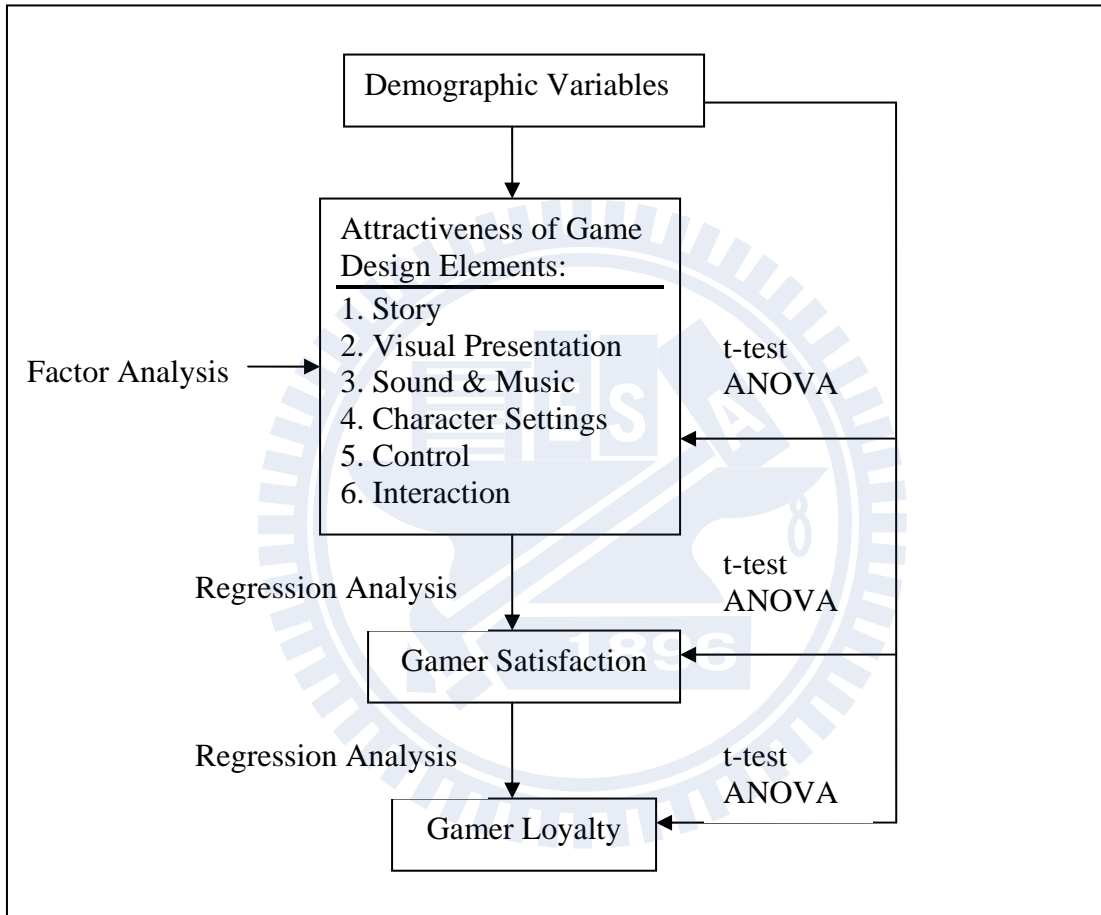


Figure 3-2 Data Analysis Framework

The study's data collection method includes both by means of retrieval of information from my3Q website where the online respondents filled out the survey and by the casual human collection method to collect the hard copy surveys. Therefore, in processing the data, there are two steps to be taken care of- human editing and computer processing:

Here are the descriptions of the statistical methods used in this study:

(1). Descriptive Statistics:

Using descriptive statistics to interpret the collected sample data can give a certain level of understanding towards research subjects' sampling structure and basic characteristics. The demographic variables include: gender, age, and average monthly income (in NTD).

(2). Factor Analysis:

Used to produce and simplify the variables from the initial number of variables, and to explain the biggest variances in the initial data. This study uses the analysis on variables of design elements, and extracts the more important elements, at the same time, drops the less important ones to shrink down the number of variable dimensions. Another use for this analysis is that not only it can shrink down the number of variables to conduct the research, but also that new variables can be generated from the old ones.

(3). One-way ANOVA Analysis:

This is used to test whether the single factors under different groups have significant relationship in their means. This research uses ANOVA to examine whether there are significant relationship between different demographic variables towards attractiveness of game design elements, gamer satisfaction, and gamer loyalty.

(4). Tukey's HSD Test:

The Tukey's Honestly Significant relationship (HSD) test is a post event analysis, single-step multiple comparison procedure used to find which means are significantly different (at $\alpha = 0.05$ significance level) from one another. When significant is achieved during ANOVA test, the Tukey HSD post event analysis is used to compare the significance level between the means of different groups.

(5). Regression Analysis:

The regression analysis can be used to analyze one or more dependent and independent variables and their relationships. This study uses regression analysis to

analyze the influence the attractiveness of game design element dimension has on customer satisfaction.

(6). Cronbach α Coefficient:

Mainly to test the reliability of this study- testing if the attractiveness of game design elements' different dimensions are consistent internally. The higher the number, it means the items' relatedness are higher, meaning higher consistency, which translates to higher reliability.

3.7 Reliability and Validity Analysis

This section will provide a description on the reliability and the validity towards the study's content.

3.7.1 Reliability

Reliability is the credibility of the measurement tools; accuracy and precision will be taken into account, which implies for stability and consistency considerations.

1. Stability: The reliability relating to stability consists of two main types: the test-retest reliability and the alternate form reliability. The former means in different times, measurements are repeated on the same group of samples, and the two results are compared to get the correlation coefficient. The latter means if a testing tool has two alternate forms, based on the score gained by the same group of objects, the correlation coefficient is calculated to get the alternate form reliability.

2. Consistency: In measuring attitudes, if certain item is used to measure the same attitude, then the items should be consistent among one another, meaning there is internal homogeneity. There are three types of measurements measuring consistency- split-half reliability, Kuder-Richardson reliability, and score reliability.

Most researches use the Cronbach's alpha coefficient as the consistency measurement of internal items of questionnaires, and this study will also use this method to test the extent of consistency of the answers on the questionnaires. According to Roberts and Wortzel, the alpha coefficient between 0.7 and 0.98 reflects high reliability.

And if it is less than 0.35, then the researcher should give up on the variable(s) and look for other variable(s) to use.

3.7.2 Validity

Validity means the extent of correctness of the variables. It refers to the extent that the tests or other measurement instruments are capable of measuring characteristics or functions that the researchers want to measure. Achieving a high score on validity means the results of the tests show more real characteristics in the variables the examiner is trying to measure. Validity coefficients of intrinsic validity are just the square root of the reliability coefficient. The American Psychological Association (APA) published a book titled “The Standards for Educational and Psychological Testing” in 1974 which generalized the testing of validity into the following three types:

1. Content Validity: Checking the operationalization against the relevant content domain for the construct. It can test the appropriateness of content validity by according to a set of processes of a measurement tool.
2. Criterion-Related Validity: Checking the performance of the operationalization against some criterion.
3. Construct Validity: Testing the level validity of some theoretical concept or trait, normally based on some concept as basis of building a constructed correlation. The level of accuracy is then based on the accuracy of the theory itself.

The variables examined in the study are based mainly from scholars with tested theoretical concepts, and the construction and presentation of the questionnaire survey is assisted by advising professor, students, and various papers, theses, and journal articles on the subject matter. Thus, the goal is to enhance the level of validity of the study with the help of various literatures and sorting out opinions from specialized scholars, making this study appropriate in terms of level of validity.

Chapter IV

Data Analysis

A total of 394 copies of valid samples are retrieved, and using SPSS 17.0 software, statistical analysis will be conducted according to previously stated goal of research and defined hypotheses.

4.1 Factor Analysis

4.1.1 Factor analysis on attractiveness of game design element 1st run

The factor analysis conducted on the research variables uses principal factor analysis (PFA) and varimax to perform orthogonal rotation. The rotated factor loading matrix is obtained when Eigenvalue is bigger than 1.

KMO and Bartlett's test of sphericity is used when conducting the factor analysis. KMO, also known as Kaiser-Meyer-Olkin, is the test of the adequacy of the samples as the tools of measurement for a study. According to Kaiser, when KMO >0.9 (excellent), KMO >0.8 (great), KMO >0.7 (Good), KMO >0.6 (Average), KMO >0.5 (Poor), and KMO <0.5 (Reject).

From Bartlett's test of sphericity, we can determine whether the data fits as a multivariate normal distribution, and that it can also be used to test whether the correlation coefficient matrix is fitted in order to proceed to the factor analysis. This study's approximate chi-square is 9069.427, with a degree of freedom of 300 when the significance level is set at $\alpha = 0.05$. In other words, the test is significant and that the correlation coefficient matrix representing the parent group does have an existing common factor. Furthermore, the KMO value is 0.929, meaning the study's attractiveness of game design element is a fitted research variable to run the factor analysis.

According to Wu & Lin (2001), when factor loading is bigger than 0.6, it means the factor is significant, and we should reject the factor when it is less than 0.6.

Research conducted by Zaltman & Burger (1975) pointed out that when cumulative explained variance is higher than 40%, the result is within a reasonable range. After conducting the factor analysis on the attractiveness of game design element , the cumulative explained variance is 76.052%, as shown in table 4-1.

Table 4-1 Attractiveness of Game Design Element
Eigenvalue and Explained Variance (1st Run)

Factor	Eigenvalue	Explained Variance	Cumulative Explained Variance
Factor 1	12.787	51.147%	51.147%
Factor 2	2.156	8.25%	59.772%
Factor 3	1.730	8.920%	66.692%
Factor 4	1.281	5.122%	71.815%
Factor 5	1.059	4.238%	76.052%

Here is the result for the first run on the factor analysis (table 4-2):

Table 4-2 Rotated Factor Loading for Attractiveness of Game Design Elements 1st Run
Rotated Component Matrix^a

	Component				
	1	2	3	4	5
Story #02	.859	.145	.141	.084	.194
Story #01	.846	.203	.029	.014	.111
Story #04	.737	.255	.193	.158	.115
Story #03	.728	.189	.194	.265	.187
Story #05	.641	.237	.292	.282	.153
Sound & Music #04	.566	-.023	.318	.376	.262
Sound & Music #03	.502	.019	.481	.279	.345
Visual Presentation #04	.214	.749	.297	.214	.292
Visual Presentation #03	.156	.738	.317	.334	.177
Visual Presentation #02	.125	.728	.208	.298	.221
Visual Presentation #05	.295	.722	.233	.130	.244
Visual Presentation #01	.245	.714	.259	.130	.335
Interaction #01	.288	.309	.766	.145	.090

Interaction #04	.228	.325	.758	.067	.163
Interaction #02	.186	.444	.748	.186	.167
Interaction #03	.081	.391	.652	.302	.208
Control #01	.204	.238	.096	.842	.065
Control #03	.113	.234	.179	.819	.139
Control #02	.166	.363	.104	.814	.111
Sound & Music #02	.372	.006	.437	.555	.346
Sound & Music #01	.414	.047	.432	.537	.380
Character Setting #03	.047	.290	.219	.258	.736
Character Setting #02	.287	.364	.247	.142	.735
Character Setting #04	.361	.227	.039	.028	.702
Character Setting #01	.258	.441	.202	.178	.682

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

As shown in table 4-2, the number of factors is reduced from a total of six to five. The “sound & music” factor is rejected and ruled out since all of the dimensions within the factor received a factor loading of less than 0.6, making them not significant for the test.

4.1.2 Factor analysis on attractiveness of game design element final run

After taking out the factor “sound & music” which received a factor loading of less than 0.6 for all its dimensions, a second and final run of factor analysis is performed, and the adjusted result shows an increase in the cumulative explained variance from 76.052% to 79.474%, as shown in table 4-3:

Table 4-3 Attractiveness of Game Design Element
Eigenvalue and Explained Variance (Final Run)

Factor	Eigenvalue	Explained Variance	Cumulative Explained Variance
Factor 1	10.830	51.571%	51.571%
Factor 2	2.003	9.540%	61.111%
Factor 3	1.575	7.501%	68.611%

Factor 4	1.270	6.046%	74.657%
Factor 5	1.012	4.817%	79.474%

And here is the result for the final (adjusted) run of the factor analysis (table 4-4):

Table 4-4 Rotated Factor Loading for Attractiveness of Game Design Element Final Run

Rotated Component Matrix^a

	Component				
	1	2	3	4	5
Visual Presentation #02	.787	.108	.194	.276	.196
Visual Presentation #01	.780	.226	.237	.104	.307
Visual Presentation #03	.756	.149	.325	.324	.172
Visual Presentation #05	.744	.286	.240	.115	.236
Visual Presentation #04	.739	.208	.321	.213	.300
Story #02	.152	.856	.133	.075	.198
Story #01	.152	.853	.058	.031	.141
Story #03	.102	.749	.238	.287	.234
Story #04	.248	.739	.204	.148	.126
Story #05	.168	.665	.324	.298	.188
Interaction #04	.232	.245	.806	.079	.205
Interaction #01	.277	.293	.773	.147	.104
Interaction #02	.406	.192	.767	.184	.184
Interaction #03	.246	.100	.730	.346	.278
Control #01	.154	.217	.151	.867	.116
Control #03	.180	.127	.208	.836	.171
Control #02	.328	.171	.133	.826	.137
Character Setting #03	.234	.060	.250	.258	.761
Character Setting #02	.353	.288	.250	.132	.741
Character Setting #04	.166	.359	.068	.050	.737
Character Setting #01	.402	.259	.229	.178	.703

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

An organized table with the factors, associated dimensions with their respective question contents and factor loadings is provided below (see table 4-5):

Table 4-5 Organized Table for Attractiveness of Game Design Element Constructs & Rotated Factor Loading

Factor	Dimension	Question Content	Factor Loading
Factor 1	Visual Presentation	The character module design in the game is unique and consistent.	.787
		The game delivers amazing style of visual arts.	.780
		The background design in the game is consistent.	.756
		The actions and expressions of the characters are designed with great detail.	.744
		The equipments (armors & weapons) in the game have unique artistic designs that are visually appealing.	.739
Factor 2	Story	The game offers a rich and intriguing story content.	.856
		The game delivers a storyline that clearly explains the plot of the game.	.853
		The events in the game are consistent with one another.	.749
		The game is expandable with lots of side stories & quests to accomplish.	.739
		The characters show development throughout the progress of the game.	.665
Factor 3	Interaction	I am meet new friends easily in the game.	.806
		The players can conveniently team up with other players for questing in the game.	.773
		The players can conveniently communicate with other players in the game.	.767
		The players can conveniently make in-game transactions with other players in the game.	.730
Factor 4	Control	The control of the game is easy to handle.	.867
		The control of the game is easy to memorize.	.836
		The control of the game is easy to learn.	.826
Factor 5	Character Setting	The sets of equipments (weapons and armors) each job class/race can wear are clearly different from one another.	.761
		There are many techniques/ maigcs available to use in the game.	.741
		The job classes/races are balanced in a way that no one class/race is superior to another.	.737
		There are many job classes/races to choose from in the game.	.703

4.2 Reliability Analysis on “Attractiveness of Game Design Element”, “Gamer Satisfaction” and “Gamer Loyalty”

According to Roberts and Wortzel, the alpha coefficient between 0.7 and 0.98 reflects high reliability. And if it is less than 0.35, then the researcher should give up on the variable(s) and look for other variable(s) to use.

Table 4-6: Reliability Score on Each of the Factor Constructs of the Attractiveness of Game Design Element

Attractiveness of Game Design Element Constructs	Cronbach's α
Story (Q1,2,3,4,5)	0.905
Visual Presentation (Q6,7,8,9,10)	0.934
Character Setting (Q15,16,17,18)	0.888
Control (Q19,20,21)	0.910
Interaction (Q22,23,24,25)	0.915
Overall Construct	0.910

The coefficients are all within the 0.7 ~ 0.98 range, thus the chosen attractiveness of game design element items are highly reliable.

Table 4-7: Reliability Score on Gamer Satisfaction and Loyalty

Gamer Satisfaction & Loyalty	Cronbach's α
Gamer Satisfaction (Q26,27,28)	0.929
Gamer Loyalty (Q29,30,31,32)	0.931

The coefficients are all within the 0.7 ~ 0.98 range, thus the chosen satisfaction and loyalty items are highly reliable.

4.3 Analysis on Effects of “Demographic Variables” on “Attractiveness of Game Design Elements”

This section examines whether gamers with different “demographic variables” will have some influence towards their “attractiveness of game design element”. Therefore, “demographic variables” including gender, age, and income will be set as independent

variables; “attractiveness of game design element” will be set as dependent variables. Independent samples t-test analysis and one way ANOVA test will be used to examine these effects.

4.3.1 “Gender” and “attractiveness of game design element”

Testing hypothesis 1-1 H₀: Gamers with different “gender” and attractiveness of game design element have no significant relationship.

Hypothesis 1-1-1 H ₀ : Gamers with different “gender” and attractiveness of game design element -“story” have no significant relationship.
Hypothesis 1-1-2 H ₀ : Gamers with different “gender” and attractiveness of game design element -“visual presentation” have no significant relationship.
Hypothesis 1-1-4 H ₀ : Gamers with different “gender” and attractiveness of game design element -“character settings” have no significant relationship.
Hypothesis 1-1-5 H ₀ : Gamers with different “gender” and attractiveness of game design element -“control” have no significant relationship.
Hypothesis 1-1-6 H ₀ : Gamers with different “gender” and attractiveness of game design element -“interaction” have no significant relationship.

Table 4-8 Independent Samples t-test for Gender on Attractiveness of Game Design Elements

Factor Dimension	Gender	Mean	F value	P value	t-test for equality of means	
Story Design Quality	Male	2.76	0.203	0.652	t	p
	Female	2.88			-0.921	0.358
Visual Presentation Design element	Male	3.27	0.858	0.355	t	p
	Female	3.46			-1.358	0.175
Character Setting Design element	Male	3.27	1.257	0.263	t	p
	Female	3.27			-0.040	0.968
Control Design Quality	Male	3.55	7.450	0.007	t	p
	Female	3.67			-0.795	0.427
Interface Design Quality	Male	3.44	5.708	0.017	t	p
	Female	3.55			-0.785	0.433

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved

This study uses independent samples t-test to examine the hypothesis, and the results found that under level of significance of $\alpha = 0.05$, there are no significant relationships between gender and perceptions of quality of all the aspects of the attractiveness of game design elements- “story”, “visual presentation”, “sound & music”, “character setting”, “control”, and “interaction”- thus we accept the null hypotheses 1-1-1H₀, 1-1-2H₀, 1-1-4H₀, 1-1-5H₀, 1-1-6H₀.

4.3.2 “Age” and “attractiveness of game design element”

Testing hypothesis 1-2 H₀: Gamers with different “age” and attractiveness of game design elements have no significant relationship.

Hypothesis 1-2-1 H ₀ : Gamers with different “age” and attractiveness of game design element -“story” have no significant relationship.
Hypothesis 1-2-2 H ₀ : Gamers with different “age” and attractiveness of game design element -“visual presentation” have no significant relationship.
Hypothesis 1-2-4 H ₀ : Gamers with different “age” and attractiveness of game design element -“character settings” have no significant relationship.
Hypothesis 1-2-5 H ₀ : Gamers with different “age” and attractiveness of game design element -“control” have no significant relationship.
Hypothesis 1-2-6 H ₀ : Gamers with different “age” and attractiveness of game design element -“interaction” have no significant relationship.

Table 4-9 One way ANOVA for Age on Attractiveness of Game Design Elements

	Age					F Value	p-value	Turkey
	(1) 17~23	(2) 24~30	(3) 31~37	(4) 38~44	(5) >45			
Story	2.7587	2.7659	3.1077	3.0800	2.5000	0.639	0.635	
Visual Presentation	3.2550	3.3467	3.5231	3.7600	3.0000	0.568	0.686	
Character Setting	3.2690	3.2383	3.3173	3.8500	3.6250	0.425	0.791	
Control	3.6924	3.6133	3.4872	3.1333	2.1667	0.847	0.496	
Interaction	3.5071	3.4983	3.2308	2.7000	2.6250	1.160	0.328	

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved

This study uses one-way ANOVA test to examine the hypothesis, and the results found that under level of significance of $\alpha = 0.05$, there are no significant relationships between age and perceptions of quality of all the aspects of the attractiveness of game design elements- “story”, “visual presentation”, “sound & music”, “character setting”, “control”, and “interaction”- thus we accept the null hypotheses 1-2-1H₀, 1-2-2H₀, 1-2-4H₀, 1-2-5H₀, 1-2-6H₀. Tukey HSD test, a post-event analysis was not needed since the p-value for all the factors are higher than 0.05 under $\alpha = 0.05$.

4.3.3 “Monthly income” and “attractiveness of game design element”

Testing hypothesis 1-3 H₀: Gamers with different “monthly income” and attractiveness of game design element have no significant relationship.

Hypothesis 1-3-1 H₀: Gamers with different “monthly income” and attractiveness of game design element -“story” have no significant relationship.

Hypothesis 1-3-2 H₀: Gamers with different “monthly income” and attractiveness of game design element -“visual presentation” have no significant relationship.

Hypothesis 1-3-4 H₀: Gamers with different “monthly income” and attractiveness of game design element -“character settings” have no significant relationship.

Hypothesis 1-3-5 H₀: Gamers with different “monthly income” and attractiveness of game design element -“control” have no significant relationship.

Hypothesis 1-3-6 H₀: Gamers with different “monthly income” and attractiveness of game design element -“interaction” have no significant relationship.

This study uses one-way ANOVA test to examine the hypothesis, and the results (Table 4-10) found that under level of significance of $\alpha = 0.05$, there are no significant relationships between age and perceptions of quality of these aspects of the attractiveness of game design elements- “story”, “sound & music”, “character setting”, “control”, and “interaction”- thus we accept the null hypotheses 1-3-1H₀, 1-3-4H₀, 1-3-5H₀. However, the factor “visual presentation” and “interaction” is found to be significant with a p-value of 0.026 and 0.045, respectively, a deeper analysis follows:

Table 4-10 One way ANOVA for Monthly Income on Attractiveness of Game Design Elements

	Monthly Income (NTD)				F Value	p-value	Turkey
	(1) <\$10,000	(2) \$10,001~\$20,000	(3) \$20,001~\$30,000	(4) \$30,001~\$40,000			
Story	2.7336	2.8917	3.0462	3.9000	1.282	0.280	
Visual Presentation	3.3590	3.0729	4.0308	3.6000	3.115	0.026*	3>2
Character Setting	3.2606	3.2865	3.3846	3.0000	0.097	0.962	
Control	3.5819	3.5278	3.8974	3.8333	0.353	0.787	
Interaction	3.5186	3.2396	4.0769	3.8750	2.705	0.045*	3>2

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved

As a post-event analysis, Tukey HSD test is used to further examine whether the significance is truly significant. We see that using the Tukey HSD test, “visual presentation” is indeed significant to demographic variable of income at $p = 0.032$ for income groups (2) and (3) with level of significance of $\alpha = 0.05$ (table 4-11). The level of perception of the gamers falling in the income group \$20,001~\$30,000 is significantly higher than the gamers falling the income group \$10,001~\$20,000. Thus we reject the null hypothesis 1-3-2H₀. We see that “visual presentation” have a higher influence on gamers in the income group \$20,001~\$30,000, then the group \$30,001~\$40,000 and those with less than \$10,000.

Table 4-11 Tukey HSD Test for Visual Presentation and Monthly Income

Tukey HSD Test					
Dependent Variable	(I) Monthly Income (\$NT)	(J) Monthly Income (\$NT)	Mean Difference (I-J)	Std. Error	Sig.
Visual Presentation	Less than \$10,000	\$10,001~\$20,000	0.28609	0.13927	0.170
		\$20,001~\$30,000	-0.67176	0.33446	0.187
		\$30,001~\$40,000	-0.24099	0.83672	0.992
	\$10,001~\$20,000	Less than \$10,000	-0.28609	0.13927	0.170
		\$20,001~\$30,000	-0.95785*	0.34847	0.032*
		\$30,001~\$40,000	-0.52708	0.84242	0.924
	\$20,001~\$30,000	Less than \$10,000	0.67176	0.33446	0.187
		\$10,001~\$20,000	0.95785*	0.34847	0.032*

		\$30,001~\$40,000	0.43077	0.89562	0.963
	\$30,001~\$40,000	Less than \$10,000	0.24099	0.83672	0.992
		\$10,001~\$20,000	0.52708	0.84242	0.924
		\$20,001~\$30,000	-0.43077	0.89562	0.963

When Tukey HSD test is performed on the “interaction” to see whether its 0.045 (very closer to the borderline of 0.05) significant is truly significant. This post-event analysis finds out that the groups \$10,001~\$20,000 and \$20,001~\$30,000 do have some sort of influence on one another due to the significance of 0.048, thus the Tukey HSD test suggests that these two income groups do have an significant relationship between one another (table 4-12). Thus, we reject hypothesis 1-3-6H₀.

Table 4-12 Tukey HSD Test for Visual Presentation and Interaction

Tukey HSD Test					
Dependent Variable	(I) Monthly Income (\$NT)	(J) Monthly Income (\$NT)	Mean Difference (I-J)	Std. Error	Sig.
Interaction	Less than \$10,000	\$10,001~\$20,000	0.27897	0.13676	0.175
		\$20,001~\$30,000	-0.55837	0.32844	0.325
		\$30,001~\$40,000	-0.35645	0.82167	0.973
	\$10,001~\$20,000	Less than \$10,000	-0.27897	0.13676	0.175
		\$20,001~\$30,000	-0.83734	0.34221	0.048*
		\$30,001~\$40,000	-0.63542	0.8726	0.869
	\$20,001~\$30,000	Less than \$10,000	0.55837	0.32844	0.325
		\$10,001~\$20,000	0.83734	0.34221	0.048*
		\$30,001~\$40,000	0.20192	0.87951	0.996
	\$30,001~\$40,000	Less than \$10,000	0.35645	0.82167	0.973
		\$10,001~\$20,000	0.63542	0.82726	0.869
		\$20,001~\$30,000	-0.20192	0.87951	0.996

4.4 Analysis on Effects of “Demographic Variables” on “Gamer Satisfaction”

Testing hypothesis 2 H₀: Gamers with different “demographic variables” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 2-1 H₀: Gamers with different “gender” and the gamer satisfaction towards the game have no significant relationship.

Hypothesis 2-2 H₀: Gamers with different “age” and the gamer satisfaction towards the game have no significant relationship.

Hypothesis 2-3 H₀: Gamers with different “monthly income” and the gamer satisfaction towards the game have no significant relationship.

Table 4-13 Independent Samples t-test for Gender on Gamer Satisfaction

Factor Dimension	Gender	Mean	F value	P value	t-test for equality of means	
Gamer Satisfaction	Male	3.17	4.187	0.041	t	P
	Female	3.26			-0.585	0.559

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved

Table 4-14 One way ANOVA for Age on Gamer Satisfaction

	Age					F Value	p-value	Turkey
	(1)	(2)	(3)	(4)	(5)			
	17~23	24~30	31~37	38~44	>45			
Gamer Satisfaction	3.1927	3.1644	3.3974	3.0000	3.0000	0.243	0.914	

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved.

Table 4-15 One way ANOVA for Monthly Income on Gamer Satisfaction

	Monthly Income (NTD)				F Value	p-value	Turkey
	(1)	(2)	(3)	(4)			
	<\$10,000	\$10,001~\$20,000	\$20,001~\$30,000	\$30,001~\$40,000			
Gamer Satisfaction	3.2226	3.0069	3.7949	3.8333	2.040	0.108	

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved

This study uses both independent samples t-test and one way ANOVA to examine the hypothesis, and the results found that under level of significance of $\alpha = 0.05$, there are no significant relationships between gamer satisfaction and demographic variables “gender”, “age”, and “income”- thus we accept the null hypotheses 2-1H₀, 2-2H₀, 2-3H₀.

4.5 Analysis on effects of “Demographic Variables” on “Gamer Loyalty”

Testing hypothesis 3 H₀: Gamers with different “demographic variables” and gamer loyalty towards the game have no significant relationship.

Hypothesis 3-1 H₀: Gamers with different “gender” and gamer loyalty towards the game have no significant relationship.

Hypothesis 3-2 H₀: Gamers with different “age” and gamer loyalty towards the game have no significant relationship.

Hypothesis 3-3 H₀: Gamers with different “monthly income” and gamer loyalty towards the game have no significant relationship.

Table 4-16 Independent samples t-test for Gender on Gamer Loyalty

Factor Dimension	Gender	Mean	F value	P value	t-test for equality of means	
	Male	3.17			t	P
Gamer Loyalty	Female	3.16	1.223	0.269	0.060	0.953

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved

Table 4-17 One way ANOVA for Age on Gamer Satisfaction

	Age					F Value	p-value	Turkey
	(1)	(2)	(3)	(4)	(5)			
	17~23	24~30	31~37	38~44	>45			
Gamer Loyalty	3.2133	3.0917	3.3365	3.0500	2.6250	0.401	0.808	

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved.

Table 4-18 One way ANOVA for Monthly Income on Gamer Loyalty

	Monthly Income (NTD)				F Value	p-value	Turkey
	(1)	(2)	(3)	(4)			
	<\$10,000	\$10,001~ \$20,000	\$20,001~ \$30,000	\$30,001~ \$40,000			
Gamer Loyalty	3.1811	3.0391	3.7885	3.8750	1.530	0.206	

At significance level $\alpha = 0.05$, *when $p < 0.05$, significance is achieved.

This study uses both independent samples t-test and one way ANOVA to examine the hypothesis, and the results found that under level of significance of $\alpha = 0.05$, there are no significant relationships between gamer loyalty and demographic variables “gender”, “age”, and “income”- thus we accept the null hypotheses 3-1H₀, 3-2H₀, 3-3H₀.

4.6 Analysis on Effects of “Attractiveness of Game Design Elements” on “Gamer Satisfaction”

Testing hypothesis 4 H₀: Attractiveness of game design elements and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-1 H₀: Attractiveness of game design element - “story” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-2 H₀: Attractiveness of game design element - “visual presentation” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-4 H₀: Attractiveness of game design element - “character settings” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-5 H₀: Attractiveness of game design element - “control” and gamer satisfaction towards the game have no significant relationship.

Hypothesis 4-6 H₀: Attractiveness of game design element - “interaction” and gamer satisfaction towards the game have no significant relationship.

This study sets the 5 factors of attractiveness of game design element as independent variables, and gamer satisfaction as the dependent variable:

$$Y = a + bX_1 + cX_2 + dX_3 + eX_4 + fX_5 + \varepsilon$$

Y (dependent variable): gamer satisfaction

X₁~X₅ (independent variables): including the attractiveness of game design element such as story, visual presentation, character setting, control, and interaction.

a : intercept term

b~f : the regression coefficient for each of the independent variables.

ε : error .

Table 4-19 Regression Analysis (1)

ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	426.128	5	85.226	203.137	.000 ^a
	Residual	162.784	388	.420		
	Total	588.913	393			

a. Predictors: (Constant), Interaction Average, Control Average, Story Average, Character Setting Average, Visual Presentation Average

b. Dependent Variable: Satisfaction Average

Table 4-20 Regression Analysis for Attractiveness of Game Design Elements on Gamer Satisfaction

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.211	.120		-1.759	.079
	Story Average	.253	.037	.240	6.841	.000
	Visual Presentation Average	.212	.045	.206	4.743	.000
	Character Setting Average	.243	.043	.223	5.618	.000
	Control Average	-.041	.032	-.043	-1.279	.202
	Interaction Average	.389	.041	.370	9.385	.000

a. Dependent Variable: Satisfaction Average

* represents $p < 0.05$, + represents $p < 0.1$
 $R^2 = 0.724$, Adjusted $R^2 = 0.720$

From table 4-19 above, we see that the predictive power of the perceived quality on attractiveness of game design elements on gamer satisfaction is R^2 (adjusted) = 72.0%, making the appropriateness of the function very high, and that the regression effects is significant ($F(5,388) = 203.137$, $p = 0.00$). From table 4-20, we can see that there are no significant effects from the perceived quality “control” on “gamer satisfaction” $p = 0.202 < 0.05$, thus we accept the null hypothesis 4-5 H_0 . And that a F2P MMORPG’s gamer satisfaction is influenced by perceived quality on story, visual presentation, character setting, and interaction:

1. Story: test results show a t value of 6.841 and p-value is $0.000 < 0.05$, thus we reject null hypothesis 4-1 H_0 . This means F2P MMORPG gamers’ perceived quality on the game’s story design has a significant effect on gamer satisfaction. The regression coefficient is positive 0.253, meaning the higher the gamer’s perceived quality on a game’s story design, the higher the gamer’s satisfaction towards the game, and vice versa.
2. Visual Presentation: test results show a t value of 4.743 and p-value is $0.000 < 0.05$, thus we reject null hypothesis 4-2 H_0 . This means F2P MMORPG gamers’ perceived quality on the game’s story design has a significant effect on gamer satisfaction. The regression coefficient is positive 0.212, meaning the higher the gamer’s perceived quality on a game’s story design, the higher the gamer’s satisfaction towards the game, and vice versa.
3. Character Setting: test results show a t value of 5.618 and p-value is $0.000 < 0.05$, thus we reject null hypothesis 4-4 H_0 . This means F2P MMORPG gamers’ perceived quality on the game’s story design has a significant effect on gamer satisfaction. The regression coefficient is positive 0.243, meaning the higher the gamer’s perceived quality on a game’s story design, the higher the gamer’s satisfaction towards the game, and vice versa.

4. Interaction: test results show a t value of 9.385 and p-value is $0.000 < 0.05$, thus we reject null hypothesis H_0 . This means F2P MMORPG gamers' perceived quality on the game's story design has a significant effect on gamer satisfaction. The regression coefficient is positive 0.389, meaning the higher the gamer's perceived quality on a game's story design, the higher the gamer's satisfaction towards the game, and vice versa.

Thus, the final Regression Function for Hypothesis 4 is:

$$Y = -0.211 + 0.253 X_1 + 0.212 X_2 + 0.243X_4 + 0.389X_5$$

Or

$$\text{Gamer Satisfaction} = -0.211 + [(0.253 * \text{Story}) + (0.212 * \text{Visual Presentation}) + (0.243 * \text{Character Setting}) + (0.389 * \text{Interaction})]$$

The regression coefficients for factors X_1 , X_2 , X_4 , X_5 are 0.253, 0.212, 0.243, and 0.389, respectively. Thus, from this result, we come to the conclusion that when a gamer is assessing his/her satisfaction towards the game, the order of the level of influence from most to least importance towards game design is- "interaction", "character setting", "story", and lastly, "visual presentation".

4.7 Analysis on Effects of "Gamer Satisfaction" on "Gamer Loyalty"

Testing hypothesis 5 H_0 : Gamer satisfaction towards the game and gamer loyalty has no significant relationship.

This study sets game satisfaction as the independent variable, and gamer loyalty as the dependent variable for the regression test:

$$Y = a + bX + \epsilon$$

Y (dependent variable): gamer loyalty

X (independent variables): gamer satisfaction

a : intercept term

b : the regression coefficient the independent variable.

ϵ : error .

Table 4-21 Regression Analysis (2)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	488.538	1	488.538	1132.721	.000 ^a
	Residual	169.068	392	.431		
	Total	657.607	393			

a. Predictors: (Constant), Satisfaction Average

b. Dependent Variable: Loyalty Average

Table 4-22 Regression Analysis for Gamer Satisfaction on Gamer Loyalty

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.263	.093		2.840	.005
	Satisfaction Average	.911	.027	.862	33.656	.000

a. Dependent Variable: Loyalty Average

* represents $p < 0.05$, + represents $p < 0.1$

$R^2 = 0.743$, Adjusted $R^2 = 0.742$

From table 4-21 above, we see that the predictive power of gamer satisfaction on gamer loyalty is R^2 (adjusted) = 74.2%, making the appropriateness of the function very high, and that the regression effects is significant ($F(1,392) = 1132.721$, $p = 0.00$). From table 4-22, we see that a F2P MMORPG gamer's loyalty is influenced by game satisfaction:

Gamer Satisfaction: test results show a t value of 33.656 and p-value is $0.000 < 0.05$, thus we reject null hypothesis $5H_0$. This means F2P MMORPG gamers' gamer satisfaction has a significant effect on gamer loyalty. The regression coefficient is

positive 0.991, meaning the higher the gamer's satisfaction, the higher the gamer's loyalty towards the game, and vice versa.

Thus, the final Regression Function for Hypothesis 5 is:

$$Y = 0.263 + 0.911X$$

Or

$$\text{Loyalty} = 0.263 + (0.911 * \text{Satisfaction})$$

The regression coefficient for factor X is 0.911. Thus, from this result, we come to the conclusion that when a gamer is assessing his/her loyalty towards the game, the level of influence of gamer satisfaction is significantly high.

4.8 Summary of research hypotheses testing results

Table 4-23 Summary of Research Hypotheses Testing Results- Hypothesis 1

Research Hypotheses	p-value	Test Result
Hypothesis 1: Gamers with different “demographic variables” and attractiveness of different attractiveness of game design elements have no significant relationship.		
1-1 H ₀ : Gamers with different “gender” and attractiveness of different attractiveness of game design elements have no significant relationship.		
1-1-1 H ₀ : Gamers with different “gender” and attractiveness of game design element - “story” have no significant relationship.	0.358	Accept
1-1-2 H ₀ : Gamers with different “gender” and attractiveness of game design element - “visual presentation” have no significant relationship.	0.175	Accept
1-1-4 H ₀ : Gamers with different “gender” and attractiveness of game design element - “character settings” have no significant relationship.	0.968	Accept
1-1-5 H ₀ : Gamers with different “gender” and attractiveness of game design element - “control” have no significant relationship.	0.427	Accept
1-1-6 H ₀ : Gamers with different “gender” and attractiveness of game design element - “interaction” have no significant relationship.	0.433	Accept

1-2 H ₀ : Gamers with different “age” and attractiveness of game design element have no significant relationship.		
1-2-1 H ₀ : Gamers with different “age” attractiveness of game design element - “story” have no significant relationship.	0.635	Accept
1-2-2 H ₀ : Gamers with different “age” and attractiveness of game design element - “visual presentation” have no significant relationship.	0.686	Accept
1-2-4 H ₀ : Gamers with different “age” and attractiveness of game design element - “character settings” have no significant relationship.	0.791	Accept
1-2-5 H ₀ : Gamers with different “age” and attractiveness of game design element - “control” have no significant relationship.	0.496	Accept
1-2-6 H ₀ : Gamers with different “age” and attractiveness of game design element - “interaction” have no significant relationship.	0.328	Accept
1-3 H ₀ : Gamers with different “monthly income” and attractiveness of game design element have no significant relationship.		
1-3-1 H ₀ : Gamers with different “monthly income” attractiveness of game design element -“story” have no significant relationship.	0.280	Accept
1-3-2 H ₀ : Gamers with different “monthly income” and attractiveness of game design element -“visual presentation” have no significant relationship.	0.026	Reject
1-3-4 H ₀ : Gamers with different “monthly income” and attractiveness of game design element -“character settings” have no significant relationship.	0.962	Accept
1-3-5 H ₀ : Gamers with different “monthly income” and attractiveness of game design element -“control” have no significant relationship.	0.787	Accept
1-3-6 H ₀ : Gamers with different “monthly income” and attractiveness of game design element – “interaction” have no significant relationship.	0.045	Reject

Table 4-24 Summary of Research Hypotheses Testing Results- Hypothesis 2

Research Hypotheses	p-value	Test Result
Hypothesis 2 H₀: Gamers with different “demographic variables” and gamer satisfaction towards the game have no significant relationship.		
2-1 H ₀ : Gamers with different “gender” and the gamer satisfaction towards the game have no significant relationship.	0.559	Accept
2-2 H ₀ : Gamers with different “age” and the gamer satisfaction towards the game have no significant relationship.	0.914	Accept
2-3 H ₀ : Gamers with different “monthly income” and the gamer satisfaction towards the game have no significant relationship.	0.108	Accept

Table 4-25 Summary of Research Hypotheses Testing Results- Hypothesis 3

Research Hypotheses	p-value	Test Result
Hypothesis 3 H₀: Gamers with different “demographic variables” and gamer loyalty towards the game have no significant relationship.		
3-1 H ₀ : Gamers with different “gender” and gamer loyalty towards the game have no significant relationship.	0.953	Accept
3-2 H ₀ : Gamers with different “age” and gamer loyalty towards the game have no significant relationship.	0.808	Accept
3-3 H ₀ : Gamers with different “monthly income” and gamer loyalty towards the game have no significant relationship.	0.206	Accept

Table 4-26 Summary of Research Hypotheses Testing Results- Hypothesis 4

Research Hypotheses	p-value	Test Result
Hypothesis 4 H₀: Attractiveness of different attractiveness of game design elements and gamer satisfaction towards the game have no significant relationship.		
4-1 H ₀ : Attractiveness of game design element - “story” and gamer satisfaction towards the game have no significant relationship.	0.000	Reject
4-2 H ₀ : Attractiveness of game design element - “visual presentation” and gamer satisfaction towards the game have no significant relationship.	0.000	Reject
4-4 H ₀ : Attractiveness of game design element - “character settings” and gamer satisfaction towards the game have no significant relationship.	0.000	Reject
4-5 H ₀ : Attractiveness of game design element - “control” and gamer satisfaction towards the game have no significant relationship.	0.202	Accept
4-6 H ₀ : Attractiveness of game design element - “interaction” and gamer satisfaction towards the game have no significant relationship.	0.000	Reject

Table 4-27 Summary of Research Hypotheses Testing Results- Hypothesis 5

Research Hypotheses	p-value	Test Result
Hypothesis 5 H₀: Gamer satisfaction towards the game and gamer loyalty has no significant relationship.		
	0.000	Reject

Chapter V

Discussion

The primary goal of this study is to examine the relationship between F2P MMORPG's perceived attractiveness of game design elements and gamer satisfaction & loyalty; more importantly, to find out the relative importance of each of the design elements towards generating gamer loyalty. The research conclusion of this study and management application towards the F2P MMORPG game design companies is proposed according to the purpose of the study and results from data analysis. Finally, suggestions towards possible future research upon the subject matter are provided at the end of this section.

5.1 Conclusion

(1) Demographic variables vs. attractiveness of game design elements

Gamers' demographic variable of "monthly income" is significantly related to the perception of attractiveness of game design element "visual presentation" and "interaction". For a F2P MMORPG's design in "visual presentation", the gamers falling in the income group of NT\$20,000~\$30,000 have the highest degree of perception level, then it's the NT\$30,001~\$40,000 group, then less than NT\$10,000 group, and lastly, the NT\$10,001~\$20,000 group. The order goes the same for "monthly income" and "interaction".

(2) Demographic variables vs. gamer satisfaction

No significant relationship is found between gamers with different demographic backgrounds and gamer satisfaction. In other words, the gamer satisfaction from playing a F2P MMORPG cannot be affected solely from demographic variables alone.

(3) Demographic variables vs. gamer loyalty

No significant relationship is found between gamers with different demographic backgrounds and gamer loyalty. In other words, the gamer loyalty from playing a F2P MMORPG cannot be affected solely from demographic variables alone.

(4) Attractiveness of game design elements vs. gamer satisfaction

After going through two rounds of factor analysis, this study sets the derived five factors of attractiveness of game design elements as the independent variables, and gamer satisfaction as the dependent variable to perform a regression analysis to examine the level of influence the defined constructs of attractiveness of game design element have on gamer satisfaction. The test result shows, the attractiveness of game design elements “story”, “visual presentation”, “character setting” and “interaction” positively affects the level of “gamer satisfaction”. The predictive power of the defined attractiveness of game design element constructs towards the gamer satisfaction is 72.0%. In terms of relative importance, when a gamer is assessing their level of satisfaction towards a F2P MMORPG, the degree of influence of “interaction” design is the highest, then the “story” and “character setting”, and lastly, “visual presentation”.

(5) Gamer satisfaction vs. gamer loyalty

There is a significant relationship found between gamer satisfaction and gamer loyalty. The predictive power of gamer satisfaction on gamer loyalty is a high 74.2%. Linking results from (4) and (5), we come to the conclusion that gamer loyalty is highly influenced by the level of gamer satisfaction, which can be largely explained (72.0%) by attractiveness of game design elements.

5.2 Suggestions & Managerial Implications

Enhance game design qualities (in the order of relative importance) of “interaction”, “story”, “character setting”, and “visual presentation”.

From the test results of the study, it is revealed in the regression analysis that the attractiveness of game design element of “interaction” ranks first in importance in generating gamer satisfaction towards a game, then it’s the “story”, “character setting”, and lastly, “visual presentation”. Since the predictive power of the attractiveness of

game design element of “interaction” on satisfaction is so significantly high (38.9%), it should be noted as a heads up for the game development companies developing F2P MMORPGs.

This result seems to answer many players’ questions towards many of the developed P2P MMORPGs’ and F2P MMORPGs’ market performance. Prior studies have already come to the conclusion that famous P2P profit model game titles of “WoW” and “Lineage Online” succeeded in generating tremendous amounts of profit not by visual effects or story or even control and balance, but that these games have great “interaction” systems that makes interaction of players easy. Those are the people who play the game not only for the sole purpose of gaming, but also to communicate with other and establish their identities in the virtual worlds. It appears that same goes for F2P profit model games as well. Some of the most popular F2P MMORPGs such as “Silk Road” and “Maple Stories” are two of the most obvious examples. Various game reviews stated that these two games offer only average storylines, visual presentations, sounds, control and interface, but yet so many gamers still keep loyal in these games and are willing to continually spend money to purchase virtual items. This is primarily due to the great community systems the games offered to the gamers that bonds them together. Once the players have found themselves bonded to a community, in forms of parties, colonies, and unions, those players often feel a higher level of engagement towards the games. Thus, if a F2P MMORPG developer is planning to design a new project, it seems shifting a bulk of resources to the design element of “interaction” is highly economical and profit-friendly.

According to the generally accepted stats provided by many gaming stats reviews, the age group 17~23 year-olds make up the core of gamers, which includes a big portion of ever-growing online gamers, especially in the genre of F2P MMORPG. The research finding goes well with the stats in that we find out this age group of 17~23 year-olds also have the highest perception towards the attractiveness of game design element of “interaction”, further justifying the importance of “interaction” design in order to satisfy the gamers and eventually to create gamer loyalty.

The test result brings to light the underlying mechanics and the motivations for the gamers to participate and continue to participate in playing a F2P MMORPG. The

concept of stunning visuals and sounds applies to console gaming, but it does not seem to apply to this genre of gaming. Since the F2P MMORPG is the new cash cow for most of the game developers, as can be seen by their movements into this market, management in the department of game design should be careful on which aspect of game design factors she should focus on in order to avoid the situation of ineffective allocation of time and money.

In a real business world where resources are limited, management must be careful on where to put to resources to achieve highest results. This study provides some insights for the game design department management and the quality control management where to put their energy and resources in. Design of a good interaction platform for the gamers will be of the highest priority, followed by story design & script writing, character setting & balance, and visual presentation. Again, a good game is the game that keeps the players in playing the game. In order for F2P MMORPG companies to generate their biggest portion of revenue- the purchase of virtual items by the gamers- the gamers themselves must be both satisfied and loyal enough to use real currency to pay for these virtual items.

5.3 Suggestions on Future Research

Due to limited time, financial, and human capital resources, this study is limited in both the scale and depth of research. Therefore, there is still plenty of room for research in this field of study, especially on this relatively new and the most profit efficient form of online gaming- the F2P MMORPGs. The profit potential of this genre of gaming is so significant that researches in this field will no doubt thrive, and new models to explain and possibly predict the economic outcome of F2P MMORPGs. The following are suggestions for people who are interested in pursuing this topic to gain a deeper understanding of the mechanics of F2P MMORPG:

1. Since the research objects are selected solely in Taipei, future research can test whether different results will occur if tested in different cities in Taiwan, different regions, and even different countries.

2. Future research can try to seek for different design variables in testing the satisfaction towards F2P MMORPG. There are still numerous design elements in the making of a game, such as player control interface and innovative technology for in-game designs.
3. This study focuses solely on game design qualities, and the effects they generate on gamer satisfaction. Future research can use a different approach, such as marketing design, customer service design, website design, broadband stability ...etc. to see if any significant findings can be found to contribute in areas other than the game itself in delivering a successful F2P MMORPG which gamers can truly appreciate.

5.4 Research Limitations

Due to the limited time, human & financial resources, the study has the following limitations:

1. Game titles were not asked in the questionnaire survey; therefore, there might be a possible bias if a big portion of players play the same game and answer specifically based on feelings toward the game
2. The study focuses on people who are gamers themselves, and those gamers have at least some online gaming experience; therefore, the non-gamers are not being considered or compared to in this research.
3. People's purchasing behaviour change over time, and will be influenced by the environment. The results from the study might not be able to get into much insight when the variable of time and/or environment is taken into account.

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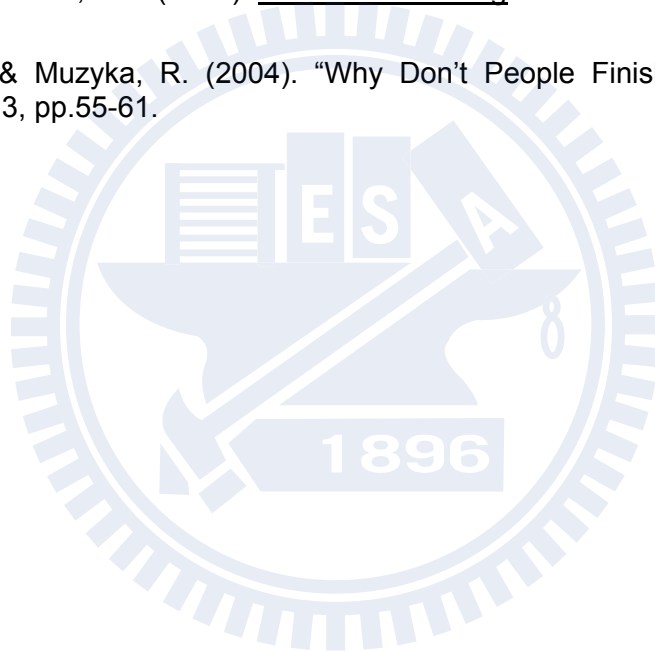
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APPENDIX A- Translated Questionnaire Survey (in English)

Dear Respondents:

This is an academic questionnaire survey examining **relationships between F2P MMORPG's attractiveness of game design elements and gamers' loyalty**. Keep in mind the data and any personal information you provide is solely for academic research purposes and will be kept completely anonymous, so please answer the questions as accurately as possible. Your valuable time and opinions will be of great assistance to this study, so thank you in taking your time filling out this survey.

Sincerely yours,

Gavin Lee
National Chiao Tung University,
Institute of Business Management

Part 1 : Please answer the following questions base on the feelings you feel towards the design of the most recent F2P MMORPG game you have played and check the associated boxes.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1. The game delivers a storyline that clearly explains the plot of the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game offers a rich and intriguing story content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. The events in the game are consistent with one another	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The characters show development throughout the progress of the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The game is expandable with lots of side stories & quests to accomplish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
6. The game delivers amazing style of visual arts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. The character module design in the game is unique and consistent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The background design in the game is consistent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. The equipments (armors & weapons) in the game have unique artistic designs that are visually appealing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. The actions and expressions of the characters are designed with great detail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. The background musics in the game make me feel comfortable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. The musics in the game are chosen appropriately to fit the style of the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. The sound effects in the game allows me to enjoy the gaming atmosphere more	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. The sound effects and the background musics sync smoothly with one another	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. There are many job classes/races to choose from in the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. There are many techniques/maigcs available to use in the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. The sets of equipments (weapons and armors) each job class/race can wear are clearly different from one another	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. The job classes/races are balanced in a way that no one class/race is superior to another	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. The control of the game is easy to handle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. The control of the game is easy to learn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. The control of the game is easy to memorize	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. The players can conveniently team up with other players for questings in the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. The players can conveniently communicate with other players in the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. The players can conveniently make in-game transactions with other players in the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. I can meet new friends easily in the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part 2: Please answer the following questions base on the feelings you feel towards the most recent F2P MMORPG game you have played, and check the associated boxes.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
1. Overall, playing this free-to-play MMORPG satisfies me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I am satisfied by the overall quality of the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. The contents of the game fit my needs for gaming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I feel a strong sense of belonging towards the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I feel uneasy whenever I discontinue playing the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I will continue playing this game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I will recommend my friends to join me in playing the game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Part 3 : Please fill out your personal information here and check the associated boxes.

1. Gender

Male Female

2. Age

Under 16 17~23 24~30 31~37

38~44 Over 45

3. Personal Average Monthly Income (in NTD)

Less than \$10,000 \$10,001~20,000 \$20,001~30,000

\$30,001~40,000 \$40,001~50,000 More than \$50,001

End of the Survey

Please check if you have missed any questions; THANK YOU again for your time

APPENDIX B- Original Questionnaire Survey (in Chinese)

各位親愛的受訪者您好：

這是一份研究學術論文問卷，內容主要是在探討免費多人線上角色扮演遊戲 (F2P MMORPG) 之遊戲設計屬性與玩家忠誠度的關係。懇請您能撥空填答賜予寶貴的意見。您的協助將成為本研究是否能順利完成之關鍵。本問卷內容僅供學術研究之用，採不具名的方式，絕不對外公開，請以您的真實狀況及個人意見安心作答。您的寶貴意見對本研究有極大的貢獻，對於您的協助，僅此敬致謝忱。

敬祝

身體健康 萬事如意 ！

國立交通大學 經營管理研究所

指導教授：陳光華 教授

研究生：李建佑 敬啟

第一部份：請依據目前或最近一次遊玩 F2P MMORPG 的經驗，選擇與你遊玩感受最接近的選項，並在適當的 內打『✓』

	非常 不 同 意	不 同 意	普 通	同 意	非常 同 意
1.遊戲的故事背景清楚的表達了該故事劇情	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.遊戲有著豐富和吸引的故事情節	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.遊戲中發生的劇情有連貫性	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.遊戲裡的角色隨著遊戲的進行有著明顯得成長	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.遊戲是有擴充性的,並有許多任務讓玩家完成	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	非常 不同 意	不 同 意	普 通	同 意	非常 同 意
11.遊戲的背景音樂令人感到舒適	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.背景音樂的選擇與遊戲風格很搭配	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.遊戲音效可引領玩家融入故事劇情的氣氛之中	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.遊戲音效與背景音樂的搭配是很合適的	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.遊戲裡有許多種族/職業可讓玩家選擇	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.遊戲裡有許多技能/魔法可讓玩家使用	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.不同種族/不同種族/職業所可以穿戴的裝備明顯的差異	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.遊戲裡各職業/種族配備的能力相當均衡	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.遊戲的操控方法是容易上手的	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.遊戲的玩法是容易學習的	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.遊戲的操控方法是令玩家容易記住的	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22.玩家可以輕易的與其他玩家組隊冒險	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.玩家可以輕易的與其他玩家進行交談	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24.玩家可以輕易的與其他玩家進行交易	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25.此遊戲讓玩家可以很容易的交到新朋友	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

第二部份: 請依據目前或最近一次遊玩 F2P MMORPG 的經驗, 選擇遊玩後與你內心感受最接近的選項, 並在適當的 內打『✓』

	非常 不同 意	不 同 意	普 通	同 意	非常 同 意
1. 整體上來說, 遊玩此遊戲令我感到滿意	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. 此款線上遊戲的整體遊戲品質令我感到愉悅	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. 遊戲的內容符合我的遊玩需求	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	非常不同意	不同意	普通	同意	非常同意
4. 此遊戲讓我感到歸屬感	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. 當我停止遊玩此遊戲時, 我會感到不自在	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. 我會繼續遊玩此款線上遊戲	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. 我會推薦朋友跟我一起遊玩此遊戲	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

第三部份：此部分為個人背景資料，僅供統計分析之用，請在最適當的 內打『✓』

1. 性別

男 女

2. 年齡

16 歲以下 17~23 歲 24~30 歲 31~37 歲
 38~44 歲 45 歲以上

3. 個人平均月收入（新台幣 NTD）

低於 10,000 元 10,001~20,000 元 20,001~30,000 元
 30,001~40,000 元 40,001~50,000 元 高於 50,001 元

本問卷到此結束，請您檢視是否有遺漏之處，再次感謝您的時間！