

Explore the affect extent of “mod” to the life-cycle of video games

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Abstract: This article explains and literature review of what is new in the game industry, mods, and the concept of video games and discusses possible implications between the two. In the following linear regression analysis, we found that the quality and total amount of mods had no effect on the total number of game owners but positively affected the annual increase of game owners. Furthermore, in a robustness test, the literature found that the role of mods is not disturbed by exogenous factors, the game company's reputation, and endogenous factors, whether the game is an open world. Above, this article is dedicated to introducing the concept of mods to the emerging game industry and making literature contributions to the planning of mods by game companies in the future.

1. Introduction

In the 21st century, the video game is already popular around the world through the Internet. With the video game's content becoming larger and various, different from other commodities, the developers and consumers may hold various opinions of a game project, such as plot, gameplay, graphics, etc. Thus, some consumers who have the ability to modify the game will shape the game into a style that parts of consumers may like by coding. Those consumers' self-added content, including but not limited to NPC (Non-Player Character), items, and quests, are called "mods".[1]

This behavior is considered as “value co-creation”, which is derived from a new type of marketing logic, “Service-dominant Logic”. Information technology has deeply changed the way that suppliers and consumers interact, enabling new forms of collaboration in the product development process and redefining the whole concept of the consumer. In detail, as part of the S-D logic, “value co-creation” describes the process in that consumers join in firms' business operations and contributes to firms' development in multiple ways.

Both academe and business sector will benefit from this research. On the one hand, the theory of value co-creation theory and product life-cycle theory are supplemented and expanded into new sector. On the other hand, business company will benefit from extended sale and reputation of consumers.

2. Literature Review

2.1 Value Co-creation and Service-Domain Logic

In the contemporary era, the dominant marketing logic has shifted from the goods, which focus on tangible resources, embedded value, and transactions, to the service that emphasizes intangible resources. The new marketing logic, service-dominant (S-D) logic, pay attention to the value created when the consumer consumes a product that becomes the core idea and research focus of marketing. Value co-creation is one of the main concepts of S-D logic, describes the process of consumers joining in firms' business operations and contributes to firms' development in multiple ways. Therefore, much research has been done to analyze around effects of value co-creation.

The developed internet web empowered consumers' interaction ability with firm employees and enhanced the scope and intensity of value co-creation. Also, another type of video game player co-creation that players modify the original game software by generating a set of add-on codes, which is called “mod,” and share these “mods” as free complimentary content in the theme forums for other players to entertainment or study. Furthermore, the hypothesis tests that video games' increased sales

and improved word-of-mouth are positively related to these consumer co-creations, the “mods,” with a valid linear regression model.[2]

2.2 Motivation and Challenges of Co-creation for Consumers and Firms

During the co-creation process, the payback towards the co-creator will usually gain from multiple aspects, like cash reward in finance, social acknowledgement, or even just a sense of belonging or titles within a small group. It also can be psychological satisfaction, such as enjoyment of creation and epistemically curiosity. On the contrary, the player, as co-creator, faces various costs from money, resources, and effort in learning.

For company, consumers' value co-creation will save both time and budget by reducing the risk of failure of the new product in the ideation and product development stage. Even after, the online player community could still provide product awareness and word-of-mouth on a large scale in the post-launch section. Meanwhile, the communication and collaboration during the co-creation process will improve the relationship between consumers and employees, and the consumer will be more satisfied. Nevertheless, Also, firm employees face massive and heterogeneous information received from consumers in co-creation, which causes the information overload problem and faces infeasible ideas. In addition, apart from the video game sector, Employees of consultant and professional service firms will also sink into the problem of role ambiguity and conflict since consumer uncertainty increases.[3]

2.3 Products Life-cycle Theory and Video Game Sector

This article places its research area on the theory of “Product Life-cycle.” Many studies explore the product life-cycle in industries. The concept of “Product Life-cycle” as the evolution of a product and different stages in the product's life that are measured by sales. In detail, there are four stages, “Introduction, Growth, Maturity, and Decline, for a product in its life-cycle. The product is brought to market with low sales in the “Introduction” stage. Then, the product's sales will gradually increase under the “Growth” stage and become stable in the “Maturity” stage. Finally, the sales will rapidly decrease because of outdated. Many researchers pay attention to the theory because it is a basis for product planning and control in management analysis.

There are rare studies on the video game lifecycle and only a few related articles for reference. For example, whether the large installed base of a console system, such as Xbox 360 or Sony Playstation 3, compensates for the declining demand of the system's later lifecycle stage? The result proved such a hypothesis and affirmed the positive effect of social value by a large installed base through direct network effects. Also, the amazing influence superstar software imposes on the console system, which certain high-quality “superstar” software, like “Super Mario 64”, improved 14% sales of its complementary hardware, the Nintendo N64 console, within five months.

The above studies' content supports the idea that high-value video games, whether quality or popularity, can bring sales benefits and competitive advantages for the firm. Obviously, a company always hopes that its game has a long enough product lifecycle to maximize its popularity and attract enough customers. Especially for the production of computer software, which has a heavy development and publicity cost but almost "zero-cost" as replication for the production process. Moreover, it is not only for the current product sales but also for building the brand to ensure repeated purchases of the new product. Meanwhile, as we reviewed before, co-creation by players is one of the choices to keep a game fresh and heat discussed with relatively low cost. Thus, a possible valuable guess comes to appear.[4]

3. Research Methodology

Within this paper, the effect evaluation will carry out by OLS regression with a Robust check between independent variables and target variables, combined with other control groups for the best estimate. The model and method have been proved effective. Similarly, the statistic of owners, mods quantity and download number will be collected in both total and yearly amounts for refinement analysis will be collected as control variables referenced from.

3.1 Data Source

This article collects 50 games from NexusMods and Steamspy. These websites have been used as a database between research value co-creation and video games by several paper journals and are very reliable.

3.2 Independent Variable

The number of accounts that used and played the game will be considered as the independent variable, which is the "owner" of this article. It is because anyone who holds this game will be counted as the game's "owner," no matter whether the one is purchased or received as a gift on steam. The game owner as an indicator is still valuable for estimating the number of people who subscribe and are interested in this game.

3.3 Dependent Variable

The dependent variables of this study mainly focus on the "quantity" and "quality" of "mods" on the game. These are two dimensions to represent the influence rate of one particular game's mods.

For the quantity independent variable, the number of mods of a video game will be a statistic to know the quantity of "mods" that represent the contribution of developers to the user base. This criterion aims to measure the influence of mod's quantity on the video game lifecycle. Theoretically, the more "mods" in the game will increase the option and function for the player, and provide more positive effects by innovativeness and quality of the game.[5]

For the quality independent variable, each game's "mod" download number is considered to be a statistic to know the creativity and utility of "mod". This criterion aims to measure the influence of mod's quality on the video game lifecycle. Similarly, High-quality mods often mean more and richer game content; A high-quality mod for a game can attract more potential players and retain them longer, which affects the number of sales of a game. One of the innovations in this paper is the introduction and discussion of the concept of "quality of mod".

3.4 Control Variables

There exists the possibility that the price, age of the game, online mode and genre will affect the game's sales. In the essays' description, the reduction of price and the short game age will lead to the sales increase, a multiple-player game will remain at a certain level of sales as time passing, and different genres of the game will attract different kinds of player that lead to different life-cycle of it. Thus, the regression will consider these four variables as the control group to exclude their influence.

3.5 Hypothesis 1: Quantity of mods

Due to the cost of funds, manpower and time for 3A game development, the individual needs of all players cannot be fully satisfied, and even some conflicting individual needs cannot be satisfied at the same time. The works are modified, and at the same time, their results will be released to the community to share, to meet the potential players who have the same needs but cannot program, which will increase the number of players in the game. As the theory mentioned in Section 3.3, A hypothesis can rise to predict the relationship between the quantity of "mods" and the annual sales rate of the game:

H1: *the mitigation extent of a video game's annual sales, as well as owners, decrease rate relates positively to the quantity of its "mods."*

In detail, the article suspects that the mod's total amount and yearly increment will lead positive effect on the owner's total amount and the yearly increment proves mod's quantity can prolong the game's product life cycle. The equation's variants are as follows:

$$Total_owner_{it} (New_owner_{it}) = \alpha + \beta_1 \times Total_mod_{it} (New_mod_{it}) + \beta_2 \times Unit_price_{it} + \beta_3 \times game_age_{it} + \beta_4 \times Online + \beta_5 \times Genre_{it} + \varepsilon_{it}$$

3.6 Hypothesis 2: Quality of mods

In this article, the "quality of a mod" is quantified by its number of downloads. This is based on a

judgment: mods with a large number of downloads usually have a better impact on the game experience of a mod player. In other words, it is "high quality" in the eyes of mod players. As the theory mentioned in Section 3.3, a hypothesis can rise to predict the relationship between the quantity of "mods" and the annual sales rate of the game:

H2: *the mitigation extent of a video game's annual sales, as well as owners, decrease rate relates positively to the quality of its "mods."*

Similar to above:

$$Total_owner_{it} (New_owner_{it}) = \alpha + \beta_1 \times Total_download_{it} (New_download_{it}) + \beta_2 \times Unit_price_{it} + \beta_3 \times game_age_{it} + \beta_4 \times Online + \beta_5 \times Genre_{it} + \varepsilon_{it}$$

4. Data Analysis

The article will count the top 50 games with mods from Nexusmod to Steamspy, using the model built above for linear regression analysis by software "Stata". A table is made, and the influence of the independent variable on the dependent variable is judged by the size and positive and negative of the coefficient. At the same time, the article also provides robust checks to ensure the stability and accuracy of the model.

4.1 Baseline Estimation

In this section, the article will verify the hypothesis of the above methodological content and analyze the relationship between the independent and dependent variables through the statistical significance and positive and negative of β .

After the linear regression, the total owner of a game can be affected only by the enough high quality of the mods rather the great numbers of mods. In other words, if a game publisher wants to maintain positive growth in its total number of users, rather than simply increasing the total number of mods, encouraging creators to improve the quality of their creations (innovative, playable) might be the right choice. Meanwhile, there are many factors that show statistical significance in the game owner's annual increasement. Not only the quantity of the model but also the quality of the model, which is the download number, can significantly affect the growth rate of a game's owner. Thus, both encouraging players to create mods and high-level coders to create high-quality mods can positively contribute to the average annual growth of game users for publishers.[6]

4.2 Robustness check with DID model

In this article, the robustness check would be considered through two aspects, exogenous assumption and endogenous, to test the stability and accuracy of our model.

On the endogenous decision aspect, the assumption depends that the game with the "open world" tag is better than the linear script game in that the player can freely interact with most of the elements within the game and without any limitation from the script. Compared with linear script, the "open world" tag may cause distortion in the coefficients form mods quantity and quality towards owner since "open world" game offers developers more freedom and easy to create. A dummy variable called "Famous" will be created. It donates one if a company be considered as a "famous and strong" game publisher, zero otherwise. After ranking the company's capital, published games and game series number, the top ten companies will be viewed as "famous" companies. Others are the infamous ones.

$$Total_owner_{it} (New_owner_{it}) = \alpha + \beta_1 \times Famous \times Total_mod_{it} (New_mod_{it}, Total_download_{it}, New_download_{it}) + \beta_2 \times Famous + \beta_3 \times Total_mod_{it} (New_mod_{it}, Total_download_{it}, New_download_{it}) + \beta_4 \times Unit_price_{it} + \beta_5 \times game_age_{it} + \beta_6 \times Online + \beta_7 \times Genre_{it} + \varepsilon_{it}$$

On the exogenous assumption, suppose a game publisher has a very high reputation, excellent previous works and rich capital. In that case, its new games' releases will inevitably receive media coverage and the attention of a massive base of fans than other small manufacturers. So, the coefficients of mod towards owners that affected by the above cause even should be concern if games remain the same quality. A dummy variable called "Open" will be created. It donates one if a game

has tag of “open world” in the Steamspy platform, zero otherwise.

$$\begin{aligned} Total_owner_{it} (New_owner_{it}) = & \alpha + \beta_1 \times Open \times Total_mod_{it} (New_mod_{it}, Total_download_{it}, New_download_{it}) + \\ & \beta_2 \times Open + \beta_3 \times Total_mod_{it} + \\ & \beta_4 \times Unit_price_{it} + \beta_5 \times game_age_{it} + \beta_6 \times Online + \beta_7 \times Genre_{it} + \varepsilon_{it} \end{aligned}$$

After similar linear regression, all the interception terms are not statistical significance at any level. It indicates that the regression model is stable and accurate from the interference of exogenous elements of publishers’ influence and endogenous elements of the game’s nature play scheme. The model is stable.

5. Conclusion

This article explores the relationship between mods and the video game life cycle. Through a literature review, we further understand mods, product life cycles, and existing game industry literature. Afterwards, through linear regression, the article will examine the quantitative and qualitative impact of mods on a game life cycle, quantified as the total number of owners in the model and the annual new increment. Finally, the article performs a robustness check to ensure whether the model is robust enough against extrinsic and endogenous factors.

The video game industry is an emerging industry, so its related academic research is very scarce. In contrast, with the recent rapid development of the video game industry, the growing economic volume and the lack of research results have become huge hidden dangers. Whether in academia or practice, the video game industry needs scientific prediction and guidance to make it better.

The innovation of this study is expanding the Product-Life cycle theory into a novel sector – the video game sector. It leverages the PLC theory and increases its applicability in a new industry. Further, by summarizing the existing research in the literature review, this paper innovatively proposes a concept equivalent to the number of mods, "quality of mods". At the same time, the article analyses and quantifies the concept of "mod quality" specifically, so that this concept can be directly used for calculation and measurement.

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