THE DEVELOPMENT OF THEORETICAL FRAMEWORK FOR IN-APP PURCHASING FOR THE GAMING INDUSTRY

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Abstract

The gaming industry is a multi-billion dollar business has evolved from video arcade games in the 1970s/80s to video game consoles and online games in the 1990s/2000s. Today, games can be played on smart phones and tablets which are initially offered for free. They make money later by offering in-app upgrades which promises to enhance the gaming experience. When a gamer engages in this purchase, the term used is in-app purchasing. Normally, a frequent gamer is interested to buy upgrades. For this, a game company must understand the needs and wants of a gamer, and design an intelligent game system which gathers and process information about the behaviour of a gamer when he/she interacts (plays) with it. The game system will suggest a list of in-app(s) which are priced according to the effectiveness for the gamer to upgrade. This research-in-progress paper presents a theoretical framework to study in-app purchasing. The In-App Purchasing Theoretical Framework is backed by Behavioural Game Theory, which is to examine gamer's behaviour, and Theory of Consumption Values, which identify the game's values which are gained from his/her gaming experience.

Keywords: Behavioural Game Theory, Theory of Consumption Values, Mobile, In-App Purchasing, Gaming Industry

1 INTRODUCTION

In the early 1950s, academics built simple video games for simulation in their research. The torch was then passed on to the gaming industry, which made billions by investing on people's want - escaping reality and entering a virtual world. Gaming trends have evolved a great deal and we now have single-player online/offline games, multi-player online games, vastly multi-player role-playing online games on various platforms such as gaming consoles, personal computers, mobile phones, tablets and on the web. Since the introduction of portable multi-media devices, namely smartphones and tablets, people download and play games on their mobile devices. According to a survey conducted by Nielsen (2011), game applications are currently the most popularly downloaded applications among all categories of mobile applications.

In the gaming industry, for a long time, the companies generate their revenue through gaming consoles, selling disks/DVDs, and online games. Today, the trend is to initially offer the mobile games and web-based games for free download. However, some of the additional premium features within the game are locked, and they can be accessed if the user pays for them. For this to occur, it is necessary to entice gamers to play the game regularly or habitually.

People are less likely to download an application even if they were only charged 99 cents to download free, but most people are likely to download when they are free (Cravens 2012). In the gaming industry, the strategy is to allow the gamers to initially download for free, but the gamers need to spend money in "in-app purchasing", which is nothing but buying additional features or upgrade components which can help them to unlock more features of the application, increase their competency or get more game credits, in order to continue playing the game. It has been predicted that by the year 2016, in-app purchasing will contribute to 41% of the app store's revenue (Cravens 2012).

In the literature, there are many studies focussed on online digital games. For instance, Liu et al. (2013) examines how competition (based on different skill levels) impact players' behaviors and emotion; Roquilly (2011) reviews that game companies use five components to control and development of virtual worlds. However, the research on gamers' in-app purchasing is still scarce. Thus, this is the goal of this research.

Most people think Game Theory relates to games. However, Game Theory is a theoretical and methodological approach to make predictions in various situations and come up with strategies to handle these situations in such a way that the outcome is beneficial. Game Theory has been applied to predict the outcomes of several economic approaches such as bargaining, auction, acquisitions and economic phenomena such as inflation, changing market conditions, the ever fluctuating shares market and many others. Game Theory is then refined to understand and making predictions when the uncertain nature of human behaviour is involved – this is known as Behavioural Game Theory (Camerer et al 2001).

Behavioural Game Theory, in this research context, is used for studying the behaviour of gamers. Behavioural Game Theory is used in the development of a theoretical framework which describes the general decision making process that a gamer engages in before purchasing an in-app component and how efficient strategies can be used to collect precise data on the behaviour of the gamers thereby helping the game developers come up with the right in-app items. Theory of Consumption Values is a complement to the prior theory to examine a gamer's behaviour in choice.

To achieve this end, in Section 2, we will briefly examine two theories – Behavioural Game Theory and Theory of Consumption Values. The proposed theoretical framework in Section 3 helps understand the interaction between the gamer and the game system and how the theories suggested in Section 2 can be used to get the desired outcome. A research approach was then proposed in Section 4. In the last section, we will discuss our next step towards the progress of this research.

2 LITERATURE REVIEW

Applying game theory in the discipline of Information Systems is not new (Lee et al. 2011). Game theory is a branch of mathematics and a major concept of Artificial Intelligence, devoted to studying interaction among rational and self-interested agents, and machine learning to make automated decisions. Game Theory strategies are applied by "players" to get the best outcome for themselves in a "game" where player assumes that every other player plays for an optimal outcome.

Eric Van Damme (1995) states that researchers are prone to spending a lot of time on enhancing the mathematical elegancy of game theory models, without considering their practicality of these models: "At present our empirical knowledge is inadequate and it is an interesting question why game theorists have not turned more frequently to psychologists for information about the learning and information processing processes used by humans".

On the other hand, Behavioural Game Theory further expands Game Theory by adding factors such as emotions, mistakes, limitation of knowledge, doubts, smartness of the player and learning capabilities of the player. Hence, Behavioural Game Theory is an approach which utilises the psychological factor and reduces assumptions in the analysis (Camerer et al 2001).

The two theories we will apply in our research are Behavioural Game Theory and Theory of Consumption Values, which we will now discuss in more details.

2.1 Behavioural Game Theory

Game Theory is highly mathematical and is based on guess-work, intuition, probability and introspection rather than observation of actual game. Unlike guess-work and predictions, Behavioural Game Theory was built on experiments which present real data on player's behaviour (Camerer et al 2001). Experiments help uncover details which affect the sensitivity of a game to its environment, hence making strategy development more effective. With the advance in the experimental techniques over a period of three decades, experiments have been helpful in giving decisive results in establishing the relation between the behaviour of the players and the environment than those made from guesswork and introspection (Camerer et al 2001). We use Behavioural Game Theory because it has three principles: (1) Precision: This framework can use more parameters which expresses the flexibility of human behaviour, since every individual is different. Having more parameters will reduce generalities and deviations in the outcomes. (2) Context-Specific: In Behavioural Game Theory, there are no common theories that can apply to all contexts. "But this does not mean that a theory can be applied to only one or two datasets, but applies to dozens of dataset" (Camerer et al 2001). (3) Empirical discipline: "Behavioural Game Theory is heavily disciplined by data, since logic cannot be applied for predicting how people would behave" (Camerer et al 2001).

This can be explained with the help of the "Ultimatum Bargaining" scenario. The ultimatum bargaining is nothing but the negotiation between the buyer (or someone who *proposes* a bargain, that is, a Proposer) and seller (or someone who accepts/responds to a bargain, that is, a Responder) to bring the price of a product down. For instance, Bob, the photographer, takes pictures of people on a cruise and sells it to then for $5. Alice and her friends want to buy that photograph for a lesser price. Hence, Alice and her friends decide to play an *ultimatum bargaining*. In this scenario, Alice is the Proposer and Bob is the Responder. In Game Theory, players are assumed to be self-interested; that is, they want to keep the most gain for themselves. If that is true, then in a bargaining scenario where two players are bargaining over some amount (say $5), the Proposer would offer the lowest denomination, say 10 cents (x=$0.10) and keep $4.90 ($5.00-x = $5.00-$0.10 = $4.90) for themselves, and the Responder will take the offer and earn 10 cents instead of rejecting the offer and earn nothing.

However, this is very unlikely for the photographer as he only earns 10 cents for his work. In such cases, Bob, the photographer, can reject the offer and earn nothing. A bargain which is much less than half of the original price is not received well by the Responder and ultimately led to the Responder

rejecting the offer to punish the Proposer who behave unfairly. Such rejections are called *negative reciprocity* (Camerer et al 2001).

Camerer and co. (2001) also go on to explain the origin of the sense of fairness in the human mind can be attributed to several generations of human experience transferred through interaction in a cognitive and emotional system.

2.2 Theory of Consumption Values

Another theory which has to be discussed for this research is the Theory of Consumption Value since the aim is to study the consumption behaviour of gamers. Consumption is one of the core activities of a social life from which consumers derive their materialistic and symbolic values in every transaction they make (Zwick and Dholakia 2008). Marketeers try to understand how consumers make the choices of purchasing a product (Sheth et al. 1991). The products that are considered most popular are the ones which satisfy consumers and increase profit. These products should not only satisfy basic needs, but should also help find meaning for the consumer. This meaning will be termed as *value*.

Sheth et al.'s (1991) Theory of Consumption Values has identified five consumption values influencing consumer choice behavior: *functional value*, *social value*, *emotional value*, *epistemic value*, and *conditional value*. In Table 1, we explain the five values influencing consumer choice behaviour.

Consumer Choice Behaviour	Explanation
Functional Value	The perceived usage and value attained from the functional/utilitarian/physical performance of the product.
Social Value	The perceived value acquired through the association with "one or more specific social groups".
Emotional Value	The perceived value acquired by the ability of a purchase/consumption to arouse feelings.
Conditional Value	The perceived value acquired by the solution offered by the consumption of a product, under specific situation or circumstances faced by the consumer.
Epistemic Value	The perceived value acquired by a product's ability to "arouse curiosity, provide novelty, and/or satisfy a desire for knowledge".

Table 1.   Five Consumption Values Influencing Consumer Choice Behavior (Park and Lee, 2011; Sheth et al. 1991).

3   THEORETICAL FRAMEWORK

There are several types of games such as arcade, cards games, strategy, and so on. We observed one particular action-based game application called *WWE Immortals* (based on World Wresting Entertainment Inc., game developed by NetherRealm Studios, http://www.wwe.com/inside/wwe-immortals) to help us develop the initial framework. The in-app purchasing framework shown in the Figure 1 shows how gamers interact with the system and how during this interaction, the gamer involves in decision-making which could possibly result in in-app purchasing.

The components of this framework are: Game Company, Game System and Gamer. The area bordered with dashed lines is beyond the scope of this research. A detailed explanation of the framework can be found below.
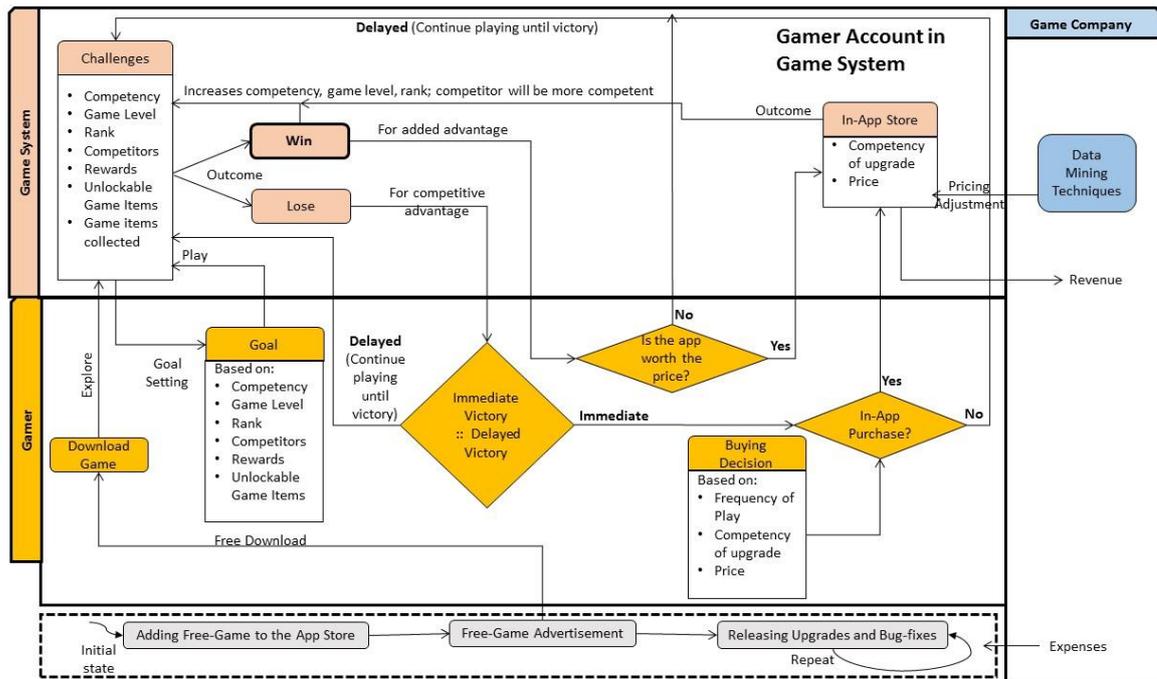
Figure 1. In-app Purchasing Theoretical Framework

3.1 Game Company

After developing a game, the game company spends money on advertisement to promote the game, and uploading the game to the online stores such as app store. Initially, the game company allows the gamers (players) to play the game for free, and receives feedback to fix up bugs in the game, add or improve features in the game.

3.2 Game System and Gamer

An "in-app purchasing" game such as *WWE Immortals* has the following components: tournaments, competitors, game level, competency level of the player, ranking, in-app purchase items such as rewards, unlockable features of the game, weapons, game credits, new characters and power boosters. The following table lists game attributes which can easily reflect the gamers' gaming and consumption behaviour.

Attribute	Explanation
Ranking	Ranking comparing with other competitors
Game Level	Number of games played
Competency Level	Level of experience achieved along with the upgrades earned/purchased
Frequency of Play	Number of games played over a period of time
Game-Play Goal	An aim to accomplish certain thing. For instance, the aim to reach a certain Rank or Competency Level
Game Items Collected	Rewards collected for reaching a Competency Level
In-App Purchasing	Upgrade (purchase) to unlock certain features to improve competency

Table 2.   Game attributes which reflects a Gamer's Behaviour

In the table above, it must be noted that Ranking, Game Level and Competency Level are not redundant. Since a game has several levels of difficulty, a Game Level of a player indicates that a player has won a particular difficulty level but has not yet won a game of a higher difficulty level.

Competency Level and Game Level are same in most games (single-player), but there are some games (multi-player games) where these terms indicate different gamer attributes. A gamer can either choose to play with the computer or with another gamer (online multi-player game). Although a gamer can win a particular Game Level when playing with the computer, he/she can still lose with a real player who is more competent (higher Competency Level). Ranking, which also comes into picture in case of multi-player games, is determined by the game credits scored by gamer after he/she wins a game. Game credits can depend on how soon a gamer can finish the game. Also more points can be scored by a gamer if he/she can beat a gamer of higher competency level as compared to their own.

As Table 2 indicates, it is from these attributes that a player tried to gain the value s/he desires (the types of values are defined in Table 1). Functional value is derived from the usefulness of a purchase. For example, when a gamer purchases an in-app upgrade which eventually helps in winning several games, the gamer finds his purchase satisfactory because it has offered a functional value. Social value is derived from a purchase when the possession of an object or a product gathers respect, admiration or envy from the society. For example, possession of a rare upgrade or achieveing a high rank makes competitors feel envious. It not only has a social value but also an emotional value which a gamer gets when he/she feels accomplished after achieving the rank that was aimed for. Conditional value is derived when a product helps the user at a particular situation. Epistemic value is derived when a product satisfies a user's curiosity. Also, a user can derive epistemic value by collecting novelty items. Hence, gamers can be classified based on the value they seek from the game and all gamers who fall in the same classification show similar behaviour.

Behavioural Game Theory and Theory of Consumption Values are embbed in the framework. The Game System will collect data on how a gamer interacts with all these gaming components and how these components influence the gamer in setting a game-play goal. The data collected can be processed and analysed to find out what value the gamer seeks or derive from this game. The data gathered can be used to suggest, an in-app upgrade which a gamer will more likely purchase.

3.3   Decision Making throughout the Game

Throughout the game-play, a gamer makes several decisions which basically revolve around what aims and value the gamer seeks from the game. Upon interfacing with the game system and its components, a gamer forms a goal in his/her mind where they aim to achieve a certain level of accomplishment. These goals change several times during the entire time they spend with the game and hence the game system must also compute how frequently a gamer changes his/her goals.

In this game, the only way to move forward in terms of game levels and competency levels is by winning each game. When it is a question of losing, a player tries to find ways to quickly increase their competency in order to win that game. This is the right time for a game system to suggest upgrades. Every upgrade available in the in-app store promises a certain level of competency for a cost (see Table 2).

The pricing of the game which is currently being studied is based on game specific attributes. *WWE Immortals*' game characters are designed after the real WWE wrestlers. Pricing can be adjusted on the popularity/notoriety of the actual wrestlers and their wrestling skills. Highest price goes to the game character with more positive skills and less weakness. Although the cost setting is not automated, it is decided by the game company based on data collected on the gamer's perception and behaviour (Table 1 and 2) upon the worth of an up-grade. If a player decided that an upgrade is not worthy of the price offered, s/he rejects the offer. This data can be recorded and collected for the company to find out more about gamers' in-app purchasing preferences and re-valuate their pricing strategy accordingly.

Data can be collected through this process and subsequently be used by the game company as a feedback to release more game upgrades (combinations) and even make the game more interesting for the gamer. This will help maximising the revenue made through in-app purchasing.

4   PROPOSED RESEARCH APPROACH

In this research, we plan to study the gamers' behaviour, i.e. this is the prescribed mode of research to study human behaviour. A multi-method research approach will be adopted. Experiment and survey will be conducted. In order to develop a game system using behavioural game theory, which suggests in-app components based on the gamers' behaviour, the subsequent steps of this research is to identify the various classes of gamers and their behaviours. We plan to approach game companies which use in-apps purchasing model. Next, for sampling purposes, we plan to identify the gamers through social media.

It is envisaged that a survey instrument will be used to study what the gamers, what they think how they behaved in an in-apps purchase gaming enviroment. We also expect to capture why gamers do not want to purchase in-apps.

- The initial step is to approach a game company and propose the In-App Purchasing Framework.

- The interested party can implement the framework in their game system for the purpose of research and experimentation.

- A survey will be conducted for the purpose of categorising gamers based on age, preferred type of game, preferred console and the value they seek out of a game (five consumption values which influences consumer behaviour).

The research intends to develop (game) experiments to study how gamers behave and when they will purchase in-apps to continue the game. It is envisaged that the study in Behavioural game theory (Camerer et al 2001) will mainly be based on experiments. For example:

- Set a specific number of challenges over a fixed period of time (per day or per month).

- In regular intervals collect information about the frequency of game-play and how many challenges were completed over that period of time.

- Limited amount of money can be given to the players to spend over a particular period of time.

- Collect data on what purchases were made during that period of time.

- The data collected will have to cover a huge demographic population. The data will be processed using data mining tools such as SAS (Business Analytics and Intelligence Software), to represent the data in a more comprehendible manner.

- After several iterations of this observation, construct graphs to identify the behaviour of each player and group players by matching the patterns of the graph.

This technique will lead us to find interesting behaviour patterns. Although each gamer makes unique in-app purchase decisions, the similarities lie in the consumption behaviour. Gamers showing similar consumption behaviour can be grouped in clusters and this will ultimately help the game industry come up with different marketing strategies for each cluster.

5   CONCLUSION AND NEXT STEP

Based on the evidence presented in this paper, there is certainly the opportunity to conduct research in this area of games using Behavioural Game Theory and Theory of Consumption Values. This study will develop into a body of understanding that companies can market their products in the future to a wider audience and provide greater appeal by offering no initial product costs. This will attract a much larger audience as gamers can play the games for free. The gamers can later be persuaded to buy in-app upgrades with the help of the In-App Purchasing Framework.

The tendency is for researchers to dismiss this area of interest as connected whereas this paper has highlighted two distinct areas. One being the game and the games experience, and secondly the application of game theory to tease and excite users with better experiences from their games so companies can extract additional revenue from gamers. Currently, the data that will be collected using the research methodology mentioned will be primarily used for categorising the behaviour of gamers. In the future, this can be done with the help of Taxonomy approach suggested by Land et al. (2013) in which they suggest an approach to classify cybercrime based on the crime pattern.

The research is not about criticising game companies but to highlight the ways gamers are interacting with their games and how game companies are about to fund and develop new games and experiences for gamers. It is envisaged that future marketing strategies in many other domains could learn from future finding of this study.

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