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Play to Earn: What motivates users to play NFT games

Short Paper

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Abstract

With the increasing popularity of nonfungible tokens (NFTs), blockchain developers began applying the technology in gaming. NFTs represent in-game digital assets only controlled by the owner, who can use, transfer or sell them to other players in exchange for cryptocurrency, enabling gamers to play and earn money. Despite the growing investments and popularity of such unique and novel games, little is known about what drives people to play such NFT games. Thus, in this exploratory study, we investigate factors impacting NFT game adoption by conducting an online survey with 252 respondents. Building on the results of Study 1, we employ a configurational approach to test the configuration of motivations with fuzzy-set qualitative comparison analysis (fsQCA). Our results are expected to contribute to ongoing discussions in designing play-to-earn crypto games.

Keywords: NFT, Play-to-Earn, Blockchain, Gaming, Cryptocurrency

Introduction

A plethora of new blockchain applications increasingly challenge established business models and practices. One of the most novel blockchain technology advancements is Nonfungible tokens (NFTs). NFT allows the creation of a *digital asset* that is ownable, unique, or limited quantity of data that can be traded and stored on a decentralized, public blockchain along with its history of ownership (Hofstetter et al., 2022). Technology allows anyone to verify ownership of digital assets. Applications of such digital tokens can represent anything from patents, intellectual property (Bamakan et al., 2022), digital art (Vasan et al., 2022), and digital collectables (Baker et al., 2022), like baseball cards. Despite their potential, NFTs are controversial. Similarly to cryptocurrencies, NFTs are viewed as speculative assets that are sold in unregulated online marketplaces, often accompanied by highly volatile prices (Hawkins, 2022).

An NFT is a digital asset that can be in the form of in-game assets, which makes NFT games unique and popular. According to a recent Forbes report, investments in NFT gaming achieved 64 billion US dollars (Liang, 2022). Similarly to traditional online games, users who choose to play NFT games can make various

purchases to improve their gameplay. Unlike traditional online games, NFT games are a unique category of crypto-games that allow users to collect and exchange tradeable cryptocurrencies within the gaming environment. These unique gaming experiences are enabled through decentralized applications on distributed ledgers such as Ethereum. Due to the embedded blockchain mechanism, any transactions in NFT games become a unique digital asset. These digital resources can only be controlled by the owner, who can use, sell, or transfer them to other players in the NFT gaming environment. NFT games can thus offer gamers exclusive in-game assets and objects, including limited-time collectibles or rare items that can be traded or sold for fiat currency. This opportunity to generate income from owned game assets has attracted attention and had a ripple effect in the local game industries, prompting game developers to delve deeper into NFT games.

One of the first success stories in the NFT gaming industry is Axie Infinity, with its user base peaking at 2.7 million in 2021 (Mccarthy, 2022), which can engage gamers in a Play-to-Earn model by facilitating them to manage a team of monsters and use them to fight against other gamers, like Pokémon. To play the game, a user must purchase at least three NFTs (presented as monsters) to form a team and start battling others. In addition, under certain conditions, users can buy, create, and sell their own NFTs. NFTs in gaming environments become in-game characters with unique artwork, skills, and characteristics. These types of games are shifting a paradigm in the gaming industry by providing users with an opportunity to "play and earn" cryptocurrency, which draws our attention to understanding why individuals engage in this gaming model.

Information systems researchers have long examined user behaviours in the online gaming context (Colwell, 2007; Gan & Li, 2018; Wu et al., 2010). However, the emergence of NFT games provides us with an opportunity for rigorous empirical and theory-driven research on such unique play-to-earn blockchain gaming, which remains very scarce (Rossi et al., 2019). Specifically, despite huge investments in these types of games (Liang, 2022), research has yet to answer some of the most fundamental questions about why people engage in play-to-earn NFT games and specifically understanding the drivers of using NFT games. To answer the research questions, we conducted a mixed methods study with two studies (Venkatesh et al., 2013). In this short paper, we present results from Study 1, which follows a qualitative research design based on 252 open-ended responses. We identified motivating factors impacting NFT game adoption. We then use these identified factors to test the configurations of motivations in Study 2 using fuzzy-set qualitative comparative analysis (fsQCA).

Our work makes several contributions. First, our study contributes to the limited understanding of individual-level adoption of NFT blockchain applications. It is one of the first empirical investigations to study adoption intentions in the NFT context. Specifically, we help to identify the motivating factors that drive individuals to use these unique games. Our study contributes to the literature on a play-to-earn. Overall, the finding of our study provides important insights into practice. With increased investments in these applications, individuals' intention to play NFT games is of considerable interest to investors, game creators, operators, and future sponsors. The identified factors in this study can help developers focus on areas that attract users to these types of games by addressing their needs.

In this paper, we begin with an overview of blockchain and cryptocurrencies and theoretical perspectives for investigating NFTs. We then present our research approach and explain and discuss the findings of Study 1. Finally, we outline a research plan for study 2 and discuss the expected implications of this study for theory and practice.

Theoretical Foundations

The underlying technology: Blockchain and Cryptocurrencies

Blockchain is a secured cryptography form of a distributed transactional database that is governed by a consensus mechanism (Beck et al., 2017). A blockchain is a chain of blocks embodying a complete record of transactions distributed to all users of the chain (Ghosh, 2019). The data on the blockchain is confirmed by participants through a consensus mechanism that specifies the rights to validate new transactions. For example, the world's first Bitcoin blockchain consensus mechanism (proof-of-work) assigns decision-making to the expenditure of computational power, where those with the most power become the likeliest to add and validate blocks to the Blockchain (Rossi et al., 2019). Once the block is 'connected' to the chain, it becomes immutable since any attempts to change the stored data will invalidate all subsequent data

(Wang et al., 2021). Blockchains can fundamentally vary depending on their protocol dimension, which refers to the technical rules under which the blockchain is produced. One distinct type of Blockchain, Hyperledger Fabric, is a permissioned blockchain where only authorized agents can read, submit, and validate transactions (Cachin, 2016). The first and most successful blockchain project, Bitcoin, is a public and permissionless blockchain protocol where all agents can read, submit, and validate transactions (Rossi et al., 2019). The product of the Bitcoin blockchain resulted in the development of bitcoin currency (Nakamoto, 2008), the world's first cryptocurrency, a new class of digital assets. Cryptocurrency is considered a subset of virtual currencies and is defined as a digital representation of value issued by a private developer instead of a central bank, credit institute, or e-money institute (Eigelshoven et al., 2021). Since the emergence of bitcoin, over 10 000 cryptocurrencies (CoinMarketCap, 2022) have been operating on different blockchain infrastructures. A new generation of blockchains emerged (e.g., Ethereum), and it is now possible to program and execute software ("smart contracts") on the blockchain infrastructure (Wood, 2014), making it the most prevailing technological infrastructure for NFTs creation and operability.

Research on Nonfungible Tokens (NFTs)

Ethereum blockchain was one of the first to incorporate the creation of nonfungible tokens (Witek et al., 2018). This new type of cryptocurrency fundamentally differs from existing ('fungible') cryptocurrencies like the original Bitcoin or Ethereum. The term fungible refers to the interchangeability of an individual unit of a commodity with one other unit of the same commodity (Chohan & Paschen, 2021). Fungible cryptocurrencies (e.g., Ethereum), like fiat currencies (e.g., US dollar), are indistinguishable because all coins are equivalent and, therefore, can be exchanged for one another. Individuals can substitute the same amount without any gains or losses. The opposite applies to nonfungible tokens, which are unique, distinguishable, and cannot be divided, merged, and exchanged like-for-like (Regner et al., 2019). Therefore, we defined NFT as a digital asset that is ownable, unique, or limited quantity unit of data that can be traded and stored on a decentralized, public blockchain along with its ownership history (Hofstetter et al., 2022). An example of a well-known and successful NFT application is digital collectables. "Bored Ape Yacht Club" issued 10 000 unique pictures of monkeys with different characteristics determining each NFT's rarity (Miller, 2022). For example, a monkey can have a different attire or colour or hold a certain special item. NFTs are usually sold in marketplaces in the form of an auction. The most expensive Bored Ape Yacht Club NFT was sold for 2.7 million dollars (Gill, 2021) and the cheapest for 150 thousand US dollars (Boom, 2022).

According to a recent systematic literature review article, NFT research is in its infancy, with limited articles published predominantly in computer science, engineering and economics-related academic journals (Taherdoost, 2023). With the emergence of NFT technology, researchers only began exploring possible NFTs applications. Regner et al. (2019), for example, developed a prototype for an event ticketing system based on NFTs where they demonstrate its usefulness in preventing fraud in secondary market transactions. Initial interest in the NFT technology found its popularity in digital art, where artists create and sell NFT motivated by social, monetary and technological aspects (Pawelzik & Thies, 2022). Building on the NFT art concept, Haried & Murray (2022) attempted to explain digital collectable NFT investment motivations from utilitarian and hedonic perceptives. Scholars found that the introduction of NFT art causes the prices of physical art to decline by about 5% (Kanellopoulos et al., 2021). Information systems scholars argue gaming industry might be one area where NFT technology can create value for developers and users, like fantasy sports (Schellinger et al., 2022).

Research on Nonfungible Tokens (NFTs) Gaming

NFT gaming, also known as "blockchain games", captures a large proportion of applications developed on blockchain technology (Du et al., 2019). Despite scholarly interest in researching NFT gaming technology (SeifoddiNi, 2022), no studies have investigated empirically user behaviours in such a gaming context (Wang et al., 2021). Published literature review papers reveal that NFT gaming scholarship is extremely fragmented, with only a few studies published (Yang & Wang, 2023). These papers tend to focus on the technical aspect of the NFT concept in the gaming contexts, such as security risks (Trojanowska et al., 2020), design (Boonparn et al., 2022), NFT architecture (Min & Cai, 2019) and economics studies evaluating NFT 'game's play to earn returns (Osivand, 2022).

In traditional games, users typically "pay to play" (P2P), where individuals first pay developers for the game and use it after installing it on a device (Tomic, 2017). Alternatively, players can choose free-to-play (F2P) games where developers provide basic games free of charge and only generate profits by selling additional

features (Alha et al., 2014), often aimed at improving gameplay. Users are offered opportunities to purchase 'loot boxes', which are features (e.g. treasure chests) that can provide randomized rewards to players (McCaffrey, 2019), giving users a competitive advantage (in-game digital assets, like better weapons). NFT game characteristics are unlike the traditional gaming system, which poses various risks such as fraud, duplication, missing, and unfair rewards (Brown et al., 2022) related to digital assets. Currently, only NFT games provide a unique ecosystem allowing players to generate their digital assets and reuse and preserve them. Gamers must register an address in the corresponding blockchain that will be a destination of virtual assets (Min et al., 2019). By trading their digital assets with others, gamers can make a profit, thus enabling every player to "play and earn" (Osivand, 2022). This paper aims to understand the mechanism of play-to-earn and build upon this mechanism to investigate motivations for playing NFT games.

Research Methods

We follow a mixed methods approach with two studies. Since the NFT gaming context differs from traditional gaming, this paper aims to identify configurations of motivations that drive individuals' use of NFT gaming. As individuals' behaviors are complex and cannot be simply attributed to a single motivation, configurations of motivations that capture the asymmetric relationships of each factor with another (Liu et al., 2017; Ordanini et al., 2014) can help understand what drives individual's NFT gaming behavior. Prior research on bitcoin also found that individual investment behavior was shaped by multiple configurations of motivations (Mattke et al., 2021). Study 1 employs a qualitative approach to understanding individuals' motivations for NFT gaming and lays the ground for identifying potential configurations of individuals' motivations for NFT gaming. Study 2 will build upon the findings of Study 1 and employ a configurational approach to identify distinct configurations of the motivations that drive NFT gaming.

Study 1: Motivations Driving NFT Gaming

We conducted an open-ended survey to explore individuals' motivating factors to play NFT games. We recruited gamers who either have played or have heard of the Axie Infinity NFT game, one of the first successful games in the NFT gaming industry. Its user base peaked at 2.7 million in 2021 (Mccarthy, 2022) to participate in the survey from Prolific. To ensure participants are NFT gamers, we included the screening questions asking participants about which NFT games they were playing. Participants were first asked why they play NFT games and what circumstances influence their gaming behaviors. They were then asked what motivations related to their intentions to play NFT games. We collected 252 survey responses and excluded those that indicated a complete lack of experience with NFT games or completed the entire process in less than 5 minutes. Of these respondents, 70% were male, and 30% were female.

Data Analysis

We took a four-step analysis approach to analyze participants' responses by following Mattke et al. (2021). We started the analysis by extracting the data from the open-ended questions and assigning descriptive codes. In step 2, we categorized codes into perceptions about technology, earnings and playing aspects. Since participants were not given any character limit, they could list multiple factors about playing NFT games. In step 3, we applied interpretive coding to the descriptive codes. Finally, we reviewed all coding and ensured consistent coding by computing inter-judge reliability (97%). We validated our analysis, ensuring that we used a sufficiently large sample of the relevant target population (Sarker et al., 2013). Our coding was drawn directly from the answers using descriptive and interpretive coding (Myers, 2019) and validated by multiple judges (Randolph, 2005).

Results

Among the factors motivating individuals to play NFT games (Table 1), we found that 36% of responses are unsurprisingly related to the entertainment value of such games. NFT games are associated with excitement and fun given by their unique characteristics. Interest in blockchain technology and NFT concepts is the second most important driving force (24%) in our sample. Some gamers choose NFT games due to the uniqueness of the technology, which allows further interest in the NFT and/or Blockchain concept. The third most frequent motivation to play NFT games is related to monetary incentives (20%). Many gamers admit that the opportunity to make money is their primary objective, even in some cases when users find

NFT games completely unentertaining. Similarly to traditional games, 8% of responses indicated that NFT games provide escape or an outlet to explore and pass free time. 9% of responses indicated their desire to collect items that attract them to NFT games. Finally, 2% of the responses indicated that NFT games provide access to a community where they can develop relationships with others.

Motivating Factors		Respondents' selected examples
Entertainment (45%)	Fun / Exciting (36%)	(1) "It's been fun, and it's interesting creating new breeds"; (2) "I've found them to be quite different than normal games, but incredibly fun"; (3) "NFT games are very exciting, and they allow me to get that adrenaline rush"; (4) "I think my experience playing NFT games has been one of excitement and entertainment"; (5) "They are a lot of fun! I wish they had a wider variety".
	Enjoy collecting (9%)	(1) "NFT games can be a lot of fun because of the collectible aspect."; (2) "They are like other online games, but the uniqueness is you can collect the character digitally. The game reminds me of Pokémon's game!"; (3) "I'm a big fan of the collectable aspect of NFT gaming and the ability to trade my NFTs for others".
Interest in NFT & blockchain technology (24%)	Creative Expression (17%)	(1) "Lots of fun learning to earn on the blockchain"; (2) "Wouldn't say it's the most enjoyable game out there, but my curiosity got the best of me"; (3) "I feel like they are a cool concept (...) my in-game collectibles have the real value'.
	In-game Asset Ownership (7%)	(1) "I like that it is like traditional gaming systems but with the uniqueness of NFTs"; (2) "I like the feeling of being able to invest in my characters and have the digital property that is tied to real monetary value"; (3) I like the idea of having a specific item and the ability to transfer that item to someone else should I choose to. I know that because of the blockchain, my items are mine".
Cryptocurrency Rewards (20%)		(1) "I don't consider many NFT games to be very fun. I am focused on making money and acquiring digital assets. (2) "I feel I could potentially profit in the long run. Other games are just games and time wasters"; (3) "I play NFT games as an investment. I don't have fun playing them. I play them more to collect NFTs and to earn"; (4) "I like the option to earn crypto money as well the option to trade with other people who play"; (5) "I place emphasis on trying to get all these unique collectibles to sell them for real money".
Escape (4%)		(1) "They take your mind off the real world"; (2) "It's very immersive, makes you feel like a child again, takes away stress"; (3) "took my mind off things".
Pass the time (4%)		(1) "Kind of use it to pass the time"; (2) "I often manage to relax and enjoy my free time when playing them"; (3) "It is really fun, and I can freely explore".
Sense of community (2%)		(1) "I've been hyped up by some friends who are very into it"; (2) "It is enjoyable because most of the people I encounter while playing are in a similar age as me, and we share common interests"; (3) "My son plays, and I can have conversations with him"; (4) "My friend got me playing NFT games".
Table 1. Motivating factors to play NFT games		

Like "traditional" online gaming, entertainment remains the most motivational factor in playing NFT games. Similarly to traditional online gaming, NFT games feature real-time interaction, no geographic restrictions, anonymity, information exchange, and entertainment (Hsu & Lu, 2007; Lo, 2008). Many gamers find these play-to-earn games "different than normal games but incredibly fun" because of their variety of challenges along with rare collectables. In Axie Infinity, gamers are tasked with killing monsters (other players' NFTs), which excites users. Some users specifically like the collectible aspects of the game.

Interest in NFT technology can be a motivator for individuals to try the play-to-earn games. Those individuals are interested in the technology that underlies such play-to-earn games. In the past, gamers could experience playing and earning real currency in MMO games such as "Diablo" by engaging in the player-to-player trade of their hard-earned in-game assets (e.g. skins) through various third-party sites such as eBay (Hamari & Lehdonvirta, 2010). In the NFT gaming context, each NFT in the game is unique and belongs to only one gamer, and it can be sold/transferred to others using blockchain infrastructure without a need for a third party (i.e., in-game asset ownership). In particular, they can create unique and own items to represent themselves in NFT games (i.e., creative expression). Therefore, many users are

curious to try these games since they *believe NFTs are cool concepts and* learning how to earn on the blockchain is fun. Blockchain technology and cryptocurrencies have become one of the most curious technologies of the age. People hold a positive view of the future of cryptocurrency and are curious about its possibilities. Our findings showed that many people who understand or are interested in blockchain or cryptocurrency technology are more inclined to play NFT games.

Since NFT games provide opportunities to earn money, naturally, many gamers are driven by financial rewards in the form of cryptocurrency rewards. In particular, blockchain technology offers a secure infrastructure that validates the ownership and transfer of digital assets, such as cryptocurrencies and NFTs, that can represent any in-game asset (Nadini et al., 2021). Gamers can sell their digital assets and convert them to "fiat" money, such as the US dollar (Delic & Delfabbro, 2022). Decentralized technology helps NFTs to accelerate their value (Chohan & Paschen, 2021). Many gamers are motivated to *play to collect NFTs in this secure and transparent* technological infrastructure. In the NFT gaming context, not only the NFT cards are valuable, but also the gaming mechanism stimulates play to earn mechanism by rewarding specific in-game cryptocurrencies to players who win battles. This motivates users by giving a financial reward for playing, and they can feel that they *"could potentially profit in the long run"*.

Our findings also revealed that NFT games attract similar motivations to other traditional games. For example, play-to-earn games also allow individuals to escape, *"mind off the real world", pass the time, and create a sense of community, thereby motivating gamers to engage.*

Like traditional online games, individuals use NFT games to escape by seeking an alternative reality that is more pleasurable than day-to-day life and to *pass the time* and avoid boredom. *A sense of community* is another important motivator for individuals to play NFT games. The NFT gaming space is a community where gamers invest their time, experience game challenges, share game and NFT tips with like-minded groups, collaborate, and support each other. A strong sense of community drives individuals to delve into these play-to-earn games.

Study 2: Configurations of Motivations Driving NFT Gaming

Based on our Study 1, where we identified relevant motivating factors in the NFT gaming context, we model the identified components of configurations of motivations that drive NFT gaming in Study 2. Our Study 2 is building upon the results of Study 1 and employs a configurational approach to identify distinct configurations of the motivations identified in Study 1 (see Table 2). We will test the configuration of motivations with fuzzy-set qualitative comparison analysis (fsQCA) to survey data (n = 350).

Research Plan for Study 2

The fsQCA approach is based on set theory and enables us to analyze the relationship between configurations of conditions and the outcome. The fsQCA can examine causal complexity (Misangyi et al., 2017). With fsQCA, the asymmetric relationship between conditions and equifinality can be investigated. In particular, individuals' intention to play NFT games may be influenced by the existence or absence of certain conditions, depending on the presence or absence of other conditions in a given configuration. Also, certain conditions may be overridden in a configuration, so these conditions are irrelevant for driving individuals to play NFT games. Therefore, the combined effect of multiple conditions can help understand the motivations of NFT gaming behavior. Furthermore, individuals may engage in the same behavior for different reasons (Misangyi et al., 2017).

In this paper, we postulate that individuals start with different perceptions of play, earn, and NFT technologies and follow many configurations that may ultimately drive them to play NFT games. In our Study 2, the conditions consist of the perceptions of play (e.g., entertainment, escape, pass the time and sense of community) and earn (e.g., cryptocurrency rewards, creative expression, and in-game assets ownership) about NFT games. The outcome variable is the intention to play NFT games. We will follow recommendations from prior literature in QCA (Misangyi et al., 2017) and use the fsQCA software (Ragin, 2006) to analyze our data.

For data collection, we will conduct an online survey and recruit participants on Prolific. Our sampling strategy would be similar to Study 1, where we used pre-screening questions asking participants if they were

familiar with NFT games to filter participants. The measures of the constructs in Study 2 will be adapted from the previous literature.

Factor	Description
Play	
Entertainment	The extent to which an individual gets fun and relaxation through playing or otherwise interacting with others in the game.
Escape	The extent to which an individual expects to escape unpleasant realities or distract his/her attention from problems and pressures.
Pass the time	The extent to which an individual expects to spend leisure time with no apparent aim or objective.
Sense of community	The extent to which an individual expects to develop the feeling of belonging to and being part of the NFT gaming community.
Earn	
Cryptocurrency Rewards	The degree to which an individual expects to benefit financially from engaging in NFT games.
Creative Expression	The degree to which an individual expects to gain or create an artistic expression from engaging in NFT games.
In-game Assets Ownership	The degree to which an individual expects to own an asset by engaging in NFT games
Table 2. Definition of the identified motivations relevant for playing NFT games	

Expected Contributions

The main objective of this paper is to investigate factors that motivate individuals to play NFT games. Specifically, we seek to contribute to the existing body of literature by identifying and examining the configurations of motivations that influence gamers' intention to play NFT games. This study is one of the first investigations attempting to explain play-to-earn motivations in NFT games. Our study is expected to contribute to research by developing a play-to-earn mechanism in the context of NFT games. In particular, our work will identify the motivating factors in the play and earn and examine how these configurations of motivations influence an individual's intention to play NFT games. The result of our work is also important to practitioners. Many game developers focus solely on the aspects of crypto rewards that NFT games provide and their earnings prospects. This study suggests that ways to make NFT games successful are to make the games enjoyable (play) while using applicable revenue mechanisms (earn) to incentivize gamers to play and engage constantly. Furthermore, developers should emphasize and explain how blockchain technology benefits users. An improved understanding of blockchain technology could improve users' familiarity with the NFT concept and how it enables the play-to-earn aspect of gaming.

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