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Web 3.0 Business Model Canvas of Metaverse Gaming Platform, The Sandbox

Song, Minzheong

Associate professor, Department of Media Communication & Advertising, Hansei University, Korea
mzsong@hansei.ac.kr

Abstract

We look at Web 3.0 business model canvas (BMC) of metaverse gaming platform, The Sandbox (TS). As results, the decentralized, blockchain-based platform, TS benefits its creators and players by providing true ownership, tradability of decentralized assets, and interoperability. First, in terms of the governance and ownership, The SAND functions a governance token allowing holders to participate in decision and SAND owners can vote themselves or delegate voting rights to other players of their choice. Second, in terms of decentralized assets and activities, TS offers three products as assets like Vox Edit as a 3D tool for voxel ASSETS, Marketplace as NFT market, and Game Maker as a visual scripting toolbox. The ASSETS made in Vox Edit, sold on the Marketplace, can be also utilized with Game Maker. Third, in terms of the network technology, in-game items are no longer be confined to a narrow ecosystem. The ASSETS on the InterPlanetary File System (IPFS) are not changed without the owner's permission. LAND and SAND are supported on Polygon, so that users interact with their tokens in a single place. Last, in terms of the token economics, users can acquire in-game assets, upload these assets to the marketplace, use for paying transaction fees, and use these as governance token for supporting the foundation.

Keywords: *Web 3.0, Metaverse, Gaming Platform, Business Model Canvas, The Sandbox*

1. Introduction

Web 3.0-based metaverse initiatives have been at the center of a discussion surrounding the interconnected, experiential metaverse, operated by a community and governed by code. One of the steps is to take the decentralization further, especially in the media and entertainment sector like game. Even if some in-game assets start to be stored on-chain, everything is still handled off-chain. Moreover, the conventional game engines like Unity and Unreal are still utilized. Despite the richness of features and the applicability of game development practices, it does not fulfill Web 3.0 philosophy of the decentralization. So, it's not easy to imagine a fully decentralized game competing with Web 2.0 games in terms of graphics, user experience (UX), game speed, and the implementation of immersive, virtual reality (VR) experiences. As such, some innovative metaverse gaming platforms position rather a temporary phase between centralized and decentralized gaming. However, with blockchain, on-chaining of gaming experiences is expected to increase in near future. Some

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Corresponding Author: mzsong@hansei.ac.kr
Tel: +82-31-450-5028, Fax: +82-31-450-5187
Associate Professor, Department of Media Communication & Advertising, Hansei University, Korea

major Web 3.0 projects or platforms like Decentraland and The Sandbox (TS) in the metaverse game realm are pioneers and they have can be compared to Web 2.0 projects such as Fortnite and Roblox [1-2].

Web 3.0 metaverse refers to a virtual world where people can interact, with the Web 3.0 technology meaning greater security, privacy, and the potential for a more robust digital economy. Some crucial components of this Web 3.0 metaverse include blockchain which is the backbone of Web 3.0 having decentralized Internet, decentralized finance (DeFi) which creates financial apps without the need for traditional banks, and Non-Fungible Tokens (NFTs) which are unique digital assets that cannot be replicated, making them ideal for virtual worlds. Among the media and entertainment industries that can use the metaverse and Web 3.0, gaming metaverse platforms like Decentraland and TS are the most leading gaming projects where users can create and monetize their own virtual experiences [3-4]. Among them, TS is now Web 3.0 virtual world built on the Ethereum blockchain, where players can build, own, and monetize their gaming experiences and the 'SAND' token is an ERC-20 utility token used for value transfers, staking and governance. Accordingly, the aim of this paper is to examine Web 3.0 business model canvas (BMC) of the metaverse gaming platform, TS.

2. Literature Review and Theoretical Background

2.1 Previous Literature Review

We searched "BMC from 2022 to 2023" on 'Google Scholar' because Web 3.0 & metaverse was added as a new topic at 'Consumer Electronics Show (CES) 2023' in January 2023. As of February 2024, we found three academic papers in 2023, excluding their relevance to specific industries.

As shown in Table 1, the first paper conducts a survey of 181 entrepreneurs for describing the association of the four main business areas like customer interface, product, infrastructure management, and financial aspects of the entrepreneurs' business model (BM), shows, there are dependency relationships between the four business areas and the BMC. In addition, there is a positive and significant association between customer interface and the BMC (0.609), product and BMC (0.540), infrastructure management and BMC (0.671), and financial aspects and BMC (0.658). Accordingly, this study shows that the four main areas of the entrepreneurs' BM are significantly associated with the nine modules of the BMC. In addition, despite such association of the areas with the BMC, it is suggested, startups should seek greater positioning in the market, strengthen their value proposition to be competitive in the market, greater resource planning and key partners [5].

The second paper proposes four criteria and ten sub-criteria to analyze existing BMCs based on their user-friendliness and to design 'responsible BMC (RBMC)' which is tested in various settings like business incubation programs, with ca. 1,000 university students. The tool was assessed throughout the development process, incorporating feedback from focus groups with start-up entrepreneurs. RBMC consists of fourteen blocks grouped into four areas like consistency (mission, vision, values), desirability (value propositions, customer segments, users and beneficiaries, customer relationships and channels), feasibility (key activities, key resources, key partners and stakeholders and governance) and viability (cost structure, revenues streams, negative and positive impacts). As a result, RBMC helps raise users' awareness about sustainability concerns, challenging them to consider issues they might have otherwise overlooked. Some users are motivated to develop a long-term vision integrating compensatory, mitigative or corrective actions into their BMs. So, RBMC is the outcome of a balanced approach combining pragmatic (user-friendliness) and normative (sustainability) perspectives and provides users with a systematic approach for integrating and applying sustainability issues in their business projects [6].

The third paper assesses how entrepreneurs use BMCs in their everyday practice through interviewing a group of micro entrepreneurs for evaluating their attitude toward one of the best-known BMC. As a result, the interviewees adopt the BMC if they believe their market is static. But in more dynamic markets, they prefer to draw on their practical experience. It means, entrepreneurs' perception of their company's competitive environment is decisive in defining their attitude toward using BMC as viable managerial tools [7].

Table 1. Summary of Previous Research in 2023

Authors	Key points
1) R. Macha-Huamán, O.M. Zavala-Zavala, F.C. Navarro-Soto, J.S. Zárate-Suárez, D.R. Yaya-Castañeda, R.G. Chura-Lucar, L. Castilla-Jibaja, P.J. Castro-Mejía, C.Mónica. Samaniego-Montoya, R.J. Espinoza-Casco, and R. Romero-Carazas	- Four areas (Customer interface, product, infrastructure management, and financial aspects) are significantly associated with the nine modules of the BMC and startups should seek greater positioning in the market, strengthen their value proposition to be competitive, and greater resource planning and key partners.
2) M. Pepin, M. Tremblay, L.K. Audebrand, and S. Chassé	- RBMC has fourteen blocks grouped into four areas like consistency, desirability, feasibility, and viability and it gives balanced approach combining pragmatic and normative perspectives.
3) H. E. G. Lopes, V. C. Rodrigues, R. S. Leite, and M. Gosling	- Interviewees adopt BMC only in the static market but in more dynamic market, they prefer to draw on their practical experience.

2.2 Theoretical Background

Web 3.0 companies are expected to provide their products and services using decentralized crowdsourced resources which are currently utilizing blockchain technology like smart contract handling user transactions with specific reward mechanisms. A whole Web 3.0 open ecosystem exchanges value using its own currencies. Such decentralization, openness, and independence bring the opportunity to build the Web 3.0 foundations. However, developing Web 3.0 business model requires a totally new perspective for evaluating Web 3.0 companies in comparison to the BMC in Web 2.0 ecosystem initiated by Alexander Osterwalder in 2005 and published as the Osterwalder-Pigneur (Swiss Model) approach in 2010 [8-10].

Figure 1 shows Osterwalder's BMC with nine steps in the left side and a new Web 3.0 BMC in the right side. For Web 3.0 business, some blocks are added to Web 2.0 BMC to capture dynamics of Web 3.0 ecosystem. The added token economics focus on issuing tokens for exchanging value, rewarding participants, and voting right in the company governance. In terms of differentiation, the first is the split between company resources and partner resources. Web 3.0 company's legal entity is only one part of its ecosystem and most of the services are provided by affiliated contributors differing from Web 2.0 BMC's key partners because of their investment and commitment to a specific project. Another difference is the split between a contributor and a paying customer. The contributors can be customers and vice versa. Their roles are set for the transaction time. In terms of social and legal concerns, Web 3.0 company's social responsibility like sustainability, social value, and inclusivity are a critical factor for investors, partners, and customers. In terms of governance and ownership, Web 3.0 company's governance structure is decentralized with various types of voting arrangements and corporate establishment. Lastly, in terms of community engagement, Web 3.0 company is as strong as the communities behind it. Accordingly, it is known how engaged their followers and contributors are on social

networks by checking the number of followers, topics, and mentions on community channels such as Twitter, Reddit, and Discord. In this block, the potential network effect is generated by the solution [10-11].

The Web 3.0 BMC on the right side of Figure 1 has three areas including value delivery, Web specifics, and ecosystem, which are again divided into thirteen blocks. The value delivery area has five blocks as follows: First, customer assets have transferable and non-transferable assets. Transferable assets change ownership like art, real estate, equity, intellectual property, NFT, crypto coins, popularity and non-transferable assets are connected to the owner's identity, like identifications, certificates, personal data, reputation as well. Second, value proposition is the collection of product and service offer to meet the customer needs and the delivery channel as well where customers achieve one-time transaction for purchasing an asset or a permanent certificate registration. Third, customer segments are the specific domains like gaming, metaverse, DeFi, and the registration and validation of ownership, identity, or certificate. Fourth, competitive edge is the reason for why the customer choose their service. Lastly, cash flows are the revenue streams like subscriptions, memberships, transaction fees from customers, percentage fees from content providers, tips, donations, etc., and the costs like salaries, infrastructure costs [11].

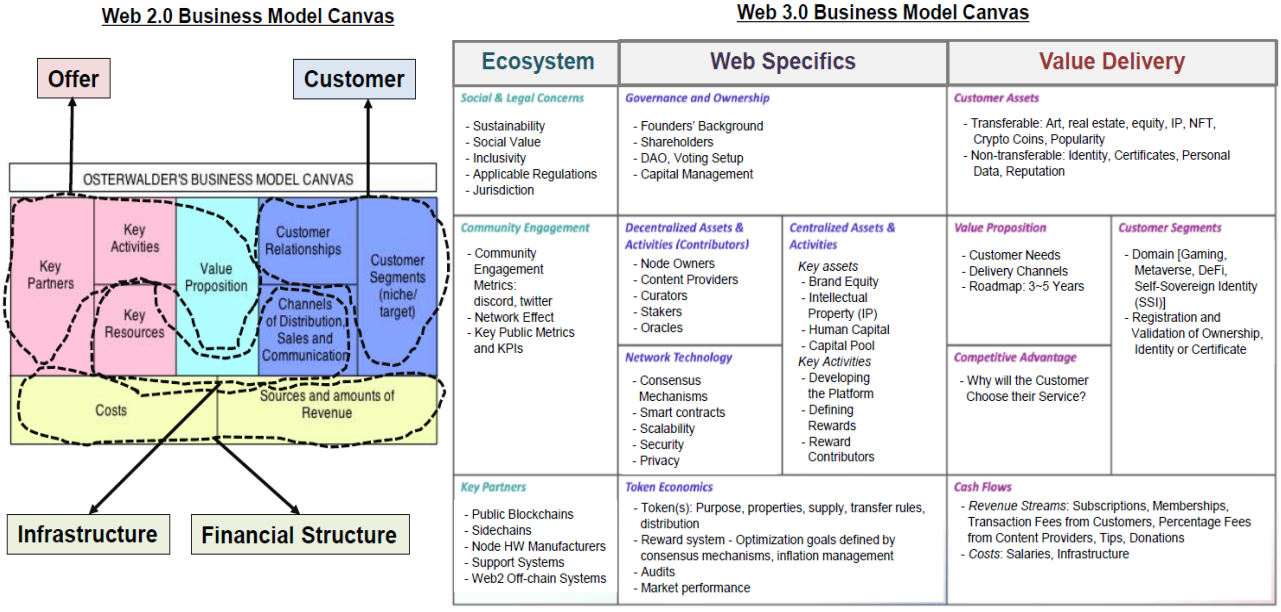

Figure 1. A comparison between Osterwalder's BMC (left) and Web 3.0 BMC (right side)

The area of Web specifics has five blocks as follows: First, governance and ownership include founders' background, shareholders, dividend sharing, decentralized autonomous organization (DAO), voting setup and capital management. Second, decentralized assets & activities or contributors include node owners in a specific blockchain, content providers, curators, stakers, and Oracles. Third, in terms of the centralized assets & activities, key assets are brand equity, intellectual property (IP), human capital, and capital pool and key activities are developing platform, defining rewards, and rewarding contributors. Fourth, network technology includes consensus mechanisms, smart contracts, scalability, security, privacy, interoperability and so on. Lastly, in the token economics, the token dynamics like purpose, properties, supply, transfer rules, and distribution include the reward system where the distribution schedules, inflation management, rewards, and fees should support the consensus mechanism describing how the participants resolve disputes and defining

the optimization goal of the whole system, and the market performance, details about token appreciation, inflation, daily traded volumes, etc. [11].

Lastly, the area of ecosystem has three blocks as follows: First, social & legal concerns are the company's social sustainability, social value, inclusivity, and applicable legal regulations and jurisdictions. Second, community engagement includes community engagement metrics like discord or twitter, network effect, and key public metrics and key performance indexes (KPIs). Lastly, key partners are public blockchains, sidechains, node hardware manufacturers, support systems, and Web 2.0 off-chain systems [11].

3. Research Design

The Web 3.0 BMC model as theoretical logic shows three parts, business's value delivery, Web specifics, and ecosystem. TS evolving to a Web 3.0 gaming platform, is now a decentralized virtual world where players can build, own, and monetize their gaming experiences on the Ethereum blockchain using the platform's utility token, SAND. TS's users as players can already create digital assets in the form of NFTs, upload them to the marketplace, and integrate into games since its launch in 2012. As of October 2023, TS provides built-in tools for user generated content (UGC), such as VoxEdit, Game Maker, and Marketplace [12].

As shown in the left side of Figure 2, one analysis of TS White Paper in 2020 provides market insights by comparing the gaming platforms without and with blockchain and TS is an example with blockchain [13]. As of 2022, TS had four Web 3.0 characteristics with blockchain technology like true ownership, security, fair revenue sharing, and peer to peer (P2P) trading. These characteristics are matched to four blocks like governance and ownership, decentralized assets and activities, network technology, and token economics in the Web specifics area of the Web 3.0 BMC mentioned above [11, 14]. Accordingly, the research scope of this paper is four blocks, governance and ownership, decentralized assets and activities, network technology, and token economics except centralized assets and activities.

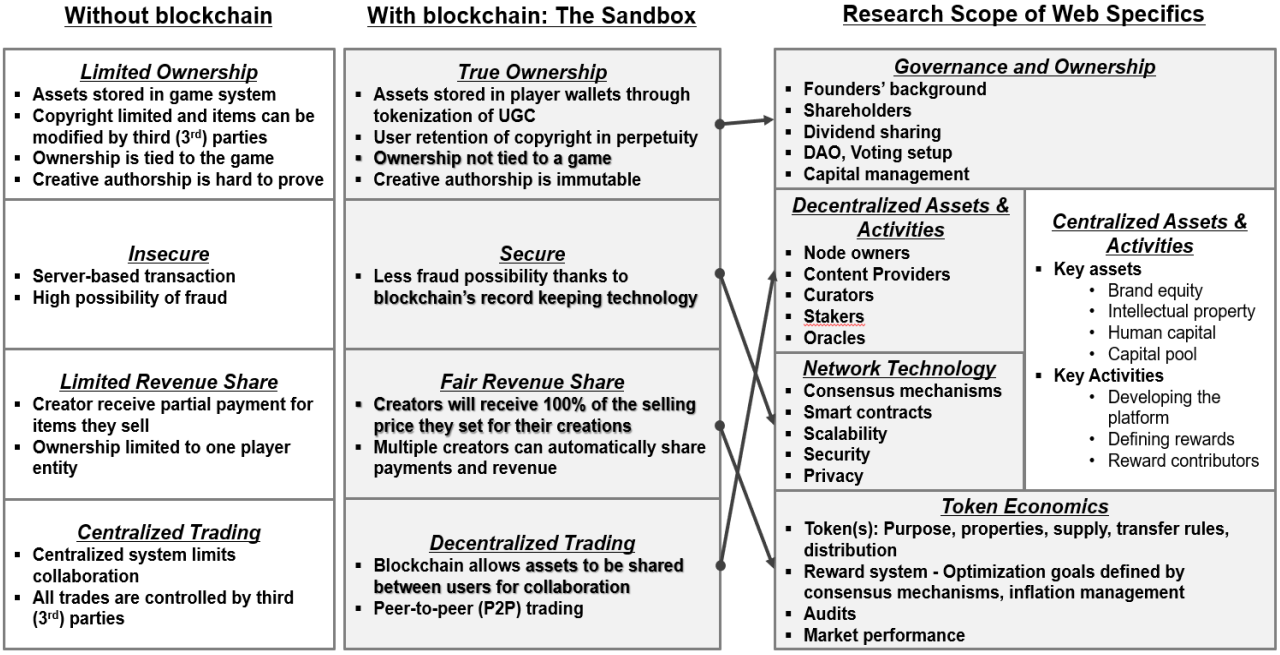

Figure 2. Research Framework

Along Figure 2, the research questions are as follows:

1) What are the governance and ownership TS takes for true ownership not tied to a game?
2) What are the decentralized assets and activities TS takes for shared assets between users collaborating?
3) What are the blockchain network technology TS takes for utilizing record keeping technology?
4) What are the token economics TS takes for creators who want to get fair revenue sharing?

The research methodology of this paper is a descriptive analysis with a case study approach and the object is TS. Thus, this study searches business activities of TS by digging its financial, market data, company documents, press releases, and executive level interviews based on the White Paper of 2020.

4. Results

4.1 Decentralized Governance and Ownership of The Sandbox

In terms of the corporate history, Pixowl, a game studio launched its first game, 'The Sandbox' in 2012 and a second game, 'The Sandbox Evolution' was launched by Pixowl a few years later. After these, TS franchise started to have a vast community to back up new Ethereum blockchain based project, because there were already 40 million downloads developed by Pixowl. Then, it was acquired by Animoca Brands in 2018. TS started to move to blockchain based Web 3.0 gaming platform and builds a decentralized governance covering the founders and shareholders who have dividends, voting rights, etc. Unlike the existing competitors including Roblox and Minecraft, TS now functions as a self-regulated, self-sovereign, user-controlled economy. It means, it provides creators true ownership of their creations. Thus, it is governed by 'TS DAO Foundation' whose ownership is distributed among token holders of its native currency, "SAND." Game developers buy and stake these SAND tokens and receive staking rewards [13, 15].

SAND is a single utility and governance token of TS serves as the basis for transactions within TS. TS allows its users to initiate transactions on the Ethereum blockchain while transaction gas fees are paid by TS, optimizing overall user experience. 50% of all SAND transactions collected from LAND sales, Premium NFT sales, transaction fees and subscription services go to the Foundation. In terms of the governance, SAND functions a governance token allowing token holders to participate in governance decision, using a DAO structure. Figure 3 shows stakeholders. For company, 'Company Reserve' is the initial company reserve which is fed with the proceeds of sales of company-owned assets with a six-month lock-up and 'Company Treasury' is the SAND coming from the proceeds of sales of company-owned assets with a twelve-month lock-up. The role of foundation is to support the TS ecosystem, offering grants to incentivize high quality content and game production. TS governance migrates towards a DAO mechanism [13, 16]

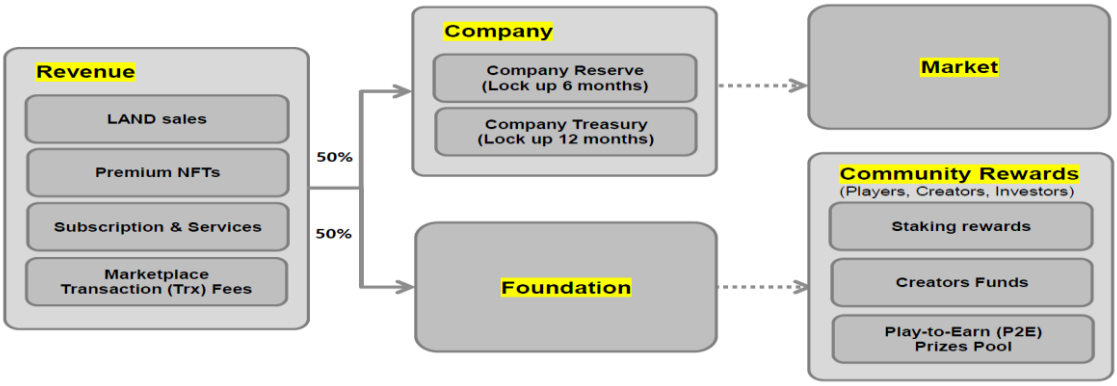

Figure 3. Revenue Share of The Sandbox by Company and Foundation

The SAND allows its holders to participate in governance decision. SAND owners can vote themselves or delegate voting rights to other players of their choice. As of February 2024, the Foundation is involved with managing the Game Makers Fund and Creators Fund, offering grants to incentivize high quality content and game production in TS, funding over 17 game projects, distributing grants to 100 artists to produce NFTs, supporting local community managers to grow awareness around the globe about TS, NFTs and blockchain gaming via 'Community Rewards' and ambassadors program, sponsoring prizes for the various contests organized by TS team like 'VoxEdit Contests' and 'Game Jams' to stimulate the creativity of users around the world and get them to engage with the TS tools, and supporting P2P tournaments and cross-gaming with activities that encourage the broader adoption of SAND [13, 16-17].

4.2 Decentralized Assets and Activities of The Sandbox

Decentralized assets are owned and operated by contributors who commit assets, efforts, and skills to the project in exchange for a reward. Such products and services are automated like registering transactions, executing code, connecting to nodes by node provider in blockchain, or created like writing a song, drawing an NFT, creating IP, etc. TS working with the creators' community is decentralized by design and takes 5% commission from the digital asset sales within the platform and the rest 95% go to the creators [18].

Decentralized activities related to these the assets are the value creation process. TS game developers as the creators create games and mint in-game assets. Then, game players buy SAND tokens for playing games and buy equipment and land as well. Independent artists as creators can also mint new assets. TS virtual landowners can also buy and develop their land [15].

Three products of TS as assets are 'Vox Edit (Voxel Editor),' 'Marketplace,' and 'Game Maker.' They are related to the decentralized activities. Vox Edit, a tool for creators where they can create in-game assets for TS ecosystem, is a software for creating voxel ASSETS which can be NFTs and be imported to the Marketplace. It is a powerful 3D pixel editor for creators to create voxel art including wearables, objects, and more. Without coding skills, they upload, publish, and sell their creations as NFTs, i.e., ASSETS made in Vox Edit, on the Marketplace [13, 19-20].

On Marketplace, creators can sell their creations made in the Vox Edit in the form of NFTs. On this, all kinds of items created by creators from digital art to 3D models can be traded. Creators can upload, publish, and set their ASSETS made in Vox Edit. ASSETS can be sold by making a sale offer on the Marketplace. The most important product TS offers is game itself. After owning ASSETS, either by making them in Vox Edit or selling them, can utilize them with the third product, the Game Maker. It is a visual scripting toolbox that allows players to build 3D games for free without any skill of coding. With this Game Maker, any genre from first-person shooters to puzzle games can be created. This product enables users to use their ASSETS within a piece of LAND, ERC-721 token that they can own in the virtual world [13, 19-20].

In terms of decentralized activities, Figure 4 shows the flow of TS's SAND within this ecosystem. Firstly, ASSET/Avatar creator creates items through Vox Editor, publishes ASSET in the Marketplace, and receives sales by SAND. Secondly, game/LAND creator places ASSET in the LAND which is published in the Marketplace and receives royalty fee by SAND when players play on it. Thirdly, Player pays entrance fee by SAND to play games on the LANDs and receives SAND when they accomplish a mission or win battles, races, contests, etc. in the game. Lastly, collector pays SAND for ASSET/LANDs and will anticipate for value appreciation [13, 19-20].

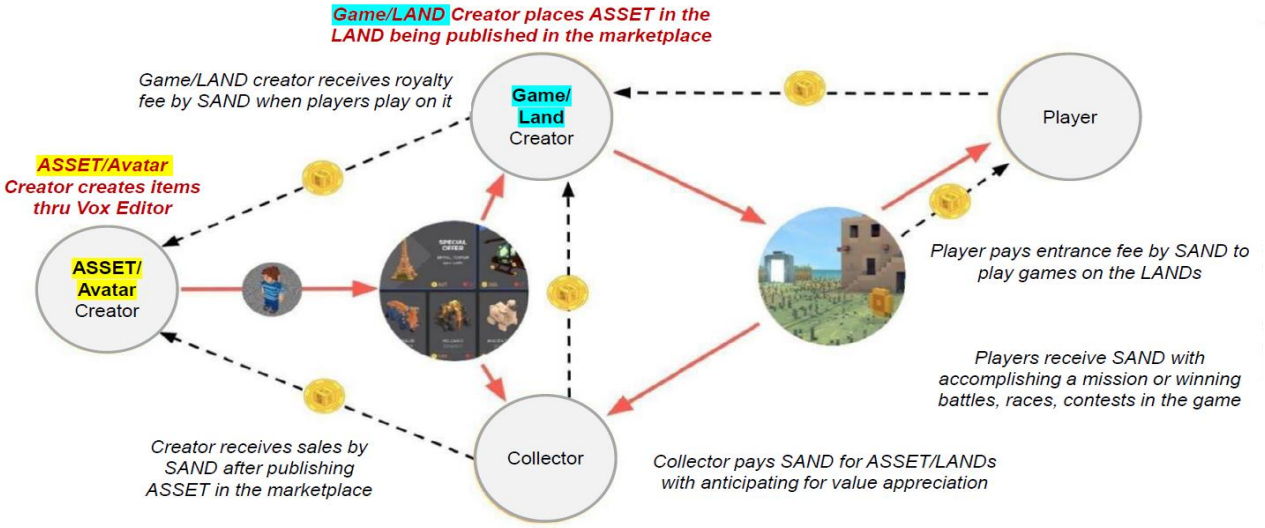

Figure 4. Decentralized Assets and Activities: The Flow of TS's SAND in the Ecosystem

4.3 Decentralized Network technology of The Sandbox

As the network technology, the blockchain is used to record ownership of tokens and allow owners to use them without restriction. TS runs exclusively on Ethereum, which is built with flexibility and a base layer on top of which all applications can build and interact with each other.

Figure 5 shows an overview of the architecture. In terms of blockchain integration of TS platform architecture, there are several components: The backend running on the cloud, AWS of Amazon, supports the frontend. When an UGC is minted, the backend releases the ASSET on InterPlanetrary File System (IPFS) which is a P2P distributed file system. It means, the ASSETS are uploaded into IPFS, and it becomes public. The smart contract records the hash of an ASSET so that the ASSET owner can prove ownership of not only the number recorded on the blockchain, but also the voxel model itself as well as the various render. The ASSET on the IPFS cannot be changed without the permission from respective owners. ERC-20 standard is used for SAND, GEM, and CATALYST tokens, while ERC-1155 and ERC-721 standards are used for the storage and trading of LAND and ASSETS. Creators create their ASSETS with Vox Edit and upload these through the browser in which user can interact with the smart contracts and AWS server. Wallets like Metamask are a Web 3.0 providers which act as an intermediary between the user and the blockchain [13, 17].

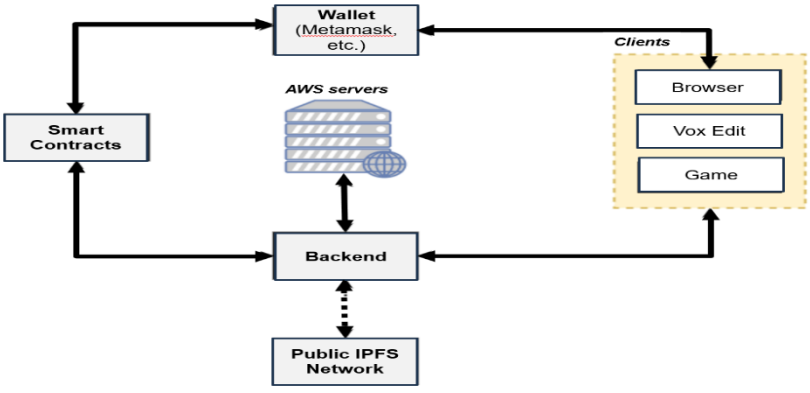

Figure 5. The Sandbox Platform Architecture

TS changed its ecosystem based on the Ethereum blockchain by deploying Polygon in July 2022. So, LAND and SAND are now supported on Polygon's network and the users can interact with their TS tokens in a single place. Based on this deployment and bridge of TS ecosystem on Polygon, users can benefit from being greener and more efficient, getting faster speed, paying lower gas fees, and so on. Polygon is built on the top of the Ethereum blockchain as a layer two scaling solution that uses a proof of stake (PoS) mechanism. As it is built on a different layer of the blockchain, users expect less of the layer one frictions. Thus, faster transaction speed, less gas fees, and greener interactions on the blockchain are expected. With the remodeling of TS ecosystem on the Polygon, creators can monetize their ASSETs with reduced gas fees [21-22].

In addition, TS released an update for the Game Maker where players were given the opportunity to make their own games in 3D in June 2017. So, TS Game Maker uses Unreal Engine4 and is free to download from the main website. It includes an import and export tool allowing users to export their creations from TS game engine and import them into Unity or Game Maker for the final step of building games. It also includes Blender as a 3D modeling tool, as well as VRML for developing WebVR applications [23].

4.4 Decentralized Token Economics of The Sandbox

Reward system is an optimization goals defined by consensus mechanisms. In return of the decentralized assets, the value can be captured in terms of token economics. The cryptocurrency, SAND is the basis of transactions and interactions. It is an ERC-20 utility token used by gamers, developers, and publishers, allowing creators and players to exchange ASSETS made in Vox Edit, as tokens (Both ERC-721 and ERC-1155 tokens). As shown in Figure 6, Players spend SAND for playing games, buying equipment, or customize their Avatar character. Creators spend SAND to acquire ASSETS, LANDS (and ERC-721 tokens), and through staking. LAND sales drive demand for SAND to purchase LANDS. Artists spend SAND to upload ASSETS to the marketplace and buy Gems for defining rarity and scarcity. General use cases are to acquire in-game assets (e.g. lands, equipment, avatar), to upload assets to the marketplace, to use as governance token for voting rights, to make passive revenues through staking, to pay transaction fees, and to support the foundation, the main entity behind the project, as mentioned above [13, 24].

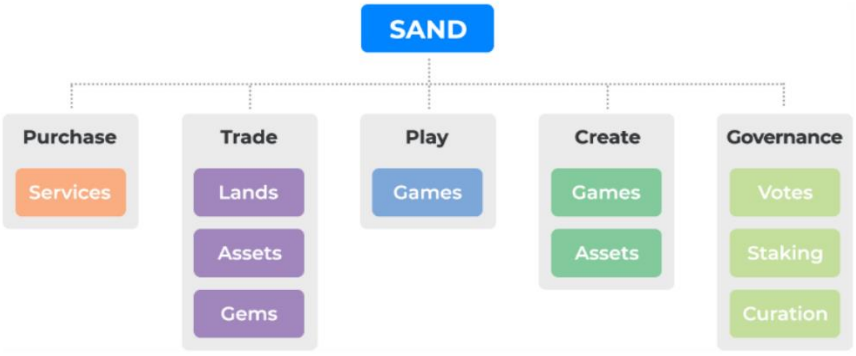

Figure 6. The Use cases for SAND

TS gaming environment is divided into five types of tokens: SAND as game currency used across the system, LANDS as worlds where players play that are created by the community, ASSETS as Voxel models created by players and traded in the marketplace, GEMS burnt to give attributes to ASSETS, and CATALYSTS burnt to mint ASSETS. Token contracts are responsible for keeping track of creator (the address that minted the token), ownership, transfers, and emitting events when the state changes [13, 20].

5. Conclusion

The results of this study are summarized in Table 2. In summary, the decentralized, blockchain-based platform, TS benefits its creators and players by providing true ownership, tradability of decentralized assets, and interoperability. First, in terms of the governance and ownership, The SAND functions a governance token allowing holders to participate in decision and SAND owners can vote themselves or delegate voting rights to other players of their choice. Second, in terms of decentralized assets and activities, TS offers three products as assets like Vox Edit as a 3D tool for voxel ASSETS, Marketplace as NFT market, and Game Maker as a visual scripting toolbox. The ASSETS made in Vox Edit, sold on the Marketplace, can be also utilized with Game Maker. Third, in terms of the network technology, in-game items are no longer be confined to a narrow ecosystem. The ASSETS on the IPFS are not changed without the owner's permission. LAND and SAND are supported on Polygon, so that users interact with their tokens in a single place. Last, in terms of the token economics, users can acquire in-game assets, upload these assets to the marketplace, use for paying transaction fees, and use these as governance token for supporting the foundation.

Table 2. Summary of Results

	Web Specifics	Key Results
1.	Governance & Ownership	- SAND functions a governance token for holders' participation in decision. - SAND owners vote themselves or delegate voting rights to other players.
2.	Decentralized Assets & Activities	- There are three products as assets like Vox Edit, Marketplace, Game Maker. - ASSETS made in Vox Edit, sold on Marketplace, utilized with Game Maker.
3.	Network Technology	- ASSETS on the IPFS are not changed without the owner's permission. - On Polygon, users interact with SAND and LAND tokens in a single place.
4.	Token Economics	- Users acquire in-game assets, upload these to the marketplace, pay fees. - Users also use these governance token for supporting the foundation.

In conclusion, this paper shows that the Web 3.0 BMC of TS, a representative case, is differentiated from the traditional BMC. TS provides services using decentralized crowdsourced resources which are synchronized, using blockchain technology with the reward mechanisms. Smart contracts handle user transactions and a whole open ecosystem exchanges values using its own currencies. This decentralization, openness, and independence is expected to bring the good opportunity to build the foundations of a better Internet.

Acknowledgement

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