Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 44 No. 3 (2023)

Fan Tokens Analysis: Reshaping Sports Industry with Non-Fungible Tokens

[1]Pooja Singhal, [2]Ritu Gupta, [3*]Shashi Bhushan, [4]Avishek Choudhuri

[1]Department of Computer Science, ABES Engineering College, 19th KM Stone, NH-09, Ghaziabad, 201009, Uttar Pradesh, India.
[2] Department of Information Technology BPIT, Guru Gobind Singh Indraprastha University, Dwarka, New Delhi, 110078, Delhi, India.
[3]Department of Computer Engineering & Applications, GLA University Mathura, Uttar Pradesh
[4]Amity Institute of information Technology, Amity University Patna.

E-mail: [1]puja52.hce@gmail.com; [2]ritu4006@gmail.com; [4]avishek.choudhuri@gmail.com
*Corresponding author(s). E-mail(s): shashi28jan@gmail.com;

Abstract:
Purpose: This analysis examines the trend of using non-fungible tokens (NFTs) to represent digital collectibles, specifically in the context of the sports industry. The use of NFTs, or NFT-FAN tokens, allows for the creation of unique and verifiable digital collectibles that can be bought, sold, and traded on Blockchain marketplaces. This trend has the potential to reshape the sports industry by providing new revenue streams for teams and players, as well as giving fans a new way to engage with and show support for their favourite teams and players. The analysis will explore the current state of the NFT-FAN token market, its potential impact on the sports industry, and the challenges and opportunities it presents.
Design/Methodology/Approach: This research attempts to identify the market cap for NFT Tokens with UFA Champions Football League case study analysis in three stages. The first stage is Data preprocessing, followed by market analysis and finally observed market cap ups and downs along with types of NFT Tokens.
Findings: The finding shows 1) Most and Least Traded Token in Last 24 Hours 2) Lowest and Maximum priced FAN Token
Originality//Value: This research brings the importance of FAN Token in the field of sports industry and trend for NFTs Token Market Cap in sports industry.

Keywords: Non-Fungible Token, Market Cap, Owners, Exogenous variables, VAR models.

1. Introduction

NFTs (non-fungible tokens) and fan tokens are digital assets that are unique and cannot be replicated, and they are being used in the sports industry to create new revenue streams and engage fans in new ways [1,2]. NFTs can be used to represent ownership of collectible items such as game-worn jerseys or autographed memorabilia, while fan tokens can be used to give fans access to exclusive content, voting rights, and other perks. These new technologies are also changing the way that teams and leagues interact with fans, as they provide new ways for fans to show their support and connect with their favourite teams and players. Overall, NFTs and fan tokens are reshaping the sports industry by providing new opportunities for revenue generation, fan engagement and fan experience.

Non-fungible tokens (NFTs) are cryptographic assets on a blockchain with unique identification codes and metadata that distinguish them from each other. Unlike cryptocurrencies, they cannot be traded or exchanged at equivalency. This differs from fungible tokens like cryptocurrencies, which are identical to each other and, therefore, can serve as a medium for commercial transactions [3,4]. Types of NFT data units may be associated with digital files such as photos, videos, and audio.Non-Fungible Tokens are an evolution of the relatively simple concept of Cryptocurrencies. These consist of sophisticated trading and loan systems for different asset types, ranging from real estate to lending contracts to artwork in Modern finance systems. By enabling digital representations of physical assets, NFTs are a step forward in the reinvention of this infrastructure.

2. Literature Review

NFTs are the most recent addition to "tokenomics," the token economy that some believe is advancing us toward Web 3.0, a decentralised Internet where stronger support is provided for digital content ownership [4,5,6]. Another type of NFT is fan tokens, which are generally distributed by sports teams to their supporters and have some utility. The NFT marketplace, where customers may browse and buy their NFTs, lies at the heart of the NFT ecosystem. Binance NFT Marketplace (www.binance.com/en/nft), OpenSea (OpenSea.io), and SuperRare are three instances of well-known NFT markets (superrare.com). These platforms charge a fee that ranges between 2 and 5%. However, dedicated NFT marketplaces are not the only places to buy and trade NFTs. Some are offered for sale directly by the artists, and there are additional venues for selling items belonging to a certain category, including galleries, museums, and auction houses [7]. A standard like the ERC-721 Non-Fungible Standard or a variant of it is used by the majority of the marketplaces, which are based on the same underlying NFT technology as the Ethereum Blockchain.

This token technology makes use of smart contracts to store some token-related metadata. This is made possible through minting, the process of attaching a digital file to an NFT. It is owned by the one who possesses the special key to the given NFT [9]. As was mentioned, the token with smart contract capability is what makes an NFT distinct, however since the smart contract functionality is present, it can be used in other contexts as well. An NFT, for instance, may make it possible to pay royalties based on usage. There is no requirement for intermediaries or human intervention in order for this to happen automatically.

NFTs can serve as collateral when obtaining a loan through distributed finance, therefore they are not merely bought so the owner can proudly display them as their avatar (DeFi). They can be staked in exchange for a loan similarly to other cryptoassets, including cryptocurrency (Ross et al., 2021).

Finally, the literature review examines the potential challenges and risks associated with NFTs and fan tokens in the sports industry, such as regulatory issues and the potential for fraud or scams [10,11].The idea behind NFTs, like other Blockchain-based technologies, is that laws may be encoded in software to some extent enabling self-regulation and self-government. A type of crypto asset is NFTs. Depending on how they are used, they may also be considered a type of artwork, a smart contract for digital assets, or a smart contract for a physical object. It is therefore not unexpected that NFTs draw criminals and crime in all of these kinds from these regions. The situation is made worse by the lack of maturity in the security and regulation, as well as the challenges in implementing them [12,13,14]. The volume and scope of illegal behaviour that results from this raises the danger level for consumers and the entire NFT ecosystem. Because the technology and applications are still in their infancy, proponents frequently present compelling arguments for the hypothetical security that Blockchain, smart contracts, and NFTs can provide, but the current iteration that consumers invest their money in does not provide that theoretical level of security [15].

The many types of insider trading are one of the offences that are unique to NFTs. An employee's personal advantage may be served by manipulating an NFT's price or using trade information from an NFT marketplace. A recent incident involved the filing of criminal charges against an NFT marketplace employee[16,17,18,19]. According to the allegations, the employee bought NFTs since they knew from the inside that the market would favour them . Although this case is still under investigation, it at least serves as a theoretical illustration of what can be done.

The fabrication of an NFT is a second type of crime. An image is created to appear as something more precious, much like a fake painting [20]. Alternately, someone who did not originally own the image can convert it into an NFT. The fabrication of an NFT is a second type of crime. An image is created to appear as something more precious, much like a fake painting. Alternately, someone who did not originally own the image can convert it into an NFT [21].

The hazards to the user and other stakeholders go beyond security issues and also include privacy issues [22,23,24]. To prevent their identity and activities from being revealed, the buyers, sellers, and other parties participating in the supply chain must authenticate themselves. The risk for the consumer is increased by the illicit activities mentioned above.According to research on the adoption of other technologies, the requirement for trust grows as danger does [25,26].

3. Materials and Methods

3.1 Dataset Description

To continue with this work, a dataset picked from Kaggle is displayed in Table 1 with a variety of Observable features as its properties. There are 12 columns and 24 NFT FAN Token.

3.2 Pre-processing

The purpose of the data cleaning phase, which covers the stages of data quality, measurement, and improvement, is to enhance the quality of the incoming network traffic data by processing it to remove

Table1: Raw Dataset for FAN Token

RAW Fan Token data schema												
Sno	Name	Symbol	Price (USD)	24Hr %Change	7Days %Change	30Days %Change	90Days %Change	Market Cap (USD)	24Hr Volume (USD)	24Hr Volume (COIN)	Circulating_Supply	No. of Owners
0	Manchester City	CITY	$14.44	1.01%	5.93%	6.80%	56.65%	$50,655,268.00	$6,552,507.50	453,795 CITY	3,508,140 CITY	17,852
1	Paris Saint-Germain	PSG	$13.72	0.97%	5.27%	3.40%	3.78%	$42,694,032.00	$10,733,626.00	782,174 PSG	3,111,172 PSG	20,510
2	FC Barcelona	BAR	$6.33	1.80%	15.63%	24.02%	3.92%	$25,004,928.00	$2,017,903.25	318,920 BAR	3,951,906 BAR	19,534
3	AC Milan	ACM	$6.02	1.48%	4.09%	9.50%	51.34%	$18,912,226.00	$7,309,522.00	1,214,052 ACM	3,141,172 ACM	27,053
4	Trabzonspor	TRA	$8.03	0.15%	0.25%	54.29%	106.21%	$18,909,934.00	$4,150,592.00	518,484 TRA	2,356,284 TRA	10,141

Raw Dataset for FAN Token

Extraneous components and clean up erroneous data. Data cleansing is crucial for fan tokens because of the massive amount of network data and the high rate of false alerts in NFT [27,28]. Non fungible Token analysts can identify abnormal network activity to identify potential attacks fast and precisely with the aid of high-quality data. The quality assessment also enables analysts to have a thorough grasp of data sources, facilitating their regular usage and implementation into the identification process. The objective of the information quality phase is to separate out high-quality data from the incoming raw information by attempting to comprehend the nature of the data source and any pertinent context information. This is achieved by implementing relevant assessment of data quality methods. Accuracy, Completeness, Consistency, and Timeliness are four of the most important aspects we use to identify high-quality data from a raw dataset based on our prior work in the area of data quality assessment for data cleaning. Data quality is assessed during the measurement phase of data cleaning using a score system based on pre-established quality standards [29]. Typically, each quality factor can be connected to a number of measurements. We use sampling techniques in the data cleaning component's improvement phase to remove low-quality data and collect a subset of high-quality data that can be put into the processing phase after that. Most of the time, we simply require a subset of the highest-quality, most pertinent data. Therefore, the purpose of filtering is to reduce enormous amounts of unstructured raw data into a manageable subset of the information that will be most relevant for a specific input.

Table 2: Pre-processed Dataset

	24Hr_per_ Change	7Days_per_ Change	30Days_per_ Change	90Days_per_ Change	Market_Cap _USD	24Hr_Volum e_USD	No_of_O wners
cou nt	24	24	24	24	24	24	24
me an	2.1	7.342083	14.447917	35.690833	8649282.65 3	2455725.943	11916
std	2.330624	7.759655	15.059143	47.911939	13711325.3 8	3114610.278	6767.923 559
mi n	0.15	0.2	1.33	0.77	93041.16	45987.19	2348
25 %	0.8675	3.8925	4.12	7.66	411301.492 5	99921.3275	7014
50 %	1.605	5.97	7.71	19.66	974753.155	268046.69	9875.5
75 %	2.49	8.1025	17.6475	41.6125	10830641.2 5	3955211.188	16534.25
ma x	11.43	37.69	54.29	221.76	50655268	10733626	27053

3.3 Methodology

The high crossover between various forms of NFT Fan Tokens will be known to anybody involved in the NFT market, despite the foregoing. Since token is required to purchase NFT, many people find this level of complexity to be non-trivial [30,31]. In light of this, our investigation examines crossover effects across the various trading Fan Tokens on the market. In order to better understand the dynamics between NFT FAN Tokens and NTF Token Price, vector autoregressive (VAR) models with exogenous variables are first estimated. The complicated dynamics of numerous time series are captured using VAR models. The majority of previous studies analysing investor interest in NFT Tokens employed VAR models. Using exogenous variables, [32,33] we estimate VAR models in this study. Economic considerations are among these exogenous variables, and they may influence investor interest in NFT markets. We have parameters like Price_Change, Owners, and Market_Cap, for instance. We also regulate NFT Token's exposure to Market _Cap and Price _Change. The two equations that make up the VAR model that we analyse in this study are as follows:

$$\boldsymbol{NFT\ fan\ token_f = \alpha + \sum_{j=1}^{p} \beta'\ NFT\ fan\ token_{f-j} + \sum_{j=1}^{p} \beta'\ NFT\ token\ price_{p-j} + \delta'\ Z_{f-1} + \mu_f} \quad \textbf{.....(1)}$$

$$\boldsymbol{NFT\ token\ price_f = \alpha + \sum_{j=1}^{p} \beta'\ NFT\ fan\ token_{f-j} + \sum_{j=1}^{p} \Upsilon'\ NFT\ token\ price_{p-j} + \delta'\ Z_{f-1} + \mu_f} \quad \textbf{....(2)}$$

NFT Fan Token is our main dependent variable; it stands for the weekly, monthly, and quarterly time series assessing the value of pricing depending on market demand. Prices for tokens fluctuate as market demand increases. In Equations (1) and (2), α is a vector of constants, β is a vector of coefficients on the first endogenous variable (the weekly NTFs Token Pricing), and γ is a vector of coefficients on the second endogenous variable (either the weekly, monthly, or quarterly). NFT token prices or the market cap value depending on the NFT market distribution. The exogenous control variables variables are represented by the vector Zf, and the vector of coefficients on these control variables is represented by δ. The vector μt represents a collection of separate white noise variations[34]. The symbol p indicates the number of delays in Equations (1) and (2).

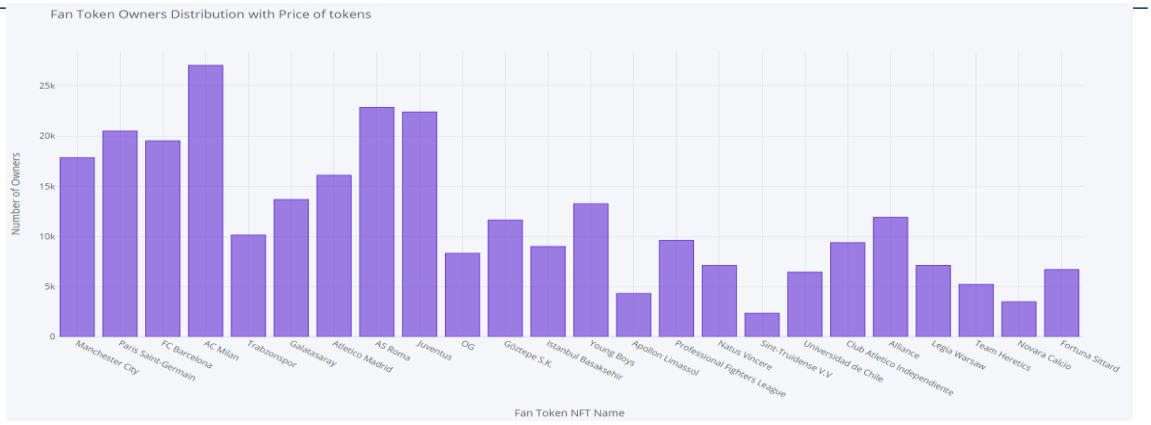

Fig 1: FAN Token Price Distribution

In above figure, the main observation shows that token lies between maximum of **$14.44** and a minimum of **$0.64**. Now, there is a need to explore the number of owners of each coins to determine the market cap.

3.3.1 Fan Token Owners Distribution with Price of tokens

The distribution of fan token ownership can have an impact on the price of tokens, but it is just one of many factors that can influence the price.

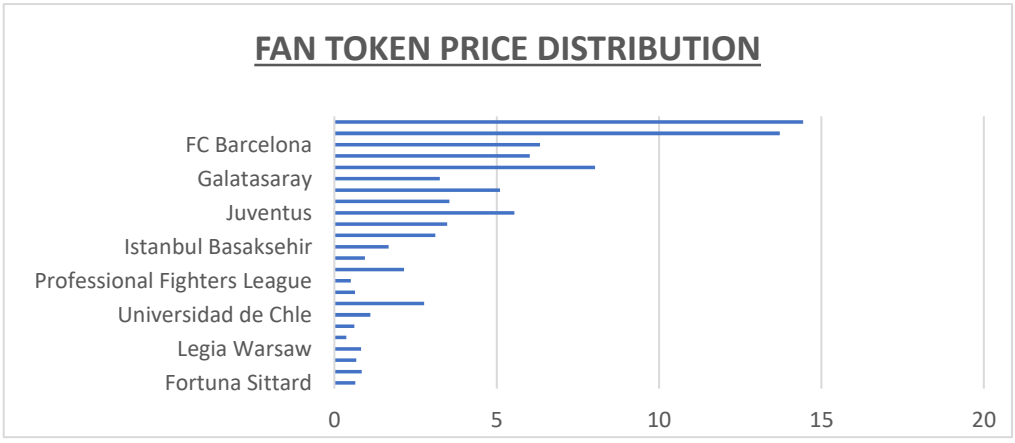

Fig 2: Fan Token Owners Distribution with Price of Tokens

As Fig2 shows, the price of Fan token can affect the distribution of ownership. The parameter to be noticed as the no of owner's increase, the price of Fan token increases**.**

3.3.2 Market Cap. Distributions (% Contribution)

Market capitalization (also known as market cap) is the sum of the worth of all the coins that have been produced in a cryptocurrency like Bitcoin. It is computed by multiplying the quantity of coins in circulation by the price at which one coin is currently traded**.**

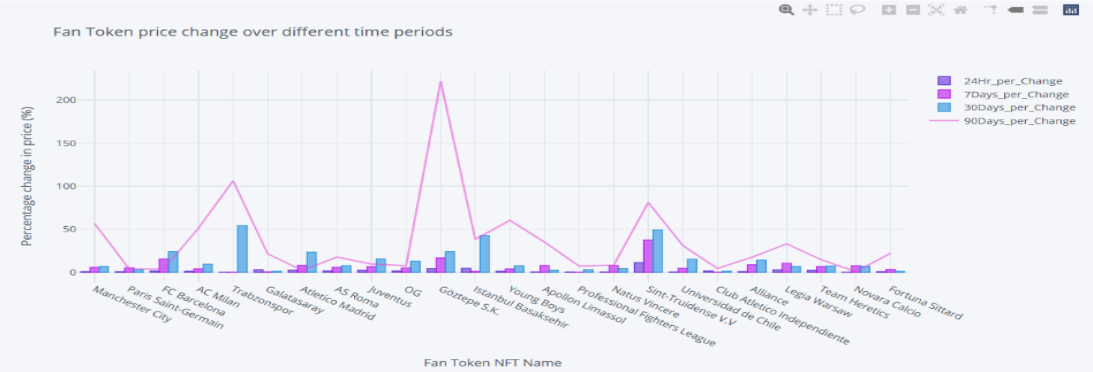

Fig3:.Market Cap Distribution of FAN Token Count

The table 3 stated that only few tokens (7 out of 24) are having a market capitalization greater than **$10 Million**. Rest tokens are only having a market capitalization less than **$10 Million**.On those coins only few are having a market cap which is higher than **$4 Million**. There are only 3 tokens who have a market cap. greater than **$20 Million**.

Table 3: Market Cap Distributions

Market Cap. Distributions (% Contribution)			
S No	Market Cap Band	No of tokens	% Contribution to $225.55M
0	Less than 4 Million	14	58.33
1	4 Million - 10 Million	3	12.5
2	10 Million - 20 Million	4	16.67
3	Geater than 20 Million	3	12.5

All these coins together contibutes **~52%** of the total market share. We will take a look at market cap. and coin **by name** once again over above to check the impact of UEFA Champions League FCs.

3.3.3 Fan Token volume of trade over different time periods

The trading volume of fan tokens can vary greatly depending on the specific token and ecosystem. Fan tokens that are associated with popular sports teams or celebrities may have higher trading volumes, as there may be greater overall demand for these tokens.

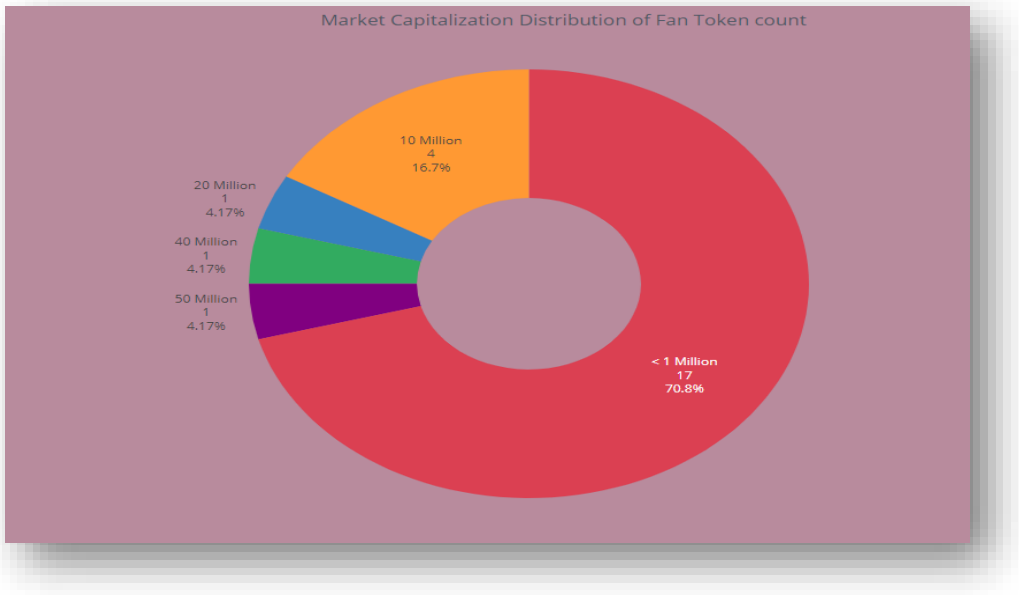

Fig5: Fan Token price change over different time periods

The Fig5 clearly indicate that over the period of time the price of the token has changes. For once token (Göztepe S.K.) the 90days change and 30days change are way higher than other.
In general, trading volume reflects the level of activity and liquidity in the market for a particular fan token. Higher trading volumes may suggest that there are more buyers and sellers actively trading the token, which can contribute to a more efficient market and potentially more stable prices[35,36].

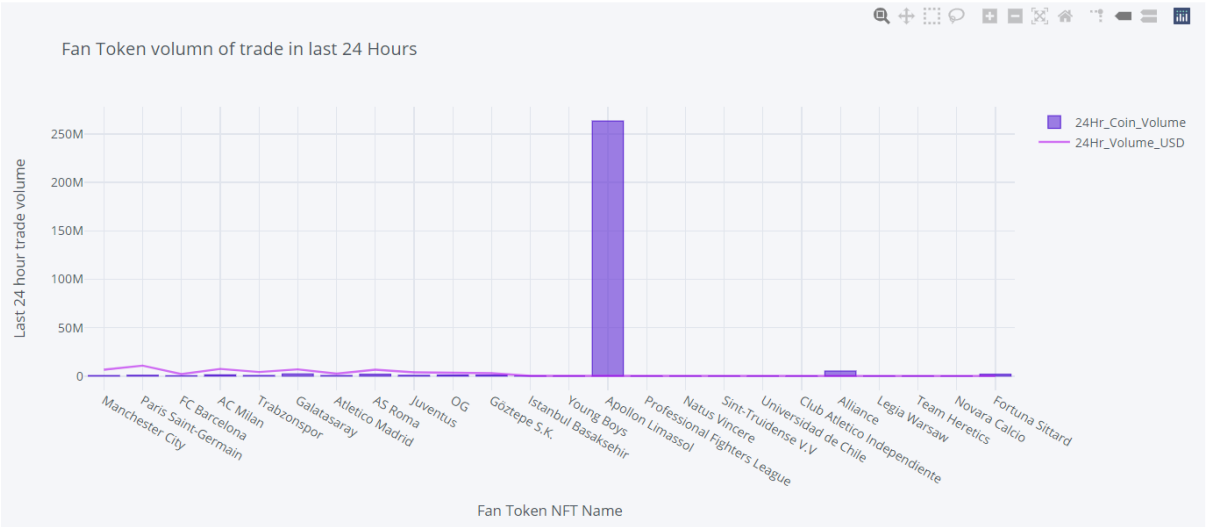

Fig 6: Fan Token Volume of trade in last 24 Hours

Fig6 clearly shown that the Fan token Apollon Limassol shows a huge trade with over $200 Millions in volume. Most of the trade volume is less than $50 Million.

4. Result Analysis

UEFA Champions League Football Clubs Fans Tokens are digital tokens that represent a form of ownership or engagement in a particular football club or ecosystem. These tokens are typically built on Blockchain technology and can provide fans with access to exclusive content, rewards, and voting rights within

the fan community. The tokens can be purchased on cryptocurrency exchanges, and their value may fluctuate based on supply and demand.The purpose of UEFA Champions League Football Clubs Fans Tokens is to deepen the connection between fans and their favourite football clubs, and to create a more engaged and loyal fan community [37,38]. By owning fan tokens, fans may have the opportunity to participate in exclusive events, influence club decisions, or earn rewards such as merchandise, tickets, or access to meet and greets with players.The introduction of fan tokens also provides football clubs with a new revenue stream, as they can sell these tokens to fans and earn a portion of the transaction fees on the cryptocurrency exchanges where the tokens are traded. The fan token ecosystem can also provide valuable data and insights into fan behaviour and preferences, which can help clubs to better understand their fan base and improve their engagement strategies.Overall, UEFA Champions League Football Clubs Fans Tokens represent a new way for football clubs to interact with their fan base and create a more vibrant and loyal community around their brand.

Table 4: UEFA Champions League Football Clubs Fans Token

UEFA Champions League Football clubs Fans Token								
S No.	Name	Symbol	Price_USD	Market_Cap_USD	24Hr_Volume_USD	7Days_per_Change	Circulating_Supply	No_of_Owners
0	Manchester City	CITY	$14.44	50655268	6552507.5	5.93	3508140 CITY	17852
1	Paris Saint-Germain	PSG	$13.72	42694032	10733626	5.27	3111172 PSG	20510
2	FC Barcelona	BAR	$6.33	25004928	2017903.3	15.63	3951906 BAR	19534
3	AC Milan	ACM	$6.02	18912226	7309522	4.09	3141172 ACM	27053
4	Atletico Madrid	ATM	$5.10	10646301	2504053.8	8.29	2086980 ATM	16095
5	AS Roma	ASR	$3.54	7659458	6582828	6.01	2163852 ASR	22869
6	Juventus	JUV	$5.54	7286281	3890084.3	6.65	1315932 JUV	22405

On above we did some analysis over market capitalization and price variable. We found out some of the tokens have huge market cap. and relatively high price too. Here we tried to use UEFA Champions League FCs for further narrow down. Previously we saw some (7 out of 24) tokens have market cap. over $10 Million. Of these 7, 5 are UEFA Champions League FCs.

4.1 Most and Least traded token in last 24 Hours

Table 5: Most and Least Traded Token in Last 24 Hours

Most and Least traded token in last 24 Hours								
S No.	Name	Symbol	Price_USD	Market_Cap_USD	24Hr_Volume_USD	7Days_per_Change	Circulating_Supply	No_of_Owners
0	Paris Saint-Germain	PSG	$13.72	42694032	10733626	5.27	3111172 PSG	20510
1	Alliance	ALL	$0.37	367406.1	45987.19	8.9	1001165 ALL	11910

4.2 Lowest and Maximum Priced Fan Token

Table 6: Lowest and Maximum Priced FAN Token

Lowest and Maximum priced Fan Token								
	Name	Symbol	Price_USD	Market_Cap_USD	24Hr_Volume_USD	7Days_per_Change	Circulating_Supply	No_of_Owners
0	Manchester City	CITY	$14.44	50655268	6552508	5.93	3508140 CITY	17852
1	Alliance	ALL	$0.37	367406.1	45987.19	8.9	1001165 ALL	11910

It's important to note that these rankings can change over time, and the trading volume of each fan token can depend on a variety of factors, including the popularity of the club, the overall demand for the token, and wider macroeconomic conditions[39,40]. Additionally, some fan tokens may be available on more cryptocurrency exchanges than others, which can impact their trading volume.

5. Conclusion

NFT Fan Tokens have the potential to reshape the sports industry by allowing fans to have a greater sense of ownership and engagement with their favourite teams and athletes. These tokens can create new revenue streams for sports organizations, while also providing fans with unique experiences and opportunities to interact with their idols. However, it remains to be seen whether NFT Fan Tokens will become a mainstream feature of the sports industry, as their success will depend on factors such as consumer adoption, regulatory frameworks, and the overall sustainability of the NFT market.

References

[1] Aki, J. (2021). Guide to tokens and NFTs: What is 'tokenization' and how does it work?.Forkast. https://forkast.news/tokens-nfts-tokenization/

[2] Belk, R. W. (1988). Possessions and the extended self. Journal of Consumer Research, 15(2), 139-168. https://doi.org/10.1086/209154

[3] Burton, B. J., & Jacobsen, J. P. (1999). Measuring returns on investments in collectibles. Journal of Economic Perspectives, 13(4), 193-212. https://doi.org/10.1257/jep.13.4.193

[4] Chaim, M. (2021). A guide to NFTs, and how they are about to revolutionize pretty much everything. ONE37pm. https://www.one37pm.com/nft/art/guide-to-nfts-beginner

[5] Murray, A., Kim, D., & Combs, J. (2023). The promise of a decentralized internet: What is Web3 and how can firms prepare? Business Horizons, 66(2), 191-202.

[6] Ross, D., Cretu, E., & Lemieux, V. (2021, December). NFTs: Tulip mania or digital renaissance? In 2021 IEEE International Conference on Big Data (Big Data) (pp. 2262-2272). IEEE.

[7] Smith, S. S., &Castonguay, J. J. (2020). Blockchain and accounting governance: Emerging issues and considerations for accounting and assurance professionals. Journal of Emerging Technologies in Accounting, 17(1), 119-131.

[8] Zarifis, A., & Cheng, X. (2022). The business models of NFTs and fan tokens and how they build trust. Journal of Electronic Business & Digital Economics, (ahead-of-print).

[9] Research Initiative (CBRI) Working Papers. http://doi.org/10.2139/ssrn.3822743

[10] Christie's. (2021). Beeple | The first 5000 days. Christie's. https://onlineonly.christies.com/s/beeple-first-5000-days/beeple-b-1981-1/112924

[11] Dash, A. (2021). NFTs weren't supposed to end like this. The Atlantic. https://www.theatlantic.com/ideas/archive/2021/04/nfts-werent-supposed-end-like/618488/

[12] Dimson, E., &Spaenjers, C. (2014). Investing in emotional assets. Financial Analysts Journal, 70(2), 20-25. https://doi.org/10.2469/faj.v70.n2.8

[13] Dormehl, L. (2021). A brief history of NFTs. Digital Trends. https://www.digitaltrends.com/features/what-are-nfts-non-fungible-tokens-history-explained/
[14] Dowling, M. (2021). Fertile LAND: Pricing non-fungible tokens. Finance Research Letters, 102096. https://doi.org/10.1016/j.frl.2021.102096
[15] Eckhardt, G. M., &Bardhi, F. (2020). New dynamics of social status and distinction. Marketing Theory, 20(1), 85-102. https://doi.org/10.1177/1470593119856650
[16] Evans, S. (2021). Blockchain sports firm Chiliz to invest $50 million in U.S. expansion. Reuters. https://www.reuters.com/article/blockchain-sports-firm-chiliz-to-invest-50-million-in-u-s-expansion-idUSKBN2AU0PA
[17] Kreuzbauer, R., King, D., &Basu, S. (2013). Natural scarcity: What makes a product a suitable means for status signaling. ACR North American Advances, 41, 747-748. https://www.acrwebsite.org/volumes/1015761/volumes/v41/NA-41
[18] Larkin, B. A., & Fink, J. S. (2016). Fantasy sport, FoMO, and traditional fandom: How second-screen use of social media allows fans to accommodate multiple identities. Journal of Sport Management, 30(6), 643-655. https://doi.org/10.1123/jsm.2015-0344
[19] Locke, T. (2021a). CryptoPunks NFTs were free when they started-now Christie's sold a collection for $17 million. CNBC. https://www.cnbc.com/2021/05/12/christies-sold-cryptopunks-nfts-collection-for-millions.html
[20] Locke, T. (2021b). Mark Cuban: The Dallas Mavericks are thinking about 'turning our tickets into NFTs.' CNBC. https://www.cnbc.com/2021/03/26/mark-cuban-dallas-mavericks-may-use-nfts-for-ticketing.html
[21] Lynn, M., &Bogert, P. (1996). The effect of scarcity on anticipated price appreciation. Journal of Applied Social Psychology, 26(22), 1978-1984. https://doi.org/10.1111/j.1559-1816.1996.tb01783.x
[22] Mardon, R., & Belk, R. (2018). Materializing digital collecting: An extended view of digital materiality. Marketing Theory, 18(4), 543-570. https://doi.org/10.1177/1470593118767725
[23] Matney, L. (2021). Ethereum's 'oldest NFT project' may not actually be the first, but it's the wildest. TechCrunch. https://techcrunch.com/2021/04/08/the-cult-of-cryptopunks
[24] McIntosh, W. D., &Schmeichel, B. (2004). Collectors and collecting: A social psychological perspective. Leisure Sciences, 26(1), 85-97. https://doi.org/10.1080/01490400490272639
[25] Merriam-Webster. (2021). Non-fungible token. In Merriam-Webster.com dictionary. https://www.merriam-webster.com/dictionary/non-fungible%20token
[26] Nason, R. S., &Wiklund, J. (2018). An assessment of resource-based theorizing on firm growth and suggestions for the future. Journal of Management, 44(1), 32-60. https://doi.org/10.1177/0149206315610635
[27] Nelson, D. (2021). Dapper Labs' NBA Top Shot has crossed the million-user mark. Coindesk. https://www.coindesk.com/dapper-labs-nba-top-shot-has-crossed-the-million-user-mark
[28] O'Dwyer, R. (2020). Limited edition: Producing artificial scarcity for digital art on the blockchain and its implications for the cultural industries. Convergence, 26(4), 874-894. https://doi.org/10.1177/1354856518795097
[29] Olmstead, A. D. (1991). Collecting: leisure, investment or obsession?. Journal of Social Behavior and Personality, 6(6), 287-306.
[30] OpenSea. (n.d.). The definition of NFT. OpenSea. https://opensea.io/assets/0x495f947276749ce646f68ac8c248420045cb7b5e/130141537905506924388120202925303085277965998183326396425135355968400895508 49
[31] Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. Computers in Human Behavior, 29(4), 1841-1848. https://doi.org/10.1016/j.chb.2013.02.014
[32] Rovell, D. (2021). NBA Top Shot: LeBron James highlight sets record sales price. Action Network. https://www.actionnetwork.com/news/nba-top-shot-lebron-james-highlight-record-sale-2021
[33] Serada, A., Sihvonen, T., &Harviainen, J. T. (2021). CryptoKitties and the new ludic economy: How blockchain introduces value, ownership, and scarcity in digital gaming. Games and Culture, 16(4), 457-480. https://doi.org/10.1177/1555412019898305

[34] Shah, K. (2021). When consumer meets crypto. Blockchain Capital. https://blockchain.capital/consumer-meets-crypto/
[35] Sharma, R. (2021). Non-fungible token definition. Investopedia. https://www.investopedia.com/non-fungible-tokens-nft-5115211
[36] Spence, M. (1973). Job market signaling. Quarterly Journal of Economics, 87(3), 355-374. https://doi.org/10.1016/B978-0-12-214850-7.50025-5
[37] Tarmy, J. (2021). For $1.3 million, an NFT and stake in a Mexican soccer team. Bloomberg. https://www.bloomberg.com/news/articles/2021-06-01/for-1-3-million-an-nft-and-stake-in-a-mexican-soccer-team
[38] Thomson, R. (2008). Vincent van Gogh: The starry night. The Museum of Modern Art.
[39] Thompson, T. H., & Sen, K. C. (2011). Valuing nostalgia: The case of the Topps 1957 baseball cards. Journal of Quantitative Analysis in Sports, 7(2). https://doi.org/10.2202/1559-0410.1345
[40] Wark, M. (2017). My collectible ass. E-flux Journal, 85. https://www.e-flux.com/journal/85/156418/my-collectible-ass/