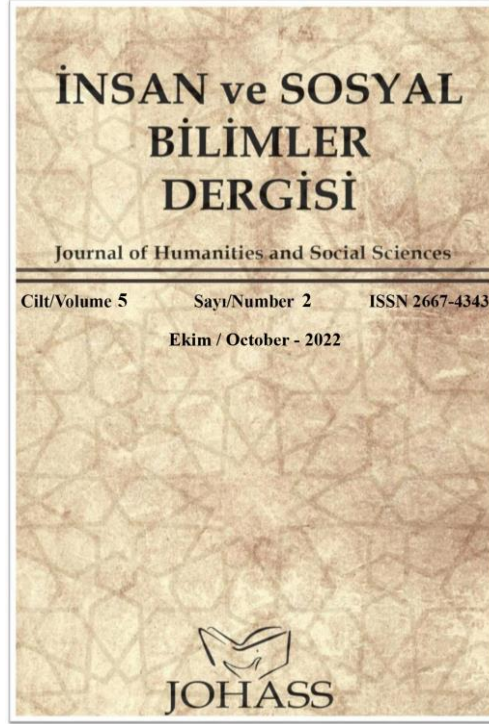# JOURNAL OF HUMAN AND SOCIAL SCIENCES (JOHASS)

Fan Tokens as A Financial Source and Digital Marketing Tool in Football: An Analysis with The Entropy-Based Waspas Method

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Fan Tokens as A Financial Source and Digital Marketing Tool in Football: An Analysis with The Entropy-Based Waspas Method

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Abstract	Research Article

Considering that the revenues of the five most important leagues in Europe reached 15.6 billion euros in the 2020-2021 season (Deloitte, 2022), it is clear that the competition in football, whose global economic weight is gradually increasing, is no longer just limited to the sporting field but has expanded to include financial and marketing efforts. The concept of "token" is taken as a tool that can display fan-oriented experiential and financial efforts combined in the context of current developments, which will be seen as the reflection of the digitization process on football. This study analyzes the activities of 'fan tokens' belonging to thirty-six different football clubs listed on the coinmarketcap.com crypto asset instant information platform, in terms of market value, 90-day return, change from the highest value (1 Year), number of exchanges traded and watchlist. (watch list)", it aims to analyze by using Entropy in the determination of criterion weights and WASPAS methods in the multi-criteria decision-making process. The global reach of the football economy and the extent of the audience it appeals to reveal the necessity of studies to be carried out in the relevant field. Therefore, as a result of this study, which was prepared with the aim of contributing to the literature for current practices, the fan token with the highest efficiency value belongs to the 'Paris Saint-Germain' club, and the related club is followed by the 'Lazio' and 'Santos' clubs; it has been determined that the club with the lowest efficiency value is 'Bayer 04 Leverkusen'.

Keywords: Finance of football, football marketing, fan token, WASPAS method.

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Introduction

In the historical sense, football has a long history. In Britain, it was formalized in 1863 (Giulianotti, 2012). Football has evolved into the most valuable media product of the modern era and now means much more to fans than just watching 22 teammates compete in a sport for 90 minutes (Goksyr & Olstad, 2012). So much so that the economic magnitudes produced by national and international organizations serve as evidence that football has evolved into a business. The English Premier League, one of the most important football leagues in the world, contributes £3.6 billion to the treasury through clubs and federations, as well as employing for 94,000 people through football, 686,000 people participating in the tourism movement to follow the matches in the stadium during the season, and the fact that it provides support of £7.6 billion to the national income brings into account the economic dimension provided by football (premierleague.com, 2022). Similar to this, the financial strength of the competing soccer clubs enables them to leverage their fan bases to meet their revenue goals; in terms of perceived brand values, it positively affects the level of competition with its competitors in many countries. The brand phenomenon makes it possible for a product or service to stand out in the minds of its target customers and generate repeat business, emerges as a uniquely competitive tool with its economic value. In terms of the football market, this issue is considered an important variable. In this context, defining the current state of the economic dimension of the world's most valuable football club brands has the potential to give an idea about the competitive side of the football economy. Table 1 presents the numerical data of the world's most valuable football club brands.

Table 1. *The Most Valuable Football Clubs in the World in terms of Brand Value in 2022*

Number	Football Club	Country of Origin	Brand Value (Billion $)	Financial Valuation
1	Real Madrid CF	Spain	1.768	AAA+
2	Manchester City FC	England	1.539	AAA
3	Barcelona FC	Spain	1.536	AAA+
4	Liverpool FC	England	1.475	AAA+
5	Manchester United FC	England	1.450	AAA+
6	FC Bayern Munich	Germany	1.286	AAA
7	Paris Saint-Germain	France	1.191	AAA-
8	Tottenham Hotspurs FC	England	1.012	AAA-
9	Chelsea FC	England	0.991	AAA
10	Arsenal FC	England	0.919	AAA

Source: https://brandirectory.com/download-report/brand-finance-football-50-2022-preview.pdf Date of access: 28/06/2022.

When Table 1 is examined, it is seen that the total value of the ten football clubs with the highest brand value is approximately 11.25 Billion $, and the clubs in the list have a very strong structure in terms of financial valuation. The support of the fans to the club plays an important role in the emergence of the brand value of Real Madrid, which is included in the table as the most valuable club in the world, as well as the sports achievements from football and other sports branches. For instance, according to Real Madrid's 2020–2021 annual report, the club has 91,701 members, 64,831 of them are adults who pay a 149.19 € membership fee and give the team a direct income of about 10 million € annually; despite having a season without fans due to the Covid-19 pandemic, it is stated that they have an operating income of 653 million € and they pay 242.9 million € in tax to national and local authorities (Real Madrid, 2022). In this perspective, it is clear that fan involvement and fan-focused finance

strategies are equally important to the growth of football teams' financial structures as athletic achievement. Given that football has a financial value, the level of devotion and loyalty of the fans to their clubs is regarded as a highly crucial component. In this regard, Mutlu & Şahin (2014) state that the fan ties of individuals to football clubs develop from their social environment, especially within the framework of the influence of the 'father' figure in the family. At the same time, the fans have internal motivations such as "supporting the team, identification with the team, the pleasure of use, social attraction and shopping pleasure" (Ayhan et.al., 2017) for purchasing some products with their club's logos. The link between the team and the fans, which is very difficult to compare with another sector as the focus of commercial marketing activities, can therefore be considered to be acquired with football from birth. Çoban (2008), on the other hand, argues that it is insufficient to discuss football only in the context of economic or sportive issues. According to the author, football is considered a factor that has a high impact on the shaping of consumption culture; it can be seen as a tool that political parties and candidates use in obtaining positions of power or opposition in the process of realizing political goals. Therefore, the place of football in marketing should not be perceived only as selling the products of football clubs or as support for fans (Mert, 2009: 130), it should be considered that many different products or services are subject to marketing through football and therefore to consumption.

There are football marketing initiatives that football clubs can utilize to increase their financial potential in an environment of growing competition, as well as marketing initiatives through football that open up the possibility of generating cash by incorporating many industries into football. The concept of marketing through football can be defined as "the use of sports (soccer) by individuals or businesses in marketing their products or the use of sports (soccer) as a means to attract the attention of potential customers both directly and indirectly" (Serarslan, 2020: 1). In this sense, marketing through football can be considered as the emphasis of football clubs' efforts to create cash from industries other than their primary operations. In this regard, the effects of the fan phenomenon on clubs should not be ignored. Because marketing through football is part of the effort of marketing to communicate with target audiences. To increase the interaction of digital financial investment enterprises with their target audience and to expand the digital investor portfolio, digital financial instruments that have diversified in recent years have become the subject of marketing through football. As a result, the "token" is used in marketing through football as a digital investment tool where both the club and the fan as an investor can gain money or specific privileges, going beyond simply physically channeling the outcomes of being a supporter to items or services. The use of diversification strategies, in addition to conventional income generation techniques, is at the heart of "token" marketing through football. This allows football clubs to participate in digital investment markets, which have drawn attention from all over the world as a result of digitalization. In this context, "token" is a financial instrument; it takes place in financial transactions as a part of a system (Fındıklı & Saygın, 2021: 60) that allows parties to transfer assets in a secure environment without the need for intermediation of a third party, to carry out e-commerce in a reliable environment as a need of the digitalized global economy. In this context, "Initial Coin Offerings (ICOs)" or token sales—which are currently accessible to investors—are smart contracts built on blockchain-based distributed ledger technology that are intended to raise external funding by issuing coins or tokens. They are seen as a way to enter the blockchain (Momtaz, 2020: 975). However, the fact that the system is based on blockchain protocols also allows the investment to be maintained without intermediaries and is still independent of many international regulations (Andres et al., 2022: 1).

Unlike traditional investment instruments, "tokens" can contribute to the provision of three different benefits (Howell et al., 2020: 3927); First, "to provide income without giving operational control to the system creators with the start of the system" second; "token holders

or potential customers can finance the development of the platform by speculating about the future value of the token"; and third, "the value of the token is realized by providing access to a future good or service and creating customer commitment". Investors have three different token alternatives in their token-based investments. These alternatives can be specified as follows (Lambert et al., 2022; Momtaz, 2020; Fındıklı and Saygın, 2021):

- *Utility Tokens:* They are the most widely used tokens that aim to support and develop a consumption-based ecosystem without giving ownership rights to their investors.
- *Security Tokens*: They are defined as tokens with investment vehicle features. It offers its investors the right to pay cash and, under certain conditions, to vote.
- *Payment Tokens*: They are payment tools in a blockchain-based ecosystem.

It is seen that businesses have shown increasing interest in "tokens" as an alternative financing source in recent years. According to Momtaz (2021: 1), 661 startups globally in 2017 made "token" issuance, while in 2018 this figure rises to over 4500. In this context, football clubs did not remain indifferent to the relevant developments, and the football club located in many different continents around the world realized token supply to realize digital investments through their clubs and provide alternative income.

This study considers the fan token data of 36 different football clubs listed on the "coinmarketcap.com" instant information platform and evaluates the fan tokens with the data obtained. In the study, Entropy and WASPAS Methods, which are among the multi-criteria decision-making methods, were used to perform the ranking for fan tokens. The main reason for the preference of the WASPAS Method is that there is no similar study in the literature on fan tokens and therefore the original contribution is presented. Therefore, the study aims to make a meaningful contribution to the field by undertaking an effort to evaluate a financial instrument that is currently used in the digitalization process for the economic development of football based on efficiency. It is determined that there are not enough studies in the literature within the scope of the related subject, thus it is aimed to fill an important gap in the literature. In the following sections of the study, the activities of football clubs in the token market are evaluated and the findings of the analysis carried out within the scope of the data obtained for tokens are shared.

Fan Tokens of Football Clubs in Turkey

Fan tokens are defined as crypto assets that work with the 'Chiliz' ($CHZ) infrastructure and are prioritized by the 'Socios.com' platform, issued to increase the interaction between sports clubs and their fans, to give the fans a voice and to offer them various advantages (Paribu, 2022). Fan tokens offer advantages such as providing the right to vote for team decisions through ownership, participation in special programs, VIP experiences, special raffles and award ticket ownership (socios.com, 2022). As a result, holders of fan tokens are given preference while utilizing the special services provided by the team they support, and football teams convert their conventional marketing strategies into experiential ones by utilizing digital content via the appropriate tokens. In this way, it enables the integration of fans in the market to increase the level of interaction not only with on-field experiences but also by including off-field and other periods. In terms of relevant interactions, it is possible to explain the privileged experiences offered and realized by fan tokens as follows (Paribu, 2022):

- The football team's locker room, team bus design, and the selection of the first eleven of the friendly matches,
- Presenting on-field and stadium tour experiences during the pre-match warm-up processes of football players on match day, such as Juventus 'Walkabout Experience' and 'Rome Golden Experience' examples,

- Participation in various competitions and award programs,
- Ownership of match tickets, signed jerseys and souvenirs,
- Establishing a communication network with token holder fans.

Chen & Wu (2022) state that consumers' image perception of any brand has a significant effect on the level of loyalty, and that the level of loyalty related to the experiences they have is also positively affected. Therefore, football clubs use the position of their existing brand images on their target audience through fan tokens to increase their loyalty levels based on experiential marketing efforts carried out specifically for the token-holder fan. Additionally, Do Carmo et al. (2022) found that if customer loyalty is directly and positively affected by emotional experiences and the phenomenon of advocacy is explained on an intensely emotional basis, the marketing value of token applications can be understood more clearly. Thus, fan tokens create an application that creates value in terms of the development of both the financial and marketing capabilities of football clubs. The mentioned advantages encourage many football clubs to have fan token applications in Turkey as well as in the world. Table 2 presents various information about football clubs holding fan tokens in Turkey.

Table 2. Football Clubs with Fan Tokens in Spor Toto Super League and 1st League

	Football Club	**League**	**Token Name**	**Platform**
1	Galatasaray A.Ş.	Super League	GAL	Socios
2	Fenerbahçe A.Ş.	Super League	FB	Paribu
3	Trabzonspor A.Ş.	Super League	TRA	Socios
4	Medipol Başakşehir FK	Super League	IBFK	Socios
5	Alanyaspor	Super League	ALA	Socios
6	Gaziantep Futbol Kulübü A.Ş.	Super League	GFK	Socios
7	MKE Ankaragücü	Super League	ANKA	Bitci
8	Vavacars Fatih Karagümrük	Super League	FKSK	Bitci
9	Kayserispor	Super League	KYSR	Bitexen
10	Giresunspor	Super League	GRS	Bitexen
11	Demir Grup Sivasspor	Super League	SVS	Bitexen
12	Adana Demirspor	Super League	DEMIR	Bitexen
13	Antalyaspor	Super League	AKREP	Bitexen
14	Atakaş Hatayspor	Super League	HATAY	Bitexen
15	Yeni Malatyaspor	1st League	YMS	Bitexen
16	Sakaryaspor A.Ş.	1st League	SKRY	Bitexen
17	Çaykur Rizespor A.Ş.	1st League	RIZE	Bitexen
18	B.B. Erzurumspor	1st League	ERZ	Bitexen
19	Tuzlaspor	1st League	TUZLA	Bitexen
20	Gençlerbirliği	1st League	GBSK	Bitci
21	Yılport Samsunspor	1st League	SAM	Socios
22	Adanaspor A.Ş.	1st League	ADANA	Bitci
23	Bodrumspor A.Ş.	1st League	BDRM	Bitci
24	Altaş Denizlispor	1st League	DNZ	Bitci
25	Göztepe A.Ş.	1st League	GOZ	Paribu
26	Altay	1st League	ALTAY	ICRYPEX

Source: https://coinmarketcap.com/tr/currencies/ Date of access: 24/07/2022

Although it is stated in Table 2, it is seen that 26 of the football teams competing in the Super League and 1st League in Turkey have launched fan tokens. Football teams in Turkey's lower levels have been located, despite the fact that it is not shown as data in the

table (Afjet Afyonspor, Kocaelispor, Bursaspor, Vanspor) also perform fan token supply. However, it is possible to talk about the existence of clubs in the top two levels of professional leagues in Turkey for fan tokens. It is evaluated that 14 of the 19 clubs competing in the Super League and 12 of the 19 clubs competing in the 1st League undertake efforts to realize the integration of the fan club on both an experiential and financial basis. It contributes to the democratization of football with the participation of the fans in club decisions, as well as the income of football clubs through fan tokens; With the creation of experiential areas, meaningful developments in loyalty levels are ensured by strengthening the bond between the club and the fans.

The realization of the fan token applications carried out by football clubs in Turkey in the style of "usage tokens" allows an emotional investment decision to be taken that appeals to the fan club bond, unlike short-term investment decisions. Beyond simply possessing a token, fans will be able to participate in the fan token ecosystem as a living entity and experience the events of many fans' fantasies (Bitexen, 2022). Therefore, the fan token's price fluctuations as a financial instrument will be influenced by both the fans' willingness to retain ownership of the token's prospective benefits and the football club's sportive achievement. However, within the scope of this study, the analysis of fan tokens as a financial investment tool is carried out on a financial basis, since it is very difficult to determine the quantitative equivalents of experiential benefits.

Method

The main purpose of this study is to evaluate the effectiveness of fan tokens as digital financial tools owned by football clubs through the Entropy-based WASPAS Method. The fact that the Entropy method used in the determination of the criterion weights and the WASPAS method used in the ranking gave consistent results in the studies in the literature is the main reason for their preference in this study. For the the study, the data is obtained from the fan token values of 36 different football clubs, which are actively invested on the "coinmarketcap.com" platform, on 05/07/2022. The aim of the study to produce solutions through the multi-criteria decision-making method necessitates the evaluation of the obtained data within the scope of the criteria. In the criterion determination process, the literature focused on identifying alternatives for crypto investments was used. In the relevant literature; Arıkan Kargı (2022) uses 7 criteria as "annual average return, total market value, security infrastructure, transaction speed, supporting institutions, change from the highest value and the number of exchanges traded; Katrancı & Kundakçı (2020), on the other hand, detects 10 criteria as "Coin Team / Developers, Annual Average Return, Total Market Value, Roadmap, White Paper, Security, Transaction Speed, Supporting Institutions and Organizations, Change from the Highest Value, Number of Stock Exchanges Traded". Genç et al. (2018), states that the most important main criterion that users pay attention to or attach importance to in choosing cryptocurrencies is "total market value", the second criterion is "the number of exchanges traded" and the third criterion is "market value cumulative score". Therefore, in the selection of criteria in the study, relevant studies were taken into account, and it was decided to use 5 different criteria in the process of evaluating the alternatives: "market value, 90-day return, change from the highest value (1 Year), number of exchanges traded and watchlist". The relevant criteria are shown in Table 3.

Table 3. Evaluation Criteria Used in the Scope of the Study

Criteria Code	Criteria	Criteria Basis
K₁	Market Value	$

K_2	90 days return	%
K_3	Change from highest value	%
K_4	Number of exchanges traded	Number
K_5	Watchlist	Number

In order to examine the fan token alternatives using the WASPAS Method, the weights of the criteria in the study need to be established. The study's objective criterion weight determination was accomplished using the entropy method.

Entropy Method

'Entropy', which was first defined as a measure of disorder in a system by Rudolph Clausius in 1865, was applied in the field of thermodynamics; it was developed by Shannon in 1948 for use in information theory and is frequently used in fields such as engineering, economics, and finance (Orçun, 2019: 444; Zhang et.al., 2011:444; Zou et.al., 2006: 1020). In addition, according to Bostancı & Ocakçı (2009: 31), the 'Entropy' method can be used even in the realization of objective inferences such as aesthetic evaluation. For this reason, it is considered that the entropy method is used by many different fields of science. The Entropy method is used to determine criterion weights in multi-criteria decision-making methods (Özdağoğlu et. al., 2017: 346). Although the method has advantages such as the individual decision maker does not need to rank the criteria and the relative weight of each criterion can be determined by simple calculations, it has an application process consisting of 5 stages (Erol & Ferrell, 2009: 1196-1997; Karami & Johansson, 2014: 523- 524). In the first step of the method, a decision matrix consisting of xij values of alternatives (Ai) and criteria (cj) and represented by D is formed (Equation 1).

$$
\begin{array}{cccc}
c1 & c2 & \dots & cj
\end{array}
$$

$$
D = \begin{array}{c} A_1 \\ A_2 \\ \dots \\ A_i \end{array}
\begin{bmatrix}
x_{11} & x_{21} & \cdots & x_{1j} \\
x_{21} & x_{22} & \cdots & x_{2j} \\
\dots & \dots & \dots & \dots \\
x_{i1} & x_{i2} & \cdots & x_{ij}
\end{bmatrix} \tag{1}
$$

In the second stage, to eliminate the differences in the scales, the normalization of the decision matrix (pij) is provided by operating in equation 2.

$$
p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}} \qquad \forall\, i, j \tag{2}
$$

In the third step, the entropy values (Ej) of the criteria are calculated with the help of equation 3. The "k" value in the equation is a coefficient defined as $(ln(m))-1$.

$$
E_j = -k \sum_{i=1}^{m} [P_{ij} ln P_{ij}] \tag{3}
$$

In step 4, the dj uncertainty is calculated using equation 4 as the degree of differentiation.

$$
d_j = 1 - E_j \tag{4}
$$

In the 5th step, the calculation of the weights (wj) of the criteria is carried out with the help of equation 5.

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j} \tag{5}$$

For the logarithm function used when calculating the entropy values of the criteria to give a healthy result, it is necessary to transform the negative values into positive values (Ayçin and Aşan, 2018: 2085). Since the 90-day return (K_2) and the change from the highest value (K_3) used in the study were negative for some fan tokens, a positive correction was applied. This process was carried out using the Z-Score (standard score) standardization method (Zhang et al., 2014: 3). In the first step of the Z-score method, the values in the decision matrix are transformed using equation 6.

$$z_{ij} = \frac{x_{ij} - \overline{X}_j}{\sigma_j} \tag{6}$$

Then, with the help of equation 7, the data is converted to positive values. The closeness to (min z_{ij}) is important in determining the variable A, and the closer the value to A, (min z_{ij}) is chosen, the more meaningful the evaluation result will be.

$$z'_{ij} = z_{ij} + A; \qquad A > \left| \min z_{ij} \right| \tag{7}$$

WASPAS Method

WASPAS (Weighted Aggregated Sum Product Assessment) method was obtained by combining WSM (Weighted Sum Model) and WPM (Weighted Product Model) models (Zavadskas et.al., 2012: 3-4). It is emphasized that the accuracy of WSM and WPM is below the WASPAS method as a single method and that WASPAS can be successfully applied in multi-criteria decision making problems in computer-aided systems, aiming to increase the ranking accuracy (Akçakanat et.al., 2017: 290; Ural et.al., 2018: 132). The WASPAS Method consists of 6 steps (Zavadskas et al., 2012: 3-4; Akçakanat et al., 2017: 290-292; Ural et al., 2018: 132-133):

In the first step, the initial decision matrix is created using equation (8).

$$D = \begin{matrix} A_1 \\ A_2 \\ \cdots \\ A_i \end{matrix} \begin{bmatrix} x_{11} & x_{21} & \cdots & x_{1j} \\ x_{21} & x_{22} & \cdots & x_{2j} \\ \cdots & \cdots & \cdots & \cdots \\ x_{i1} & x_{i2} & \cdots & x_{ij} \end{bmatrix} \tag{8}$$

In the second step, the normalized decision matrix is created. In this context, separate calculations are made for the benefit and cost criteria in equations (9) and (10).

$$\text{Benefit Criteria: } \acute{x}_{ij} = \frac{x_{ij}}{\max_i x_{ij}} \tag{9}$$

$$\text{Cost Criteria: } \acute{x}_{ij} = \frac{\min_i x_{ij}}{x_{ij}} \tag{10}$$

In the 3rd step, the total relative importance of the i alternatives based on the weighted sum method (WSM) is calculated with the help of equation (11).

$$Q_i^{(1)} = \sum_{j=1}^{n} \acute{x}_{ij} w_j \tag{11}$$

In step 4, the total relative importance of the i alternatives based on the weighted product method (WPM) is calculated with the help of equation (12).

$$Q_i^{(2)} = \prod_{j=1}^{n} \acute{x}_{ij}^{w_j} \tag{12}$$

In the 5th step, the calculation of the total importance of the alternatives is carried out with the help of equation (13) by taking the equal contributions of the weighted total and weighted product models.

$$Q_i = 0,5Q_i^{(1)} + 0,5Q_i^{(2)} = 0,5 \sum_{j=1}^{n} \acute{x}_{ij} w_j + 0,5 \prod_{j=1}^{n} \acute{x}_{ij}^{w_j} \tag{13}$$

The sixth and final stage involves calculating the overall relative importance of the alternatives. Alternatives are ranked with the help of equation (14). λ (lambda), included in the equation, takes a value between 0 and 1.

$$Q_i = \lambda\, Q_i^{(1)} + (1-\lambda)\, Q_i^{(2)} \qquad (\lambda=0,\, 0,1,\, \ldots,\, 1) \tag{14}$$

Findings

In the process of evaluating the findings of the study, first of all, within the scope of the fan tokens included in the analysis, the steps of the Entropy and WASPAS Methods are shown respectively. The initial decision matrix required to use the respective methods is shown in Table 4.

Table 4. *Initial Decision Matrix for Fan Tokens*

Number	Fan Token	K_1	K_2	K_3	K_4	K_5
		Max	Max	Min	Max	Max
1	PSG	19335553	-57,77	-89,84	18	28332
2	LAZIO	18533302	-52,84	-93,96	21	12502
3	SANTOS	16926953	-36,37	-86,99	19	8432
4	CITY	15829560	-71,28	-87,75	13	13758
5	BAR	15741762	-57,63	-86,35	9	20680
6	PORTO	14046281	-67,07	-87,71	20	8532
7	MILAN	9036364	-59,92	-82,43	9	12114
8	INTER	8033466	-61,82	-81,19	3	3566
9	GAL	7873663	-34,53	-85,18	7	10698
10	ATM	6687530	-52,3	-87,05	10	12212
11	ASR	6479275	-26,78	-74,31	12	8537
12	JUV	4925191	-42,2	-81,51	14	13129
13	TRA	4338560	-77,34	-81,52	4	4135
14	FB	4096316	-31,54	-82,86	1	3357
15	VCF	3173761	-44,34	-74,24	2	1467
16	AFC	2911858	-51,19	-78,02	4	3083
17	GOZ	1663316	-68,73	-75,45	2	1768
18	LUFC	862161	-65,26	-98,59	1	474

19	IBFK	782954	-7,91	-52,92	1	1165
20	MENGO	774023	-82,31	-94,18	2	2269
21	SCCP	761544	-44,97	-99,79	1	1575
22	EFC	604482	-59,16	-77,28	1	603
23	AVL	533320	-60,69	-85,46	1	748
24	YBO	502377	-53,77	-93,95	1	1327
25	GALO	488578	-60,14	-91,44	1	693
26	SPFC	428455	-57,67	-87,21	1	633
27	SAM	358270	-60,47	-96,71	1	408
28	STV	334799	-60,55	-93,74	1	811
29	APL	304118	-63,94	-93,15	1	915
30	CAI	214144	-47,09	-99,61	1	1117
31	UCH	178844	-62,93	-99,69	1	1362
32	LEG	174131	-61,12	-91,19	1	647
33	DZG	141483	-42,28	-79,23	1	430
34	NOV	70050	-65,49	-91,87	1	856
35	FOR	55139	-46,55	-93,18	1	545
36	LEV	51864	-64,81	-95,11	1	351

The Entropy Method was used in the study to determine the criterion weights required for the application process of the WASPAS Method. However, as can be seen in Table 4, K_2 and K_3 criteria have negative values. Therefore, it is considered necessary to correct the negative values with the Z-score method as indicated in equations (6) and (7) in the study. After the correction, the standard deviation values of the data did not change in the matrix; A value of 1.9 for the K_2 criterion; for the K_3 criterion, it was determined that the A value was found to be 1.37, and therefore, it was seen that the operation performed did not have a negative contribution to the data set. The decision matrix obtained as a result of the Z-score correction process is shown in Table 5.

Table 5. *Adjusted Decision Matrix for Fan Tokens*

Sıra	Fan Token	K_1	K_2	K_3	K_4	K_5
		Max	Max	Min	Max	Max
1	PSG	19335553	1,675562	1,064776	18	28332
2	LAZIO	18533302	2,010408	0,627715	21	12502
3	SANTOS	16926953	3,129048	1,367112	19	8432
4	CITY	15829560	0,757965	1,286489	13	13758
5	BAR	15741762	1,685071	1,435005	9	20680
6	PORTO	14046281	1,043908	1,290733	20	8532
7	MILAN	9036364	1,529535	1,85085	9	12114
8	INTER	8033466	1,400487	1,982393	3	3566
9	GAL	7873663	3,254021	1,559122	7	10698
10	ATM	6687530	2,047084	1,360747	10	12212
11	ASR	6479275	3,7804	2,712243	12	8537
12	JUV	4925191	2,733075	1,948446	14	13129
13	TRA	4338560	0,34637	1,947385	4	4135

14	FB	4096316	3,457101	1,805234	1	3357
15	VCF	3173761	2,587727	2,719669	2	1467
16	AFC	2911858	2,122475	2,318675	4	3083
17	GOZ	1663316	0,931161	2,591308	2	1768
18	LUFC	862161	1,166843	0,136551	1	474
19	IBFK	782954	5,062048	4,981355	1	1165
20	MENGO	774023	0,008808	0,604376	2	2269
21	SCCP	761544	2,544937	0,009252	1	1575
22	EFC	604482	1,581154	2,397177	1	603
23	AVL	533320	1,477236	1,529419	1	748
24	YBO	502377	1,947242	0,628775	1	1327
25	GALO	488578	1,514592	0,895043	1	693
26	SPFC	428455	1,682354	1,343774	1	633
27	SAM	358270	1,492179	0,335987	1	408
28	STV	334799	1,486745	0,651053	1	811
29	APL	304118	1,256497	0,713642	1	915
30	CAI	214144	2,400947	0,028346	1	1117
31	UCH	178844	1,325096	0,01986	1	1362
32	LEG	174131	1,448031	0,921564	1	647
33	DZG	141483	2,727642	2,190315	1	430
34	NOV	70050	1,151221	0,849428	1	856
35	FOR	55139	2,437624	0,710459	1	545
36	LEV	51864	1,197406	0,505719	1	351

Based on the data in the corrected decision matrix, the Entropy method is used to determine the weights for the criteria determined for the evaluation of fan tokens within the scope of the study. The stages of the Entropy method are included under the relevant title of the study, and the criteria weights obtained as a result of adapting the relevant stages to the data set are shown in Table 6.

Table 6. Fan Token Evaluation Criteria Weights

Criteria Code	Criteria	Criteria Base	Weights
K_1	Market Value	$	0,311144011
K_2	90 days return	%	0,056250154
K_3	Change from highest value	%	0,107832582
K_4	Number of exchanges traded	Number	0,253337709
K_5	Watchlist	Number	0,271435545

When Table 6 is examined, the criterion with the highest level of importance among the criteria in the study is the market value with 31.1%, while the criterion with the lowest level of importance is determined as the 90-day return with 5.6%. In the process of realizing the purpose of the study, it is aimed to use the WASPAS method, so after the criterion weights are determined, the analysis stages for the relevant method can be started. The first step of the WASPAS method is to create a normalized decision matrix by using equality (9) and equality (10) within the scope of benefit and cost criteria by using the corrected decision

matrix in Table 4. The matrix obtained as a result of the application of the method is shown in Table 7.

Table 7. *WASPAS Method Normalized Decision Matrix*

Number	Fan Token	K_1	K_2	K_3	K_4	K_5
1	PSG	1	0,331005	0,008689	0,857143	1
2	LAZIO	0,958509	0,397153	0,014738	1	0,441268
3	SANTOS	0,875432	0,618139	0,006767	0,904762	0,297614
4	CITY	0,818676	0,149735	0,007191	0,619048	0,485599
5	BAR	0,814136	0,332883	0,006447	0,428571	0,729917
6	PORTO	0,726448	0,206222	0,007168	0,952381	0,301144
7	MILAN	0,467344	0,302157	0,004999	0,428571	0,427573
8	INTER	0,415476	0,276664	0,004667	0,142857	0,125865
9	GAL	0,407212	0,642827	0,005934	0,333333	0,377594
10	ATM	0,345867	0,404398	0,006799	0,47619	0,431032
11	ASR	0,335096	0,746812	0,003411	0,571429	0,30132
12	JUV	0,254722	0,539915	0,004748	0,666667	0,463398
13	TRA	0,224383	0,068425	0,004751	0,190476	0,145948
14	FB	0,211854	0,682945	0,005125	0,047619	0,118488
15	VCF	0,164141	0,511201	0,003402	0,095238	0,051779
16	AFC	0,150596	0,419292	0,00399	0,190476	0,108817
17	GOZ	0,086024	0,183949	0,00357	0,095238	0,062403
18	LUFC	0,044589	0,230508	0,067752	0,047619	0,01673
19	IBFK	0,040493	1	0,001857	0,047619	0,04112
20	MENGO	0,040031	0,00174	0,015308	0,095238	0,080086
21	SCCP	0,039386	0,502748	1	0,047619	0,055591
22	EFC	0,031263	0,312355	0,003859	0,047619	0,021283
23	AVL	0,027582	0,291826	0,006049	0,047619	0,026401
24	YBO	0,025982	0,384675	0,014714	0,047619	0,046837
25	GALO	0,025268	0,299205	0,010336	0,047619	0,02446
26	SPFC	0,022159	0,332347	0,006885	0,047619	0,022342
27	SAM	0,018529	0,294778	0,027535	0,047619	0,014401
28	STV	0,017315	0,293704	0,01421	0,047619	0,028625
29	APL	0,015728	0,248219	0,012964	0,047619	0,032296
30	CAI	0,011075	0,474303	0,326374	0,047619	0,039425
31	UCH	0,009249	0,261771	0,465842	0,047619	0,048073
32	LEG	0,009006	0,286056	0,010039	0,047619	0,022836
33	DZG	0,007317	0,538841	0,004224	0,047619	0,015177
34	NOV	0,003623	0,227422	0,010892	0,047619	0,030213
35	FOR	0,002852	0,481549	0,013022	0,047619	0,019236
36	LEV	0,002682	0,236546	0,018294	0,047619	0,012389

The third step of the WASPAS method is to determine the total relative importance of the i alternatives based on the weighted sum method (WSM). Equation (11) is used in the

realization of the relevant application. The significance ranks of fan tokens based on the weighted sum model are shown in Table 8.

Table 8. *Significance Ratings Based on Weighted Sum Model*

Number	Fan Token	K_1	K_2	K_3	K_4	K_5	$\Theta i(1)$
1	PSG	0,311144	0,018619	0,000937	0,217147	0,271436	0,819282
2	LAZIO	0,298234	0,02234	0,001589	0,253338	0,119776	0,695277
3	SANTOS	0,272385	0,03477	0,00073	0,22921	0,080783	0,617879
4	CITY	0,254726	0,008423	0,000775	0,156828	0,131809	0,552561
5	BAR	0,253313	0,018725	0,000695	0,108573	0,198125	0,579432
6	PORTO	0,22603	0,0116	0,000773	0,241274	0,081741	0,561418
7	MILAN	0,145411	0,016996	0,000539	0,108573	0,116059	0,387579
8	INTER	0,129273	0,015562	0,000503	0,036191	0,034164	0,215694
9	GAL	0,126701	0,036159	0,00064	0,084446	0,102492	0,350439
10	ATM	0,107614	0,022747	0,000733	0,120637	0,116997	0,368729
11	ASR	0,104263	0,042008	0,000368	0,144764	0,081789	0,373193
12	JUV	0,079255	0,03037	0,000512	0,168892	0,125783	0,404812
13	TRA	0,069815	0,003849	0,000512	0,048255	0,039615	0,162047
14	FB	0,065917	0,038416	0,000553	0,012064	0,032162	0,149111
15	VCF	0,051072	0,028755	0,000367	0,024127	0,014055	0,118376
16	AFC	0,046857	0,023585	0,00043	0,048255	0,029537	0,148664
17	GOZ	0,026766	0,010347	0,000385	0,024127	0,016938	0,078564
18	LUFC	0,013874	0,012966	0,007306	0,012064	0,004541	0,050751
19	IBFK	0,012599	0,05625	0,0002	0,012064	0,011161	0,092275
20	MENGO	0,012455	9,79E-05	0,001651	0,024127	0,021738	0,06007
21	SCCP	0,012255	0,02828	0,107833	0,012064	0,015089	0,17552
22	EFC	0,009727	0,01757	0,000416	0,012064	0,005777	0,045554
23	AVL	0,008582	0,016415	0,000652	0,012064	0,007166	0,04488
24	YBO	0,008084	0,021638	0,001587	0,012064	0,012713	0,056086
25	GALO	0,007862	0,01683	0,001115	0,012064	0,006639	0,04451
26	SPFC	0,006895	0,018695	0,000742	0,012064	0,006064	0,04446
27	SAM	0,005765	0,016581	0,002969	0,012064	0,003909	0,041288
28	STV	0,005388	0,016521	0,001532	0,012064	0,00777	0,043274
29	APL	0,004894	0,013962	0,001398	0,012064	0,008766	0,041084
30	CAI	0,003446	0,02668	0,035194	0,012064	0,010701	0,088084
31	UCH	0,002878	0,014725	0,050233	0,012064	0,013049	0,092948
32	LEG	0,002802	0,016091	0,001083	0,012064	0,006199	0,038238
33	DZG	0,002277	0,03031	0,000455	0,012064	0,00412	0,049225
34	NOV	0,001127	0,012793	0,001174	0,012064	0,008201	0,035359
35	FOR	0,000887	0,027087	0,001404	0,012064	0,005221	0,046664
36	LEV	0,000835	0,013306	0,001973	0,012064	0,003363	0,031539

In the next step of the method, the total relative importance of the i alternatives based on the weighted product method (WPM) is calculated with the help of equation (12). The result of the analysis carried out within the scope of the related equation is shown in Table 9.

Table 9. *Significance Ratings Based on Weighted Sum Model*

Number	Fan Token	K₁	K₂	K₃	K₄	K₅	Θi(2)
1	PSG	1	0,939703	0,599449	0,961701	1	4,500853
2	LAZIO	0,986901	0,949383	0,634599	1	0,800865	4,371749
3	SANTOS	0,959451	0,973304	0,583509	0,974964	0,719666	4,210894
4	CITY	0,939648	0,898694	0,587346	0,885596	0,821949	4,133234
5	BAR	0,938024	0,940002	0,580467	0,806822	0,918095	4,18341
6	PORTO	0,905346	0,915021	0,587138	0,987716	0,721972	4,117193
7	MILAN	0,789241	0,934895	0,564755	0,806822	0,794041	3,889755
8	INTER	0,760874	0,930272	0,560589	0,610808	0,569747	3,43229
9	GAL	0,756132	0,975451	0,575298	0,757055	0,767697	3,831632
10	ATM	0,718678	0,950349	0,583803	0,828647	0,79578	3,877256
11	ASR	0,711638	0,983712	0,541957	0,867819	0,722087	3,827214
12	JUV	0,653433	0,965925	0,561635	0,90238	0,811574	3,894946
13	TRA	0,628151	0,859965	0,561667	0,656987	0,593108	3,299878
14	FB	0,617022	0,978778	0,566277	0,462415	0,560483	3,184974
15	VCF	0,569928	0,96296	0,541797	0,551181	0,447688	3,073554
16	AFC	0,554858	0,952284	0,551197	0,656987	0,547678	3,263003
17	GOZ	0,466136	0,909158	0,544629	0,551181	0,470951	2,942055
18	LUFC	0,379941	0,92077	0,748058	0,462415	0,329454	2,840638
19	IBFK	0,368718	1	0,507569	0,462415	0,420536	2,759238
20	MENGO	0,367404	0,69949	0,637197	0,551181	0,503949	2,759222
21	SCCP	0,365551	0,962057	1	0,462415	0,456404	3,246427
22	EFC	0,340202	0,936643	0,549222	0,462415	0,351699	2,64018
23	AVL	0,327199	0,933068	0,576493	0,462415	0,372883	2,672057
24	YBO	0,32117	0,947679	0,634484	0,462415	0,435664	2,801412
25	GALO	0,318399	0,934379	0,610779	0,462415	0,365233	2,691205
26	SPFC	0,305652	0,939917	0,584593	0,462415	0,356364	2,648942
27	SAM	0,289103	0,933596	0,678843	0,462415	0,316315	2,680273
28	STV	0,283072	0,933404	0,632106	0,462415	0,381158	2,692156
29	APL	0,274732	0,924612	0,62588	0,462415	0,393848	2,681487
30	CAI	0,246326	0,958911	0,886263	0,462415	0,415761	2,969676
31	UCH	0,2329	0,927381	0,920927	0,462415	0,438754	2,982377
32	LEG	0,230973	0,93202	0,608859	0,462415	0,358487	2,592754
33	DZG	0,216523	0,965817	0,554592	0,462415	0,320856	2,520204
34	NOV	0,173986	0,920072	0,614234	0,462415	0,386787	2,557493
35	FOR	0,161499	0,959729	0,626182	0,462415	0,342176	2,552
36	LEV	0,158451	0,92211	0,649561	0,462415	0,303655	2,496192

As the last step of the WASPAS method, the weights of the θi(1) and θi(2) values determined from the values in Table 7 and Table 8 and calculated according to WSM and WPM were taken using equation (13) (λ=0.5) and performance rankings for fan tokens are shown in Table 10.

Table 10. *WASPAS Method Results and Rankings Performed within the Scope of Fan Tokens*

Number	Fan Token	Score	Ranking
1	PSG	2,660067	1
2	LAZIO	2,533513	2
3	SANTOS	2,414386	3
4	CITY	2,342897	5
5	BAR	2,381421	4
6	PORTO	2,339306	6
7	MILAN	2,138667	8
8	INTER	1,823992	12
9	GAL	2,091036	11
10	ATM	2,122993	9
11	ASR	2,100204	10
12	JUV	2,149879	7
13	TRA	1,730962	13
14	FB	1,667043	16
15	VCF	1,595965	17
16	AFC	1,705834	15
17	GOZ	1,510309	20
18	LUFC	1,445694	21
19	IBFK	1,425756	23
20	MENGO	1,409646	24
21	SCCP	1,710974	14
22	EFC	1,342867	31
23	AVL	1,358468	29
24	YBO	1,428749	22
25	GALO	1,367858	25
26	SPFC	1,346701	30
27	SAM	1,36078	28
28	STV	1,367715	26
29	APL	1,361286	27
30	CAI	1,52888	19
31	UCH	1,537662	18
32	LEG	1,315496	32
33	DZG	1,284715	35
34	NOV	1,296426	34
35	FOR	1,299332	33
36	LEV	1,263866	36

When Table 10 is examined; in the light of the financial data that emerged during the period in which the analysis was carried out, the fan token with the highest value belongs to the Paris Saint-Germain football club; it is seen that the related club is followed by Lazio and Santos clubs, respectively. The team with the lowest level of efficiency in terms of financial performance is identified as Bayern Leverkusen.

Results and Discussion

The transformation in computer and communication technologies has led to significant changes in the competition targets of businesses as well as in social life in the last 20 years. While the digitalization process is ending the life cycles of many products and services very quickly, new and digitally developing products and services very quickly reach a marketable position on a global scale. Therefore, the digital world, as an area where competition between businesses is intensified, is seen as a target for all businesses to generate income. It can be said that the football economy, which traditionally generates income by marketing physical facilities, is taking very important steps in the digital transformation process. Especially in the post-Covid-19 period, the fact that physical (social) distances are tied to the rules, the decisions taken by the central administrations, and the football clubs, which are deprived of their main income sources (match day activities, ticket/combination sales, etc.), digital resources are at the forefront of the fields they apply for alternative income sources. In this regard, it should be noted that football clubs have a very important advantage compared to traditional businesses. As businesses in the sports industry, it can be said that football clubs have customer loyalty that is very difficult for businesses in many different industries such as retail, health, tourism and technology. Because the concept of the customer for traditional industries leaves its place in the football industry to the concept of fans, who have a very deep connection with clubs in experiential dimensions. Therefore, it is said that football clubs have several distinctive and perhaps impossible-to-imitate abilities in marketing processes with the help of the fandom phenomenon. Football clubs that want to direct this kind of loyalty to digital resources other than the purpose of generating income on a physical basis, take advantage of "blockchain" technologies, where transactions have increased in global financial markets in recent years, and take part in the realization of cryptocurrency transactions called "fan tokens" in the process of transforming fan loyalty into a digital income source. Football clubs traded in crypto markets with the fan token offer products and services for the purchase of both their fans and investors who want to carry out financial transactions on the relevant blockchain. Among the related services, it is possible to offer experiences such as the type of jersey, the design of the team bus, and the decision of the squad on the match day, which will allow the fans to establish a deeper bond with the football club and create a value-oriented change in terms of marketing. With fan tokens, both experiential value presentation is provided and the club and investor have the opportunity to earn income in the financial markets. Therefore, it is considered that the marketing efforts of football clubs that offer fan tokens for related crypto assets are very important.

This study analyzes fan tokens listed on 'coinmarketcap.com' with the WASPAS method within the scope of the criteria "market value, 90-day return, change from the highest value, number of exchanges traded and watchlist", which are used to evaluate the financial performance of crypto assets in the literature. Within the scope of the study, the criterion weights were determined by the Entropy Method to determine the effectiveness of the fan tokens, and the related analyzes were carried out considering the data of 36 different football clubs on the aforementioned crypto platform on 05/07/2022. As a result of the analysis, it was determined that the fan token with the highest activity belongs to the 'Paris Saint-Germain' club; It has been determined that this club is followed by 'Lazio' and 'Santos' clubs. It has been found that the football club with the lowest efficiency is 'Bayer 04 Leverkusen'. The fact that the total weight of the market value, the number of exchanges traded, and the watchlist criteria were 83.5% and the high values of the top tokens in these criteria were effective in obtaining these results.

The study carried out covers the results of the data obtained on a certain date. Therefore, it is considered that the results of the study only provide a cross-section for the

relevant date and cannot be generalized. In addition, the criteria that are frequently used in the evaluation of the effectiveness of cryptocurrencies were taken into account in the study, and it seems possible that the efficiency rankings may change with the use of different criteria. Finally, the criteria determined in the analysis process were weighted using the 'Entropy method' and ranked with the 'WASPAS' method. Therefore, it is possible to obtain different results with the use of different multi-criteria decision making techniques. In future studies, the title of "fan token" can be reconsidered using different constraints. As an issue that should be emphasized, it is thought that the studies carried out on the financial basis of 'fan tokens' are quite lacking in the literature, so it is very valuable to contribute through different methods and applications related to the field.

As a result, football clubs aim to increase their level of competition by implementing fan token applications and offering different product mixes to the digital market in the process of adapting to changing market conditions with digitalization. Reaching higher levels of financial performance will only be possible if football clubs channel their supporter potential to areas that will generate income, as well as their sportive success. In this context, it is considered that financial performance in football is directly and highly related to fan-oriented marketing efforts.

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