NOVA IMS Information Management School

MDDM

Master's Degree Program in

Data-Driven Marketing

Blockchain technology in football:

A new way to keep fans engaged?

Tomás Horta Correia Silva Carvalho

Dissertation

presented as partial requirement for obtaining the Master Degree Program in Data-Driven Marketing

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação
Universidade Nova de Lisboa

NOVA Information Management School

Instituto Superior de Estatística e Gestão de Informação

Universidade Nova de Lisboa

BLOCKCHAIN TECHNOLOGY IN FOOTBALL: A NEW WAY TO KEEP FANS ENGAGED?

By

Tomás Horta Correia Silva Carvalho

Master Thesis presented as partial requirement for obtaining the master's degree in data-Driven Marketing, with a specialization in Digital Marketing & Analytics

Supervisor: Paulo Rita

Co-Supervisor*:* Maria Teresa Borges Tiago

February 2024

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading
to its elaboration. I further declare that I have fully acknowledge the Rules of Conduct and Code of Honor from the NOVA Information Management School.

[Tomás Horta Correia Silva Carvalho]

[Lisbon, 11th March 2024]

ABSTRACT

This thesis explores the transformative potential of blockchain technology in enhancing fan engagement within the football industry, focusing on the determinants influencing its adoption among fans. Through a comprehensive literature review and empirical analysis using Structural Equation Modeling (SEM), this study investigates the roles of perceived ease of use, perceived usefulness, task characteristics, technology characteristics, task-technology fit, familiarity, and trust in the adoption of blockchain technology for fan engagement purposes.

For football enthusiasts like me, this work has a special significance, as it unlocks the future possibilities of football experiences. Beyond theoretical advancements, the study offers practical insights into the potential transformation of the fan experience. By scrutinizing how blockchain technology can reshape fan engagement, this research not only contributes to academic understanding but also speaks directly to the interests of football fans. The findings suggest that perceived ease of use and task-technology fit significantly influence adoption intentions, presenting the prospect of a more immersive and tailored football experience for fans. In contrast, perceived usefulness shows a nuanced impact, suggesting a need for theoretical model refinement to better capture the dynamics of emerging technology adoption in football. Trust emerges as a critical factor, emphasizing the importance of security and transparency in fostering blockchain acceptance.

This thesis contributes to both theoretical understanding and practical applications of blockchain in football management, highlighting the necessity of user-friendly, relevant, and trusted blockchain applications to enhance fan experiences. It also identifies barriers to blockchain adoption, including technological complexity and regulatory uncertainty, and suggests future research directions to further explore this promising intersection of technology and football. Through its findings, this study provides valuable insights for football organizations looking to leverage blockchain technology, offering a new paradigm for fan engagement and interaction in the football industry.

Keywords: Blockchain technology; Fan engagement; Adoption intention; Trust; Football

INDEX

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

AVE	Average Variance Extracted
CR	Composite Reliability
CB-SEM	Covariance-based techniques
CA	Cronbach's Alpha
HTMT	Heterotrait-monotrait ratio
NFT	Non-Fungible Tokens
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
PoS	Proof of Stake
PoW	Proof of Work
SEM	Structural Equation Modeling
TTF	Task Technology Fit
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
PLS-SEM	Variance-based partial least squares

1. INTRODUCTION

Football, with its global appeal and deeply rooted traditions, has always been more than just a game. It is a phenomenon that brings together diverse cultures and communities, united by a shared passion for their teams and the sport itself. The unique bond between football clubs and their fans is central to the sport's identity, creating an atmosphere that is unparalleled in the world of sports. This connection, fostered over generations, has continually evolved, adapting to changes in society, technology, and fan expectations.

In this landscape of enduring passion and evolving engagement, this thesis investigates a groundbreaking intersection. Blockchain technology, initially the bedrock of cryptocurrencies (Nakamoto, 2008), emerges as a transformative tool with the potential to reshape fan engagement in football. This exploration is set against the backdrop of a rapidly digitalizing world, where integrating innovative technologies like blockchain could be instrumental in redefining the fan experience. The digital era has ushered in new modes of interaction between fans and their beloved sports, transcending traditional forms of engagement. Blockchain stands out in this technological revolution, offering unique attributes such as decentralization, enhanced security, and unparalleled transparency (Swan, 2015). These features present new opportunities for engaging football fans, from providing authenticated digital collectibles to enabling secure and transparent fan interactions. This thesis aims to explore the multifaceted dynamics of blockchain technology in the sports domain, particularly in football, and how it can not only align with but also enhance the passionate engagement that fans have with the sport.

As we delve into this new era, several pertinent research questions arise:

• What are the potential applications of blockchain technology that could redefine fan engagement in football?

• What challenges could impede the integration of blockchain in football?

These questions seek to dissect the capacity of blockchain technology to not only align with but also enhance the passionate engagement that fans have with the sport.

The crux of this research lies in understanding how blockchain technology can offer novel approaches to fan engagement in football. In an era marked by digital transformation, this study examines the potential of blockchain to contribute strategically to the development of football clubs, fostering deeper connections with fans while opening new avenues for revenue generation (Tapscott & Tapscott, 2016). The integration of blockchain into football goes beyond mere technological innovation; it offers a fundamental shift in how clubs can interact with their fans, creating more personalized and engaging experiences. This includes the potential for clubs to leverage blockchain for more transparent fan loyalty programs, innovative ticketing solutions, and enhanced fan merchandise systems. By delving into these areas, the thesis seeks to uncover how blockchain technology can not only keep fans engaged but also redefine the traditional paradigms of fan-club interactions in the football industry (Buterin, 2014).

A preliminary survey of existing literature reveals a significant gap in studies focusing on the application of blockchain technology within the sports sector, particularly in relation to football.

While there is extensive research on blockchain's applications in various sectors, including finance, healthcare, and supply chain management (Swan, 2015), its role in enhancing sports fan engagement, especially in football, remains underexplored. Notably, studies in the domain of sports management have primarily concentrated on traditional models of fan engagement and have yet to fully integrate the potential impact of emerging technologies like blockchain (Buterin, 2014). This thesis seeks to bridge this gap by drawing from interdisciplinary research spanning technology, sports management, and fan engagement.

The importance of this research lies in its aim to unravel whether the implementation of blockchain technology is the future of fan engagement in football. While existing research provides a robust exploration of blockchain's technical and business applications, it often overlooks the sports industry as a fertile ground for technological innovation, particularly in the context of fan engagement (Tapscott & Tapscott, 2016). This thesis, therefore, places blockchain technology within football-specific environment, aiming to discern if and how it can revolutionize the way fans interact and connect with the sport. The focus is not only on how blockchain can enhance current fan engagement practices but also on investigating its potential to usher in new paradigms of interaction and loyalty in the sports industry. By synthesizing insights from technology and sports management literature, this study endeavors to provide a unique perspective on the potential future of blockchain technology in fostering fan engagement in football, addressing a significant gap in current academic research.

Structured to facilitate a thorough exploration, the thesis comprises an in-depth literature review and methodology chapter. It culminates with a discussion of these findings, exploring their implications and potential future directions for blockchain technology in football.

In summary, this thesis aims to deliver an insightful examination of how blockchain technology could transform fan engagement in football. It seeks to provide valuable insights for football clubs, fans, and the broader sports industry, envisioning a future where technology integration not only enhances fan experiences but also pioneers new forms of interaction and engagement within the football community.

2. LITERATURE REVIEW

Blockchain technology's potential to disrupt and innovate extends to the sports industry, whose implications for fan engagement are particularly compelling. Football fan engagement and blockchain technology combine to create new opportunities for communication, loyalty schemes, and revenue creation for both teams and supporters (Pilkington, 2016). This literature critically investigates the corpus of research on blockchain technology's application in sports, focusing on fan engagement within football.

The potential of blockchain technology to enable safe, open, and decentralized transactions is what makes it so revolutionary. In the sports sector, this capability has the potential to completely change the way fans communicate with their favorite teams (Nakamoto, 2008). In football, where fan loyalty and engagement are crucial to club success, blockchain applications promise to enhance these relationships through innovative solutions such as tokenization, smart contracts, and direct voting mechanisms (Chapman et al., 2020).

The research proceeds by first examining the fundamentals of blockchain technology and then analyzing how it is beginning to be used in fan engagement methods within the sports business. The discussion then focuses on football, where the decentralization of fan engagement via blockchain technologies is juxtaposed against traditional centralized engagement methods. This examination, considering the potential and problems it brings, highlights the theoretical and practical consequences of blockchain in football.

Theoretical frameworks for technology adoption are also covered in this analysis since they provide an important context for understanding how blockchain might be used to enhance sports fan interaction. This section attempts to contextualize the adoption of blockchain within the sports business and forecast its future trajectories by examining concepts such as the Diffusion of Innovations theory and the Technology Acceptance Model (TAM) (Davis, 1989; Rogers, 2003).

Since there is still a lot to learn about blockchain in sports, this review seeks to summarize what is known, point out any gaps, and lay the groundwork for future research. The final objective is to present a comprehensive understanding of how blockchain may interact with football fans and how it can revolutionize the sports sector.

2.1. BLOCKCHAIN: AN EMERGING TECHNOLOGY

Blockchain technology, initially conceptualized as the backbone for Bitcoin, has swiftly risen as a vanguard in technological innovation with implications far beyond its original domain (Nakamoto, 2008). It stands as a distributed ledger technology, a paradigm shift from traditional centralized databases, where data is stored across a widespread network of servers. This enables multiple parties to access and verify the data concurrently, ensuring high levels of accuracy and trust. Its decentralized architecture markedly enhances security and resilience against fraudulent transactions, making each entry transparent and permanent upon verification and recording (Tapscott & Tapscott, 2016).

The unique structure of blockchain is characterized by a chronological chain of blocks, each containing a bundle of transactions. The addition of a new block to this chain necessitates the

consensus of the network's nodes, a collective agreement that validates the block through computational algorithms. This process of consensus is critical in upholding the integrity and sequential logic of the ledger, preventing tampering and ensuring the fidelity of the recorded data (Crosby et al., 2016). Among the various mechanisms for achieving consensus, Proof of Work (PoW) and Proof of Stake (PoS) are the most prevalent, each playing a significant role in maintaining the security and reliability of blockchain networks (Zheng et al., 2017).

Beyond the realm of digital currencies, the functionality of blockchain to execute smart contracts—contracts that are programmed to automatically enforce the terms encoded within them—promises to streamline operations and reduce the need for intermediaries across various sectors, including sports (Buterin, 2014). These smart contracts, once conditions are met, autonomously perform actions that would otherwise require manual execution, thereby offering potential efficiency gains and operational cost reductions.

Furthermore, blockchain's capability for tokenization, converting tangible or intangible assets into digital tokens, opens new avenues for fan engagement. This is particularly pertinent in the sports industry where tokenization can be leveraged to create digital collectibles, offer unique fan rewards, and foster a new dimension of interaction between sports entities and their supporters (Champion et al., 2020). In football, this has taken shape through the launch of fan tokens and digital collectibles that enhance the fan experience by offering a stake in the club's legacy and future.

The transparency and immutability of blockchain also hold potential benefits for the integrity of sports competitions. It can be employed as a tool to combat corruption, authenticating the legitimacy of sports merchandise, ensuring the validity of tickets, and securing the transfer processes of players (Pamplin, 2018). These characteristics of blockchain resonate with the core values of trust and transparency that are crucial in sports, indicating its potential to serve as a foundational element for innovation, particularly in enhancing football fan engagement (Mitteldorf & Matsumoto, 2019).

As technology continues to mature, its applications within the sports industry, notably in football, are anticipated to grow. The ability of blockchain to provide a secure, transparent, and engaging environment for fans is just beginning to be tapped. This thesis aims to thoroughly investigate the potential of blockchain within the sports industry, envisioning its role as a transformative element that can redefine fan engagement and operational efficiencies.

In sum, blockchain technology presents a robust, innovative framework ripe for application in the sports domain. Its continued evolution is expected to bring about significant advancements, making a comprehensive exploration and analysis of its potential within the sports industry, especially football, both timely and necessary.

2.2. THE SPORTS INDUSTRY AND FAN ENGAGEMENT

Fan engagement in the sports industry, particularly within the realm of football, has become a linchpin in the relationship between clubs and their supporters. It represents not just the physical presence at matches or viewership ratings, but an emotional and psychological commitment that spans purchasing merchandise to active participation in fan communities (Woratschek et al., 2016). This dedication by fans is critical for driving the economic engines of clubs through various consumption behaviors, which are integral to their financial health and the nurturing of a loyal fan base (Bauer et al., 2008).

The significance of fan engagement to football clubs transcends the game itself, as engaged fans contribute to creating a vibrant community atmosphere. They are central to establishing a club's brand identity and an invaluable asset in leveraging marketing and commercial strategies (Gladden & Funk, 2002). The dynamic of fan engagement has been revolutionized by the advent of digital media, presenting both challenges and a wealth of opportunities for clubs to enhance their interaction with fans (Hambrick et al., 2010).

Traditionally, fan engagement was largely limited to the live experience of attending matches and television viewership. However, the digital revolution has transformed fan engagement strategies, with football clubs adopting an array of online platforms to offer more interactive and personalized experiences. These platforms have allowed fans greater access to content, fostering a deeper sense of connection, and enriching their experience beyond the confines of the stadium (Pritchard & Stinson, 2016).

The shift towards digital media has enabled clubs to transcend physical and geographical barriers, creating global fan communities. By utilizing official club websites, mobile apps, and virtual and augmented reality technologies, clubs can now engage with fans from all corners of the world, allowing them to partake in the communal spirit of supporting their team (Gerrard, 2019)

Despite the opportunities for personalization and direct communication that digital transformation offers, football clubs face the challenge of continuously engaging with fans in an increasingly crowded digital space. This requires a strategic and resource-intensive approach to content creation to maintain a consistent and authentic online presence (Gerrard, 2019).

Furthermore, digital mediums provide clubs with a wealth of data on fan preferences, enabling them to craft engagement strategies that resonate deeply with fans and foster a more personalized experience. The insights gained from fan interactions on digital platforms are invaluable for clubs in tailoring their marketing and engagement initiatives to enhance the fan experience (Woratschek et al., 2016).

The economic implications of fan engagement are significant, with a direct correlation between engaged fan bases and the financial performance of clubs. Engaged fans drive revenue streams such as merchandise sales, media rights, and sponsorship deals, which are critical for the financial stability and growth of football clubs (Biscaia et al., 2013).

Moreover, engaged fans contribute to the generation of valuable intellectual property in the form of trademarks and branding, amplifying a club's market value and attractiveness to investors (Rein et

al., 2006). The evolving dynamic of fan engagement, bolstered by digital advancements, continues to be a critical factor in the commercial success and vibrancy of football clubs worldwide.

In summary, as the sports industry continues to embrace digital innovation, the importance of balancing traditional fan engagement methods with new media strategies becomes increasingly apparent. Football clubs must navigate this landscape with careful consideration of the preferences and behaviors of their fan base to ensure the sustained growth and vibrancy of their brands.

2.3. BLOCKCHAIN IN THE SPORTS INDUSTRY

The integration of blockchain technology into the sports industry heralds a significant shift in the paradigm of how sports organizations conduct their operations and engage with their fan base. This technology, with its decentralized ledger capable of securely processing and storing diverse data types, is proving to be a valuable asset in enhancing the transparency and trustworthiness of sports transactions (Pine & Gilmore, 2017). Blockchain's introduction into sports management is poised to reshape traditional models, offering a more secure and efficient framework for handling a multitude of interactions.

In the realm of ticketing, blockchain technology is being leveraged to combat fraud and ensure the secure transfer and verification of ticket ownership. Blockchain-based ticketing systems enable the creation of a tamper-proof record of each transaction, providing a secure method for ticket sales and exchanges that significantly reduces the possibility of counterfeiting and unauthorized reselling, thereby protecting both the interests of fans and organizations (Mittag, 2019).

H1 - Trust in Blockchain technology will positively affect PU.

H2 - Trust in Blockchain technology will positively affect PEOU.

The potential of blockchain extends to the development of fan loyalty programs, with clubs issuing digital tokens that serve as a currency within the club's ecosystem. These tokens offer fans innovative ways to engage with their teams, such as participating in decision-making processes, purchasing merchandise, or accessing exclusive content. This incentivizes fan engagement and loyalty by offering a tangible value in exchange for their support (Schmidt, 2018).

In addition to the transformative applications of blockchain in ticketing and fan engagement, the sports industry is witnessing the rise of Non-Fungible Tokens (NFTs) as a novel avenue for creating and trading digital collectibles. NFTs are unique digital assets, often associated with a digital or physical item, and their uniqueness is verified and secured on the blockchain, providing proof of ownership that is transparent and immutable. In sports, NFTs have begun to change the landscape of memorabilia, allowing fans to own, trade, and collect digital items such as exclusive video clips, images of iconic moments, or digital signatures of athletes (Marr, 2021).

The allure of NFTs in the sports industry stems from their ability to provide fans with an unforgeable certificate of ownership for a piece of sports history, which could potentially be appreciated in value. This not only incentivizes the collection from an investment perspective but also enriches the emotional value of fandom. Major sports leagues and clubs have started to explore NFTs as a means

to further engage their fan base, with NBA Top Shot being a prominent example where fans can collect and trade officially licensed NBA collectible highlights (Kastrenakes, 2021). As the market for sports NFTs continues to grow, it presents an innovative revenue stream for sports organizations and a new frontier in the fan experience.

Also, the management of athletes is being transformed through the use of smart contracts, which are self-executing contracts with the terms of the agreement directly written into code. Smart contracts facilitate the automation of payments and the execution of agreements upon the fulfillment of specified conditions, potentially eliminating the need for intermediaries and thereby increasing efficiency (Wang et al., 2019).

The use of blockchain in the sports industry also extends to the authentication and verification of merchandise, combating the proliferation of counterfeit goods. By ensuring the traceability and authenticity of sports memorabilia, blockchain helps maintain the integrity of club brands and provides fans with the assurance of purchasing genuine products.

Moreover, blockchain is being utilized to enhance the integrity of sports competitions. By providing an immutable ledger for recording results and statistics, blockchain technology can act as a deterrent against match-fixing and other forms of corruption, thereby safeguarding the sanctity of sports (Pamplin, 2018).

As the sports industry continues to explore the breadth of blockchain's applications, it is becoming increasingly clear that this technology holds the promise to revolutionize not just fan engagement and ticketing, but also athlete management, merchandise authentication, and the overall integrity of sports competitions.

In summary, blockchain technology presents a multifaceted opportunity for innovation in the sports industry. Its ability to enhance security, efficiency, and transparency offers sports organizations a powerful tool to reimagine their operations and fan interactions. As this technology continues to evolve, its applications within the sports industry are likely to become more widespread and integral to sports management and fan engagement strategies.

2.4. BLOCKCHAIN FOR FAN ENGAGEMENT IN FOOTBALL

Blockchain technology is revolutionizing fan engagement in football, introducing a system that values transparency, participation, and tangible rewards, aligning with the digital era's push for deeper connections between fans and their teams. This technological advancement is ushering in a new era of interaction, allowing fans to feel more intertwined with the clubs they support.

The introduction of tokenization is one of the most significant impacts of blockchain on football. Clubs are creating their own cryptocurrencies, known as 'fan tokens,' which serve multiple functions. They act as fluctuating digital assets and tools that empower fans to influence club decisions, access exclusive merchandise, and unlock unique experiences. These tokens not only encourage active fan participation but also open new revenue streams for the clubs. Leading this innovation are clubs like Paris Saint-Germain and Juventus, whose fan tokens enhance engagement by offering voting rights and access to special experiences (Marciano, 2019).

Blockchain's integration into ticketing systems is also enhancing the matchday experience. It provides robust protection against ticket fraud and establishes a transparent secondary market for ticket sales, ensuring a secure and fan-friendly ticketing process (Mittag, 2019). The technology's application extends to merchandise authentication, tracking the provenance of collectible items like game-worn jerseys, which bolsters consumer trust and adds value to club memorabilia (Wang et al., 2019).

A notable advancement complementing these innovations is the emergence of Non-Fungible Tokens (NFTs) in football. NFTs offer fans unique digital ownership of items, from digital trading cards to exclusive content, enabling interactive opportunities and investment in the club's legacy. The immutable nature of blockchain ensures the authenticity and rarity of these digital collectibles, providing an experience that parallels the emotional value of physical memorabilia. Clubs such as Manchester City are exploring the NFT space, offering fans the chance to collect digital art and experiences that could serve as valuable assets (Katz, 2021). NFTs transcend traditional collectability, offering an engaging digital experience that echoes the sentimental value of tangible collectibles.

The potential of blockchain in football suggests a future where the traditional barriers between clubs and fans are diminished, creating a more immersive and interactive fan experience. As this technology evolves, its applications within the sports industry are likely to become more sophisticated, further enhancing how fans interact with the game.

In summary, blockchain technology offers a compelling framework for fan engagement in football, promising a future of increased transparency, security, and fan participation. As this technology continues to develop, its potential to reshape the sports industry grows, demanding ongoing analysis and strategic implementation to maximize its benefits for fans and clubs alike.

2.5. CHALLENGES AND LIMITATIONS

While blockchain technology presents transformative potential for the sports industry, particularly in football, it is not without challenges and limitations. Blockchain integration into sports is still relatively nascent, and several hurdles must be overcome to realize its full potential.

One of the primary challenges is the technological complexity and the lack of understanding and trust among the general public. Blockchain, being a complex and sometimes abstract concept, faces adoption resistance. There is a pressing need for education and awareness campaigns to help fans and stakeholders understand the technology's benefits and operations (Tapscott & Tapscott, 2016).

H3 - Familiarity will negatively affect Perceived Easy of Use (PEOU).

Another significant challenge is the scalability of blockchain systems. The current infrastructure of many blockchain solutions is not yet ready to handle the high transaction volumes that major sports events can generate, potentially leading to bottlenecks and increased transaction costs (Catalini & Gans, 2016). This is particularly crucial in scenarios where blockchain is used for ticketing or live voting on match days.

Privacy and security concerns also pose substantial challenges. While blockchain is secure by design, the increasing frequency of sophisticated cyber-attacks raises concerns about the vulnerability of personal data, especially when considering the global and open nature of blockchain networks (Yli-Huumo et al., 2016).

Regulatory uncertainty is another limiting factor. The legal framework surrounding blockchain technology is still under development, with regulators and lawmakers worldwide trying to understand the technology and its implications fully. This uncertainty can hinder the investment and development of blockchain applications within the sports industry (Werbach, 2018).

Furthermore, the environmental impact of blockchain, particularly those utilizing proof-of-work protocols that require substantial computational power and energy consumption, has been a growing concern. This is particularly salient given the sports industry's increasing focus on sustainability and environmental responsibility (Mora et al., 2018).

In conclusion, while blockchain technology holds significant promise for revolutionizing fan engagement in football, these challenges and limitations must be addressed through continued innovation, education, collaborative regulation, and a commitment to sustainability.

2.6. THEORETICAL PERSPECTIVES ON TECHNOLOGY ADOPTION IN SPORTS

2.6.1. Technology Acceptance Model (TAM)

In the realm of sports, particularly in the context of integrating emerging technologies like blockchain for fan engagement, understanding the theoretical foundations that govern technology adoption is crucial. The Technology Acceptance Model (TAM), developed by Davis in 1989, stands out as a pivotal model in this regard and will be the primary theoretical framework guiding this thesis.

TAM posits that two principal factors determine an individual’s acceptance and use of technology: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived Usefulness is defined as the degree to which a person believes that using a particular system would enhance their consumer experience with the technology. In the sports context, this translates to the belief that blockchain technology can improve aspects such as fans engagement or club operations (Davis, 1989). Perceived Ease of Use, on the other hand, refers to the degree to which a person believes that using a particular system would be free of effort. This aspect is particularly crucial in the adoption of blockchain technology in sports, as the technology is often perceived as complex and challenging to understand.

Research in various fields has consistently validated TAM as an effective predictor of technology acceptance. For instance, studies have shown a significant correlation between these two factors and users' attitudes towards using new technologies, which subsequently predicts actual system use (Venkatesh & Davis, 2000). Applying TAM to blockchain in sports, one would hypothesize that the greater the perceived usefulness and ease of use of blockchain applications (such as digital tokens for fan engagement or NFT's collectibles), the higher the likelihood of their acceptance by fans and sports organizations.

Moreover, TAM serves as a practical framework for examining the specific attributes of blockchain technology that might influence its adoption in the sports industry. For instance, blockchain's ability to ensure secure and transparent transactions could be seen as a key component of its perceived usefulness. Likewise, the development of user-friendly interfaces for blockchain applications would directly relate to its perceived ease of use.

The decision to choose TAM as the model for this thesis is informed by its simplicity, empirical validation, and relevance to the current study. While other models, like the Diffusion of Innovations theory and the Unified Theory of Acceptance and Use of Technology (UTAUT), offer broader perspectives on technology adoption, TAM provides a more focused, concise framework that is particularly suited to examining the acceptance of a specific technology like blockchain in the sports industry. Its emphasis on perceived usefulness and ease of use as primary determinants of technology acceptance makes it an ideal model for exploring how blockchain can be integrated into sports settings to enhance fan engagement and operational efficiency.

In conclusion, the Technology Acceptance Model, with its clear, empirically supported determinants of technology acceptance, offers an ideal framework for analyzing the adoption of blockchain technology in football. It provides the necessary tools to assess both the potential benefits and challenges of implementing blockchain in football settings, making it an invaluable guide for this research.

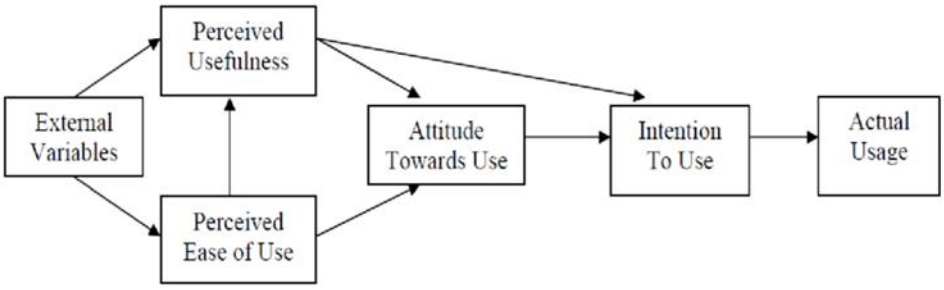

Figure 1 - Technology Acceptance Model (TAM)

H6 -The Perceived Usefulness will positively affect Adoption intention.

H7 - The Perceived Ease of Use will positively affect Adoption intention.

2.6.2. Task Technology Fit (TTF)

Continuing from the Technology Acceptance Model (TAM), another pivotal theoretical framework that complements TAM in understanding technology adoption in sports, particularly regarding blockchain technology for fan engagement, is the Task Technology Fit (TTF) model. This model provides an additional dimension to the analysis by focusing on the compatibility between the technology and the tasks it is intended to support.

The TTF model, proposed by Goodhue and Thompson in 1995, posits that technology is more likely to positively impact performance when there is a good fit between the technology's functionalities and the tasks it is used for. The model suggests that when technology is well-suited to the tasks at hand, it is more likely to be used and to enhance performance (Goodhue & Thompson, 1995).

Moreover, previous research by Zhou, Lu, and Wang (2010) in the field of mobile banking user adoption has demonstrated the efficacy of integrating Task Technology Fit (TTF) with the Unified Theory of Acceptance and Use of Technology (UTAUT). Their study elucidated how the alignment of technology with specific tasks (TTF) contributed significantly to understanding user adoption behaviors in mobile banking, providing valuable insights into the interplay between technology capabilities and task compatibility. In the context of blockchain technology in football, TTF can be used to assess how well blockchain aligns with specific fan engagement tasks, such as ticketing, merchandise sales, and interactive fan experiences.

For instance, the application of blockchain in ticketing systems can be examined through the lens of TTF by evaluating how well blockchain technology meets the requirements of efficient, secure, and transparent ticketing processes. Similarly, the use of blockchain for fan tokens and NFTs can be analyzed to see how well these technologies fit with the task of enhancing fan engagement and providing unique fan experiences.

The choice to integrate TTF alongside TAM in this thesis is based on the complementary nature of the two models. While TAM provides insight into the user's acceptance of technology based on perceived usefulness and ease of use, TTF offers an additional perspective by examining the alignment between the technology's capabilities and the specific tasks it aims to improve. This combination allows for a more comprehensive analysis of blockchain technology's adoption in the sports industry, considering both the users' acceptance and the practical applicability of the technology to specific tasks in sports management and fan engagement.

In conclusion, the integration of TTF with TAM in this thesis provides a robust framework for understanding the adoption and effectiveness of blockchain technology in sports. By examining both the acceptance of the technology (TAM) and its fit with specific tasks (TTF), this research can offer deeper insights into how blockchain can be optimally utilized to revolutionize fan engagement in football.

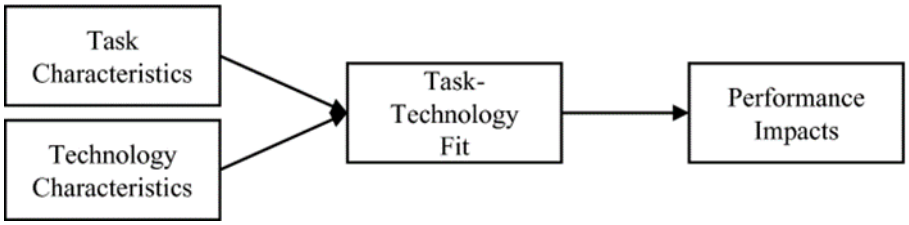

Figure 2 - Task Technology Fit (TTF)

H4 - The influence of Blockchain Task Characteristics will positively affect Task-Technology Fit.

H5 - The influence of Blockchain Technology Characteristics will positively affect Task-Technology Fit.

H8 - The influence of Task-Technology Fit on Adoption Intention of Blockchain technology will be positive.

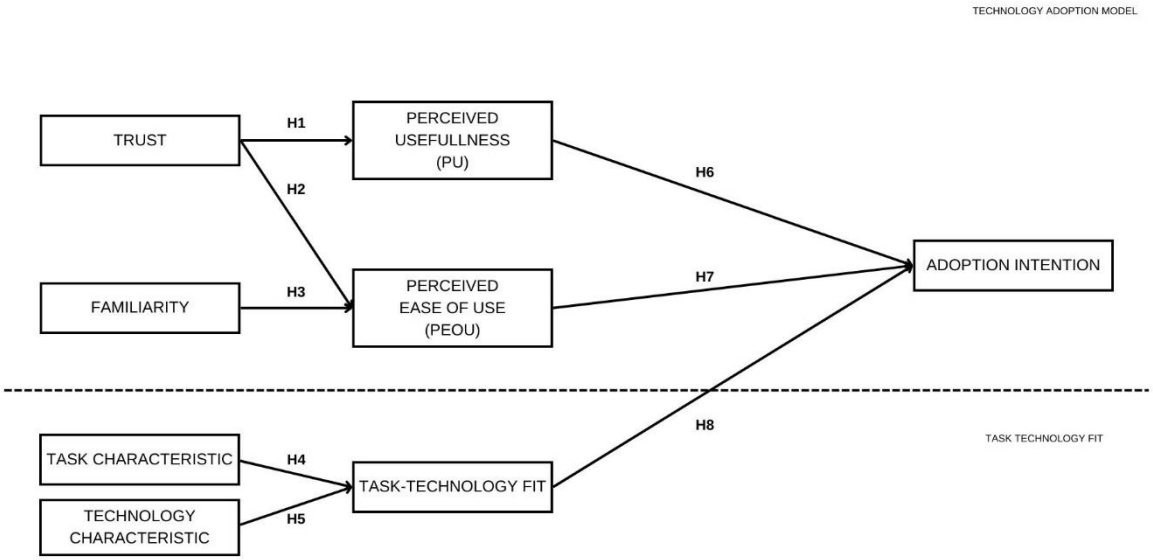

Figure 3 - Conceptual Model

3. METHODOLOGY

To amass quantitative data for subsequent analysis, the research model underwent scrutiny through Structural Equation Modeling (SEM). This robust statistical analysis technique allows researchers to test and validate theoretical frameworks rigorously. SEM, characterized as a causal-predictive approach, finds its niche in marketing and management, serving as the preferred methodology for studies involving prediction and theory development (Hair, 2011). Its application becomes particularly relevant in instances where the research model is built upon secondary data, as is the case in this study (Hair et al., 2014).

Within the realm of SEM, two prominent methodologies are often employed: covariance-based techniques (CB-SEM) and variance-based partial least squares (PLS-SEM). While both methodologies share common historical roots, PLS-SEM initially lagged in popularity among researchers. However, recent reviews and methodological enhancements have contributed to the resurgence of PLS-SEM, especially within the domain of marketing research (Hair, Sarstedt, Ringle, & Mena, 2012). Consequently, for this dissertation, PLS-SEM was judiciously selected due to its versatility in handling small sample sizes and allows to explore or support the development of the theory that is being studied (Poushneh & Vasquez-Parraga, 2017).

Executing the data analysis using PLS-SEM requires specialized software, and several user-friendly options cater to researchers with varying technical proficiencies. For this research endeavor, SmartPLS 4 4.1 emerged as the software of choice. This selection was made with the overarching objective of scrutinizing the established hypotheses, seeking to unravel the intricate relationships encapsulated within the theoretical model (Hair et al., 2012). The utilization of SmartPLS 4.4.1 aligns with the research's commitment to employing a methodologically sound and user-friendly platform for extracting meaningful insights from the collected data.

3.1. MEASUREMENT INSTRUMENTS

All of the constructs employed as measures were based on two theories, The Technology Adoption Model (TAM) and the Task-Technology Fit (TTF) and were thus modified from publications evaluated during the Secondary Research conducted in the initial part of this study. The constructs were submitted to modest alterations with the purpose of better reflecting the scenario that was presented to the sample, and all of them were measured in a 5 choices Likert scale (1 to 5) varying from “Strongly Disagree” to “Strongly Agree”.

Likert-scale was chosen, at first, to follow the original scales and due to the facility to administer it – it is easy to comprehend (for the respondent), can be applied online, doesn't require any specific equipment, and the results are easily quantified (Yusof et al., 2019).

Several scales were used along the survey, namely Perceived Ease of Use (four items) and Adoption Intension (two items) were adapted from Venkatesh & Davis (2000), and Task characteristics (three items) and Technology characteristics (three items) were adapted from Zhou et al.(2010). Task-Technology Fit (eight items) was measured using an adapted scale of T. C. Lin & Huang (2008), while Perceived Usefulness (four items) was adapted from Davis & Venkatesh (1996). Finally, Familiarity

was measured using four items from Kim et al. (2009) and Trust was adapted using four items from Deb & Lomo-David (2014). The items for all constructs are included in Appendix A.

3.2. PROCEDURE

A survey was produced utilizing the Qualtrics application to develop, publish, and store all participant responses. At the beginning of the survey, participants are informed about the purpose of the survey, along with information about their rights, anonymity and the data processing procedure. Any participant who refused to share their anonymous answers was automatically excluded from the database. No question in this survey was mandatory (either leave it blank or answer "Don't Know/Don't want to answer") to ensure that participants' wishes were respected.

In this study, only football fans who are actively involved with their club were considered. This survey was developed in English and later translated into Portuguese because it was easier to apply and obtain a larger sample, and it was distributed via e-mail and social media (Instagram, Linkedin, Facebook, and WhatsApp). To avoid potential bias or answer variations, this sharing was always accompanied by a brief sentence explaining the survey's theme but never providing any information about any hypothesis.

The initial questions establish the participants' eligibility based on age and active affiliation with a football club. Subsequently, socio-demographic information is collected, including gender, age, academic qualifications, and occupation. The survey then delves into the participants' online interactions with their football clubs and their annual expenditures related to club-related items. Following this, a section providing support for the theme introduces key concepts of Blockchain for those less familiar. The main block of questions explores participants' familiarity, trust, perceived usefulness, ease of use, task characteristics, technology characteristics, and their intention to adopt Blockchain applications for fan engagement. The survey concludes by capturing participants' intentions to adopt Blockchain applications if they have access to them. The questionnaire is designed to extract valuable insights into football fans' perspectives on emerging possibilities facilitated by Blockchain technology and their potential impact on fan-club interactions.

4. RESULTS

4.1. SAMPLE CHARACTERIZATION

As mentioned previously, the survey was administered via the Qualtrics platform, and went live between February 20 and 27. Of the 261 responses received, only 234 were considered valid. Firstly, 12 responses were not considered valid due to the survey not being completed by the end. Then, 15 responses were eliminated because they had a standard deviation of less than 0.25, which may indicate biased responses.

Regarding the demographic profile of the respondents, the vast majority of the sample is male (82%), with around 40% aged between 25 and 34. In addition, 85% have a university degree (master's or bachelor's) and 82% of the sample say they are employed.

Table 1 - Sample Characterization

Sample Characterization			
Gender	Female	42	18%
	Male	192	82%
	Non-binary / third gender	0	0%
	I prefer not to say	0	0%
Age	18-24 years old	39	17%
	25-34 years old	93	40%
	35-44 years old	39	17%
	45-54 years old	48	21%
	55-64 years old	12	5%
	>65 years old	3	1%
Academic Education	No schooling	0	0%
	Basic Education	6	3%
	High school	21	9%
	Bachelor's Degree	90	38%
	Master's Degree	111	47%
	PhD	6	3%
Occupation	Student	21	9%
	Working student	18	8%
	Employee	192	82%
	Unemployed	0	0%
	Retired	3	1%

4.2. MEASUREMENT MODEL

The evaluation of the measurement model aimed to establish its robustness by scrutinizing construct reliability, as well as convergent and discriminant validity.

To assess the reliability of constructs, the Composite Reliability (CR) coefficient was analyzed, where a value exceeding 0.7 indicates statistical significance (Henseler, Ringle, & Sinkovics, 2009). The examination of Table 2 reveals that all constructs exhibit CR values above 0.7, indicating strong internal consistency and the reliability of each construct.

Additionally, internal consistency was affirmed through the evaluation of Cronbach's Alpha (CA) coefficients, with all constructs surpassing a value of 0.6. Cronbach's Alpha, ranging from 0 to 1, reflects higher levels of reliability with greater values. Notably, Task Characteristics demonstrated a slightly lower but still satisfactory CA result of 0.701 (Nascimento, Oliveira, & Tam, 2018).

Furthermore, the assessment of the reliability of the indicators stipulates that all loadings must be higher than 0.7, and any loading lower than 0.4 implies exclusion from the model. As shown in Appendix C, there was no need to exclude any of them, as all loadings were above 0.7, which means that the reliability of the indicator was robust.

Subsequently, to confirm convergent validity, the Average Variance Extracted (AVE) criterion was examined, with a threshold above 0.5 indicating that latent variables explain more than half of the variance of their respective indicators (Hair et al., 2017). Inspection of Table 2 affirms that all constructs exhibit AVE values greater than 0.5, validating convergent validity across the measurement model.

Table 2 - Reliability and Convergent Validity

	Cronbach's alpha (CA)	**Composite reliability (rho_a)**	**Composite reliability (rho_c)**	**Average variance extracted (AVE)**
ADOPTION INTENTION	0.944	0.944	0.973	0.947
FAMILIARITY	0.917	0.933	0.942	0.802
PERCEIVED EASY OF USE	0.898	0.899	0.929	0.767
PERCEIVED USEFULNESS	0.945	0.955	0.960	0.859
TASK CHARACTERISTICS	0.701	0.720	0.831	0.622
TASK-TECHNOLOGY FIT	0.969	0.970	0.976	0.890
TECHNOLOGY CHARACATERISTICS	0.761	0.823	0.854	0.662
TRUST	0.904	0.906	0.933	0.777

The evaluation of discriminant validity encompassed the examination of three distinct measures: cross-loadings, the Fornell-Larcker criterion, and the Heterotrait-monotrait ratio (HTMT).

Cross-loadings necessitate that the external loading of an indicator on its designated construct exceeds all cross-loadings. The findings presented in Appendix B affirm that the outer loadings indeed surpass the cross-loadings.

The Fornell-Larcker criterion posits that the square root of the Average Variance Extracted (AVE) should exceed the correlation coefficients with other constructs (Fornell & Larcker, 1981). Examination of Table 3 reveals that the diagonal values, representing the square roots of the AVE, consistently exceed the correlation coefficients with other constructs (off-diagonal values), meeting the criterion.

Table 3 - Discriminant validity (Fornel Larkert)

Constructs	**AI**	**FAM**	**PEOU**	**PU**	**TAC**	**TTF**	**TEC**	**T**
AI	**0.973**							
FAM	0.292	**0.895**						
PEOU	0.646	0.323	**0.876**					
PU	0.718	0.257	0.576	**0.927**				
TAC	0.588	0.215	0.402	0.483	**0.789**			
TTF	0.777	0.244	0.705	0.865	0.466	**0.944**		
TEC	0.562	0.433	0.570	0.523	0.477	0.574	**0.813**	
T	0.525	0.357	0.447	0.420	0.425	0.469	0.488	**0.882**

Finally, the Heterotrait-Monotrait ratio stipulates that the Heterotrait-Monotrait (HTMT) value must be less than 0.90 to establish discriminant validity between the reflective constructs. The data in Table 4 shows that almost all the HTMT values are below 0.90, with only one ratio slightly exceeding the value (0.902), which proves discriminant validity.

Table 4 - Discriminant validity (HTMT)

Constructs	AI	FAM	PEOU	PU	TAC	TTF	TEC	T
AI								
FAM	0.308							
PEOU	0.701	0.346						
PU	0.757	0.271	0.621					
TAC	0.720	0.254	0.509	0.573				
TTF	0.812	0.252	0.755	0.902	0.555			
TEC	0.632	0.523	0.646	0.587	0.678	0.616		
T	0.565	0.389	0.492	0.448	0.538	0.499	0.549	

The comprehensive analysis of composite reliability, convergent validity, indicator reliability, and discriminant validity attested to the acceptability of the constructs. These results affirm the suitability of the constructs for testing the proposed theoretical model.

4.3. STRUCTURAL MODEL

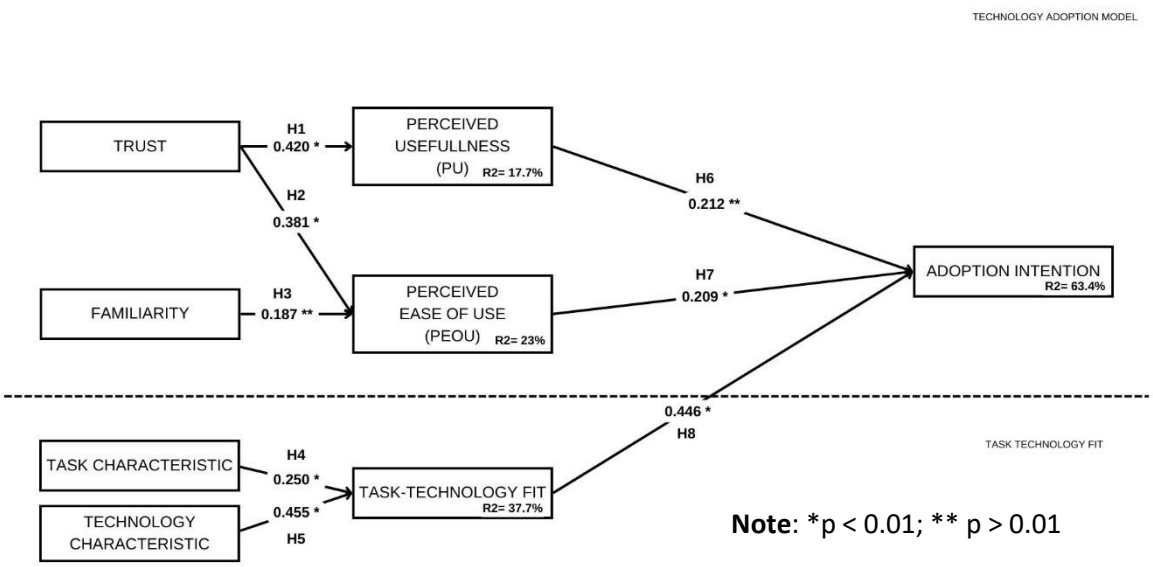

Figure 4 - Model with results

After systematically validating and confirming all aspects and criteria of the measurement model, attention was turned towards the analysis of the structural model. Evaluation of the Structural Model in this study involved the examination of R2 measures and the significance levels of path coefficients.

The coefficients of determination (R2) for the dependent variables, namely Adoption Intention, Perceived Usefulness, Perceived Easy of Use, and Task-Technology Fit, were found to be 0.63, 0.18, 0.23, and 0.38, respectively. The significance of the path coefficients was assessed through a meticulous bootstrapping procedure utilizing Smart PLS, which results are shown in Figure 4. This statistical technique provided robust estimations of the standard errors and confidence intervals for the path coefficients, enabling a rigorous evaluation of their significance within the structural model.

Looking at the results, it is possible to assert that the model explains 63.4% of the variation in Adoption Intention, which was supported by Perceived Ease of Use ($\beta = 0.209$, $p < 0.01$) and by Task-Technology Fit ($\beta = 0.446$, $p < 0.01$), but it was not supported by Perceived Usefulness ($\beta = 0.212$, $p > 0.01$). Thus, hypotheses H7 and H8 were confirmed and hypothesis H6 was not.

The model elucidates 23% of the variance in Perceived Ease of Use, with Trust emerging as a significant explanatory factor ($\beta = 0.381$, $p < 0.01$). In line with the initial hypothesis, Familiarity showed a negative association ($\beta = 0.187$, $p > 0.01$), confirming H2 and H3. Furthermore, Trust statistically supported Perceived Usefulness ($\beta = 0.420$, $p < 0.01$), so H1 was valid.

Finally, 37.7% of the variance in task-technology adaptation is explained by the model, with discernible effects from the characteristics of the technology ($\beta = 0.455$, $p < 0.01$) and the characteristics of the task ($\beta = 0.250$, $p < 0.01$). Therefore, both H4 and H5 find empirical support. In summary, of the eight hypotheses tested, seven were confirmed, while only one was not supported.

Table 5 - Hypothesis Validation

Hypothesis Validation	
H1 - Trust in Blockchain technology will positively affect PU.	Confirmed
H2 - Trust in Blockchain technology will positively affect PEOU.	Confirmed
H3 - Familiarity will negatively affect Perceived Easy of Use (PEOU).	Confirmed
H4 - The influence of Blockchain Task Characteristics will positively affect Task-Technology Fit.	Confirmed
H5 - The influence of Blockchain Technology Characteristics will positively affect Task-Technology Fit.	Confirmed
H6 -The Perceived Usefulness will positively affect Adoption intention.	Not Confirmed
H7 - The Perceived Ease of Use will positively affect Adoption intention.	Confirmed
H8 - The influence of Task-Technology Fit on Adoption Intention of Blockchain technology will be positive.	Confirmed

5. DISCUSSION AND CONCLUSIONS

The significant influence of perceived ease of use and task-technology fit on the adoption intention of blockchain in football fan engagement highlights the necessity for blockchain applications to be user-friendly and closely aligned with fans' engagement activities. These findings are consistent with the Technology Acceptance Model (TAM) principles, as proposed by Davis (1989), emphasizing that ease of use significantly impacts users' willingness to adopt new technologies. However, the unexpected minimal impact of perceived usefulness on adoption intention suggests a nuanced scenario for blockchain in sports, where the conventional drivers of technology adoption, as outlined in TAM, may not fully account for fans' behaviors towards blockchain (Davis, 1989; Venkatesh & Davis, 2000). This indicates a potential shift in what constitutes 'usefulness' in the context of emerging technologies like blockchain, where the technology's novelty and its fit with specific tasks may overshadow its direct benefits in users' perceptions.

The importance of task-technology fit in this context underscores the need for blockchain solutions to be designed with the specific tasks and experiences of football fans in mind, aligning with the Task-Technology Fit (TTF) model suggested by Goodhue & Thompson (1995). This alignment ensures that the technology not only supports but enhances the activities fans engage in, such as purchasing tickets, trading digital collectibles, or participating in fan communities, thereby increasing the likelihood of adoption.

The significant role of trust in influencing both perceived ease of use and perceived usefulness reflects the critical importance of security and reliability in the adoption of blockchain technologies, echoing the sentiments expressed in Champion, N. et al. (2020) and reinforcing the blockchain's value proposition as outlined by Buterin, V. (2014). This finding is crucial for sports management professionals considering blockchain applications, as it highlights the necessity of building and maintaining trust in technological innovations among fans.

These results also shed light on the negative association between familiarity and perceived ease of use, a somewhat counterintuitive finding that may reflect the complex nature of blockchain technology. This aspect merits further exploration to understand how familiarity with blockchain impacts user perceptions and how educational initiatives can mitigate any adverse effects, thus facilitating smoother adoption processes.

Furthermore, the study's findings challenge the sports management field to reconsider the weight of perceived usefulness in technology adoption models, especially in contexts where the technology's innovative aspects might outshine its immediate practical benefits. This re-evaluation is crucial in understanding how emerging technologies like blockchain can be effectively integrated into football fan engagement strategies, ensuring they meet fans' needs and preferences.

5.1. THEORETICAL IMPLICATIONS

The nuanced findings of this study contribute to a deeper understanding of the factors influencing blockchain technology's adoption in sports, suggesting a potential refinement of existing theoretical models like TAM and TTF. The diminished role of perceived usefulness in determining adoption intention may indicate the need for these models to incorporate additional dimensions that capture the unique attributes of emerging technologies, such as the novelty factor or the specific context of use (Davis, 1989; Goodhue & Thompson, 1995). This adaptation could provide a more accurate framework for predicting and explaining technology adoption behaviors in the rapidly evolving digital landscape of football fan engagement.

Moreover, the pivotal role of trust in blockchain adoption underscores the relevance of integrating trust as a core component in technology acceptance models. Trust has been recognized as a crucial factor in the acceptance and use of new technologies (Mitteldorf & Matsumoto, 2019), suggesting that models like TAM could be expanded to explicitly include trust as a determinant of technology adoption, particularly in contexts involving financial transactions or personal data.

The study's implications for theoretical development also extend to the examination of task-technology fit, emphasizing the importance of designing technology that aligns with users' specific tasks and contexts. This finding reaffirms the relevance of the TTF model in guiding the development and implementation of technology solutions in sports management and beyond, encouraging a closer integration of user-centered design principles in technology development processes.

5.2. PRACTICAL IMPLICATIONS

For football management professionals, the study's findings highlight the critical importance of focusing on the usability and task relevance of blockchain applications to encourage adoption among fans. This entails not only designing intuitive and easy-to-use interfaces but also ensuring that these applications meaningfully enhance the fan experience, whether through improved access to games, exclusive content, or unique forms of fan interaction (Mitteldorf & Matsumoto, 2019; Champion et al., 2020). Emphasizing these aspects can help overcome potential resistance to adoption due to the perceived complexity of blockchain technology.

Additionally, building and maintaining trust in blockchain applications is paramount for sports organizations. This involves transparent communication about the security features and benefits of blockchain, addressing privacy concerns, and demonstrating the technology's reliability and value in enhancing fan engagement. Given the sensitivity of personal and financial data involved in many blockchain applications, fostering a strong sense of trust can significantly influence fans' willingness to engage with these technologies (Catalini & Gans, 2016).

Lastly, the practical implications extend to the need for education and outreach efforts to demystify blockchain technology for football fans. Given the negative association between familiarity and perceived ease of use identified in the study, football organizations have a unique opportunity to lead educational initiatives that clarify blockchain's benefits and functionalities, facilitating a smoother transition for fans into this new technological era in football (Pamplin, 2018; Marciano, 2019).

By addressing these key areas, football management professionals can leverage blockchain technology more effectively, enhancing fan engagement and opening up new avenues for interaction and value creation within the sports industry.

5.3. LIMITATIONS AND FUTURE RESEARCHS

This study is not without its limitations, which should be considered when interpreting the findings. Firstly, the sample's demographic profile, predominantly male and highly educated, may limit the generalizability of the results to the broader population of football fans. Future research should aim to include a more diverse and representative sample of fans to capture a wider range of perspectives on blockchain technology in football (Woratschek, H., Horbel, C., & Popp, B., 2016).

To address this limitation, future research can study demographic factors and their impact on blockchain technology adoption within football. Given the predominance of a younger, educated demographic in the current study's sample, investigating how different age groups, educational backgrounds, and cultural contexts influence perceptions and adoption of blockchain could yield valuable insights. This could help in developing more targeted strategies for promoting blockchain applications across a broader spectrum of football fans (Bauer, H. H., Stokburger-Sauer, N. E., & Exler, S., 2008).

Another limitation is that the study focuses only on familiarity and trust as external variables influencing blockchain adoption, potentially overlooking other important variables that could impact fans' adoption behaviors. Future research could explore additional factors, such as personal innovativeness, social influence, and perceived risk, to develop a more comprehensive understanding of what drives or hinders blockchain adoption among football fans (Davis, F. D., 1989; Rogers, E. M., 2003).

Addressing these limitations in future research will enhance our understanding of blockchain technology's role in football fan engagement, providing valuable insights for both theory and practice in football management and technology adoption.

BIBLIOGRAPHICAL REFERENCES

Bauer, H. H., Stokburger-Sauer, N. E., & Exler, S. (2008). Brand image and fan loyalty in professional team sport: A refined model and empirical assessment. *Journal of Sport Management, 22*(2), 205-226. https://doi.org/10.1123/jsm.22.2.205

Biscaia, R., Correia, A., Rosado, A. F., Ross, S. D., & Maroco, J. (2013). Sport sponsorship: The relationship between team loyalty, sponsorship awareness, attitude toward the sponsor, and purchase intentions. *Journal of Sport Management, 27*(4), 288-302. https://doi.org/10.1123/jsm.27.4.288

Buterin, V. (2014). A next-generation smart contract and decentralized application platform. *Ethereum White Paper.*

Catalini, C., & Gans, J. S. (2016). Some Simple Economics of the Blockchain. *MIT Sloan Research Paper, (5191-16).* https://dx.doi.org/10.2139/ssrn.2874598

Champion, N., et al. (2020). Tokenisation of the sports industry: A Blockchain revolution to reinvent an ecosystem. *Journal of Digital & Social Media Marketing, 8*(1), 69-80. https://doi.org/10.1123/ijsc.2019-0051

Chapman, T., Brown, R., & Chatterjee, S. (2020). Blockchain in Sports: The Novelty and the Promise. *Sport Business and Management: An International Journal, 10*(4), 341-353.

Crosby, M., et al. (2016). Blockchain technology: Beyond bitcoin. *Applied Innovation, 2*, 6-10.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340. https://doi.org/10.2307/249008

Davis, F. D., & Venkatesh, V. (1996). A critical assessment of potential measurement biases in the Technology Acceptance Model: Three experiments. *International Journal of Human-Computer Studies, 45*(1), 19–45. https://doi.org/10.1006/ijhc.1996.0040.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.2307/3151312

Gerrard, B. (2019). Digital and social media in professional team sports. In *Routledge Handbook of the Business of Football* (pp. 207-223).

Gladden, J. M., & Funk, D. C. (2002). Developing an understanding of brand associations in team sport: Empirical evidence from consumers of professional sport. *Journal of Sport Management, 16*(1), 54-81. https://doi.org/10.1123/jsm.16.1.54

Goodhue, D. L., & Thompson, R. L. (1995). Task-Technology Fit and Individual Performance. *MIS Quarterly, 19*(2), 213-236. https://doi.org/10.2307/249689

Hahn, K. H., & Kim, J. (2009). The effect of offline brand trust and perceived internet confidence on online shopping intention in the integrated multi-channel context. *International Journal of Retail and Distribution Management, 37*(2), 126–141. DOI:10.1108/09590550910934272.

Hair Jr, J. F., Babin, B. J., & Krey, N. (2017). Covariance-based structural equation modeling in the Journal of Advertising: Review and recommendations. *Journal of Advertising, 46*(1), 163-177. https://doi.org/10.1080/00913367.2017.1281777

Hair, J. F., Hollingsworth, C. L., Randolph, A. B., & Chong, A. Y. L. (2017). An updated and expanded assessment of PLS-SEM in information systems research. *Industrial Management & Data Systems, 117*(3), 442–458. https://doi.org/10.1108/IMDS-04-2016-0130

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2), 139-152. https://doi.org/10.2753/MTP1069-6679190202

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the academy of marketing science, 40*(3), 414-433. https://doi.org/10.1007/s11747-011-0261-6

Hambrick, M. E., Simmons, J. M., Greenhalgh, G. P., & Greenwell, T. C. (2010). Understanding professional athletes' use of Twitter: A content analysis of athlete tweets. *International Journal of Sport Communication, 3*(4), 454-471. https://doi.org/10.1123/ijsc.3.4.454

Kastrenakes, J. (2021). NBA Top Shot, explained. *The Verge*. Retrieved from https://www.theverge.com/2021/2/27/22303626/nba-top-shot-highlights-explained-blockchain-crypto-nft-dapper-labs.

Katz, L. (2021). Manchester City to launch football's first official NFT collection. *Forbes*. Retrieved from https://www.forbes.com/sites/leemathews/2021/03/19/manchester-city-to-launch-footballs-first-official-nft-collection/.

Lin, T.C., & Huang, C.-C. (2008). Understanding knowledge management system usage antecedents: An integration of social cognitive theory and task technology fit. *Information & Management, 45*(6), 410-417. https://doi.org/10.1016/j.im.2008.06.004

Marr, B. (2021). How NFTs Are Set to Disrupt the Sports Industry. *Forbes*. Retrieved from https://www.forbes.com/sites/bernardmarr/2021/05/31/how-nfts-are-set-to-disrupt-the-sports-industry/.

Marciano, A. (2019). Football clubs are scoring with blockchain. *Forbes*. Retrieved from https://www.forbes.com/sites/alexmascioli/2019/09/09/football-clubs-are-scoring-with-blockchain/.

Mittag, T. (2019). Managing Digital Transformation in the Sports Industry: Developing a Conceptual Framework for Digital Business Models in Professional Football. *Business & Information Systems Engineering, 61*(5), 535-544.

Mitteldorf, J., & Matsumoto, E. (2019). Blockchain: A new playbook for sports fan engagement. *Journal of Sports Analytics, 5*(2), 65-75.

Mora, C., Rollins, R. L., Taladay, K., Kantar, M. B., Chock, M. K., Shimada, M., & Franklin, E. C. (2018). Bitcoin emissions alone could push global warming above 2°C. *Nature Climate Change, 8*(11), 931-933. https://doi.org/10.1038/s41558-018-0321-8

Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. Retrieved from https://bitcoin.org/bitcoin.pdf.

Nascimento, B., Oliveira, T., & Tam, C. (2018). Wearable technology: What explains continuance intention in smartwatches? *Journal of Retailing and Consumer Services, 43*, 157-169. https://doi.org/10.1016/j.jretconser.2018.03.017

Pamplin, B. (2018). Blockchain technology: What is it good for? *Sports Business Journal*.

Pine, B. J., & Gilmore, J. H. (2017). *The Experience Economy*. Harvard Business Review Press.

Pilkington, M. (2016). Blockchain Technology: Principles and Applications. In *F. Xavier Olleros & Majlinda Zhegu (Eds.), Research Handbook on Digital Transformations*. Edward Elgar. https://doi.org/10.4337/9781784717766.00019

Poushneh, A., & Vasquez-Parraga, A. Z. (2017). Discernible impact of augmented reality on retail customer's experience, satisfaction and willingness to buy. *Journal of Retailing and Consumer Services, 34*, 229-234. https://doi.org/10.1016/j.jretconser.2016.10.005

Pritchard, M. P., & Stinson, J. L. (2016). Leveraging brands in sport business. Routledge. https://doi.org/10.4324/9780203108994

Rein, I., Kotler, P., & Shields, B. (2006). *The Elusive Fan: Reinventing Sports in a Crowded Marketplace*. McGraw-Hill.

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). Free Press.

Schmidt, S. L. (2018). Blockchain: Anticipated legal challenges and regulatory responses. *Journal of Law and Technology, 31*(2), 303-321.

Swan, M. (2015). *Blockchain: Blueprint for a new economy*. O'Reilly Media.

Tapscott, D., & Tapscott, A. (2016). *Blockchain revolution: How the technology behind Bitcoin is changing money, business, and the world*. Penguin.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, 46*(2), 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926

Wang, Y., Singgih, M., Wang, J., & Rit, M. (2019). Making sense of blockchain technology: How will it transform supply chains? *International Journal of Production Economics, 211*, 221-236. https://doi.org/10.1016/j.ijpe.2019.02.002

Werbach, K. (2018). *The Blockchain and the New Architecture of Trust*. MIT Press.

Woratschek, H., Horbel, C., & Popp, B. (2016). The sport value framework – A new fundamental logic for analyses in sport management. *European Sport Management Quarterly, 16*(6), 615-641. https://doi.org/10.1080/16184742.2013.865776

Yli-Huumo, J., Ko, D., Choi, S., Park, S., & Smolander, K. (2016). Where Is Current Research on Blockchain Technology? —A Systematic Review. *PLOS ONE, 11*(10), e0163477. https://doi.org/10.1371/journal.pone.0163477

Yusof, N. A. D. M., Jamil, P. A. S. M., Hashim, N. M., Karuppiah, K., Rasdi, I., Tamrin, S. B. M., ... & Sambasivam, S. (2019). Likert Scale vs. Visual analogue scale on vehicle seat discomfort questionnaire: a review.

Zhou, T., Lu, Y. and Wang, B. (2010), "Integrating TTF and UTAUT to explain mobile banking user adoption", *Computers in Human Behavior, 26*, 760-767. https://doi.org/10.1016/j.chb.2010.01.013

APPENDIX A

Construct	Original item:	Reference:	Adapted item:
Familiarity (FAM)	Overall, I am familiar with this site.	Kim et al., 2009 (pag.36)	FAM1: I am familiar with Blockchain technology.
	I am familiar with searching for items on this site.		FAM2: I am familiar with some Blockchain applications (NFTs, digital tokents, etc).
	I am familiar with the process of purchasing from this site.		FAM3: I am familiar with the use of these Blockchain applications.
	I am familiar with buying products from this site.		FAM4: I am familiar with the benefits I get from using these blockchain applications.
Trust (T)	I feel safe providing personal privacy information over the m-banking	Deb & Lomo-David, 2014 (487)	T1: I feel safe providing information about my personal privacy through Blockchain technology.
	I'm not worried to use m-banking as I know my transactions will be secured and safe		T2: I am not worried about using Blockchain applications because I know my transactions will be safe and secure.
	I feel secure sending sensitive information across the m-banking		T3: I feel safe sending sensitive information via Blockchain technology.
	The bank will not divulge any of my information to the third party		T4: Blockchain technology applications will not disclose any of my information to third parties.
Perceived Usefulness (PU)	Using Wordperfect improves my performance in my degree program .	Davis & Venkatesh, 1996 (45)	PU1: I believe that i would find a blockchain applications useful for fans engagement.
	Using WordPerfect in my degree program increases my productivity .		PU2: I sense using blockchain applications would improve the club's effectiveness in terms of fan engagement.
	Using WordPerfect enhances my effectiveness in my degree program .		PU3: I think that using a blockchain application would allow me to have an optimized connection with my club.
	I find WordPerfect useful in my degree program .		PU4: I sense using blockchain application would improve fan engagement performance.
Perceived Ease of Use (PEOU)	My interaction with the system is clear and understandable.	Venkatesh & Davis, 2000 (201)	PEOU1: I think my interaction with the Blockchain system will be clear and understandable.
	Interacting with the system does not require a lot of my mental effort.		PEOU2: I feel that interacting with the Blockchain system won't require much mental effort.
	I find the system to be easy to use.		PEOU3: I find Blockchain system to be easy to use.
	I find it easy to get the system to do what I want it to do.		PEOU4: I find it easy to get Blockchain system to do what i want it to do.
Adoption Intention (AI)	Assuming I have access to the system, I intend to use it.	Venkatesh & Davis, 2000 (201)	AI1: Assuming I have access to Blockchain applications, I intend to use it.
	Given that I have access to the system, I predict that I would use it.		AI2: Given that I have acess to Blockchain applications, I predict that I would use it.
Task characteristics (TAC)	I need to manage my account anytime anywhere.	Zhou et al., 2010 (766)	TAC1: I need feel connect with my football club anytime anywhere.
	I need to transfer money anytime anywhere.		TAC2: I need access to my collectibles anytime anywhere.
	I need to acquire account information in real time.		TAC3: I need to acquire my football club information in real time
Technology characteristics (TEC)	Mobile banking provides ubiquitous services.	Zhou et al., 2010 (766)	TEC1: Blockchain technology provides ubiquitous services.
	Mobile banking provides real-time services.		TEC2: Blockchain technology provides real-time services.
	Mobile banking provides secure services.		TEC3: Blockchain technology provides secure services.
Task-Technology Fit (TTF)	The functionalities of KMSs were very adequate	T. C. Lin & Huang, 2008 (415)	TTF1: The functionalities of Blockchain applications are very adequate for engaging fans for a club.
	The functionalities of KMSs were very appropriate		TTF2: The functionalities of Blockchain applications are very appropriate for engaging fans for a club.
	The functionalities of KMSs were very useful		TTF3: The functionalities of Blockchain technology are very useful for engaging fans for a club.
	The functionalities of KMSs were very compatible with the task		TTF4: The functionalities of Blockchain technology are very compatible with the involvement of a club's fans.
	The functionalities of KMSs were very helpful		TTF5: The functionalities of Blockchain technology are very helpful for engaging fans for a club.
	The functionalities of KMSs were very sufficient		TTF6: The funcionalities of Blockchain technology are very sufficient for engaging fans for a club.
	The functionalities of KMSs made the task very easy		TTF7: The functionalities of Blockchain technology have made the task of involving a club's supporters very easy.
	In general, the functionalities of KMSs were best fit the task		TTF8: In general, Blockchain functionalities are best fitted to the task.

Appendix A - Constructs

APPENDIX B

	AI	FAM	PEOU	PU	TAC	TTF	TEC	T
AI_1	0.973	0.273	0.606	0.721	0.567	0.760	0.525	0.505
AI_2	0.973	0.294	0.651	0.678	0.578	0.752	0.569	0.516
FAM_1	0.215	0.882	0.271	0.143	0.106	0.186	0.390	0.247
FAM_2	0.207	0.904	0.225	0.173	0.175	0.156	0.419	0.304
FAM_3	0.265	0.943	0.335	0.241	0.184	0.250	0.404	0.325
FAM_4	0.338	0.851	0.302	0.339	0.293	0.261	0.345	0.391
PEOU_1	0.552	0.356	0.850	0.565	0.317	0.637	0.500	0.453
PEOU_2	0.552	0.311	0.903	0.497	0.297	0.591	0.518	0.383
PEOU_3	0.593	0.218	0.888	0.495	0.418	0.606	0.527	0.342
PEOU_4	0.563	0.238	0.860	0.454	0.377	0.632	0.450	0.382
PU_1	0.580	0.273	0.451	0.865	0.436	0.644	0.448	0.367
PU_2	0.725	0.222	0.584	0.955	0.478	0.815	0.469	0.440
PU_3	0.704	0.238	0.561	0.957	0.501	0.870	0.532	0.435
PU_4	0.639	0.226	0.527	0.926	0.362	0.864	0.490	0.302
TAC_1	0.449	0.134	0.292	0.271	0.806	0.357	0.308	0.308
TAC_2	0.499	0.231	0.329	0.511	0.822	0.432	0.383	0.346
TAC_3	0.441	0.127	0.335	0.330	0.735	0.295	0.457	0.360
TEC_1	0.361	0.328	0.314	0.303	0.437	0.282	0.729	0.299
TEC_2	0.405	0.430	0.439	0.427	0.397	0.434	0.863	0.318
TEC_3	0.555	0.317	0.567	0.496	0.370	0.592	0.842	0.514
TRUST_1	0.422	0.396	0.380	0.360	0.400	0.394	0.436	0.900
TRUST_2	0.484	0.400	0.398	0.409	0.397	0.433	0.506	0.888
TRUST_3	0.435	0.286	0.361	0.335	0.410	0.371	0.367	0.903
TRUST_4	0.499	0.177	0.430	0.369	0.296	0.447	0.401	0.835
TTF_1	0.751	0.212	0.685	0.771	0.434	0.944	0.586	0.402
TTF_2	0.740	0.239	0.640	0.841	0.471	0.962	0.558	0.376
TTF_3	0.714	0.266	0.695	0.812	0.416	0.938	0.604	0.504
TTF_4	0.695	0.207	0.650	0.823	0.471	0.926	0.470	0.456
TTF_5	0.764	0.229	0.656	0.835	0.411	0.948	0.482	0.479

Appendix B - Discriminant validity - Cross loadings

APPENDIX C

	Outer loadings
AI_1 <- ADOPTION INTENTION	0.973
AI_2 <- ADOPTION INTENTION	0.973
FAM_1 <- FAMILIARITY	0.882
FAM_2 <- FAMILIARITY	0.904
FAM_3 <- FAMILIARITY	0.943
FAM_4 <- FAMILIARITY	0.851
PEOU_1 <- PERCEIVED EASY OF USE	0.850
PEOU_2 <- PERCEIVED EASY OF USE	0.903
PEOU_3 <- PERCEIVED EASY OF USE	0.888
PEOU_4 <- PERCEIVED EASY OF USE	0.860
PU_1 <- PERCEIVED USEFULNESS	0.865
PU_2 <- PERCEIVED USEFULNESS	0.955
PU_3 <- PERCEIVED USEFULNESS	0.957
PU_4 <- PERCEIVED USEFULNESS	0.926
TAC_1 <- TASK CHARACTERISTICS	0.806
TAC_2 <- TASK CHARACTERISTICS	0.822
TAC_3 <- TASK CHARACTERISTICS	0.735
TEC_1 <- TECHNOLOGY CHARACATERISTICS	0.729
TEC_2 <- TECHNOLOGY CHARACATERISTICS	0.863
TEC_3 <- TECHNOLOGY CHARACATERISTICS	0.842
TRUST_1 <- TRUST	0.900
TRUST_2 <- TRUST	0.888
TRUST_3 <- TRUST	0.903
TRUST_4 <- TRUST	0.835
TTF_1 <- TASK-TECHNOLOGY FIT	0.944
TTF_2 <- TASK-TECHNOLOGY FIT	0.962
TTF_3 <- TASK-TECHNOLOGY FIT	0.938
TTF_4 <- TASK-TECHNOLOGY FIT	0.926
TTF_5 <- TASK-TECHNOLOGY FIT	0.948

Appendix C - Outer loadings

ANNEXES

Questionário sobre o envolvimento dos adeptos de futebol com tecnologia Blockchain

---

Início do bloco: Introdução

Caro Participante,

O meu nome é Tomás Carvalho e o presente inquérito por questionário realiza-se no âmbito da minha dissertação final do mestrado em Data-Driven Marketing pela NOVA Information Management School (NOVA IMS).

Procuro entender se a tecnologia Blockchain tem potencial para se tornar uma das principais fontes de envolvimento dos adeptos implementadas pelos clubes de futebol.

Se tens mais do que 18 anos e se és adepto ativamente ligado a um clube de futebol, poderás participar neste estudo com uma duração de 4-5 minutos. A participação é voluntária, não havendo respostas corretas ou erradas, estas serão mantidas confidenciais e anónimas e os resultados serão utilizados unicamente para fins académicos.

Se tiveres alguma dúvida, poderás contactar-me através do endereço m20210816@novaims.unl.pt.

---

*

Q1 Tens idade igual ou superior a 18 anos?

- ○ Sim (1)
- ○ Não (2)

---

*

Q2 És um adepto ativamente ligado a um clube de futebol?

- ○ Sim (1)
- ○ Não (2)

Fim do bloco: Introdução

Início do bloco: Questões iniciais

Questões Iniciais

Q3 Género:

- ○ Masculino (1)
- ○ Feminino (2)
- ○ Não binário / terceiro género (3)
- ○ Prefere não dizer (4)

Q4 Idade:

- ○ 18-24 anos (1)
- ○ 25-34 anos (2)
- ○ 35-44 anos (3)
- ○ 45-54 anos (4)
- ○ 55-64 anos (5)
- ○ +65 anos (6)

Q5 Habilitações Académicas:

- ○ Sem escolariedade (1)
- ○ Ensino primário (até 4ºano) (2)
- ○ Ensino básico (até 9ºano) (3)
- ○ Ensino secundário (até 12ºano) (4)
- ○ Licenciatura (5)
- ○ Mestrado (6)
- ○ Doutoramento (7)

Q6 Ocupação:

- ○ Estudante (1)
- ○ Empregado (2)
- ○ Trabalhador-Estudante (3)
- ○ Desempregado (4)
- ○ Reformado (5)

Q7 Com que frequência interages online com o teu clube (por exemplo, visitar o Website, clicar em anúncios relacionados com a equipa, reagir nas redes sociais, comprar produtos online, utilizar a aplicação do clube, etc.)?

- ○ Diariamente, várias vezes (1)
- ○ 1 /dia (2)
- ○ 1-4 /semana (3)
- ○ 1-3 /mês (4)
- ○ Raramente (5)
- ○ Nunca (6)

Q8 Aproximadamente quanto gastas **anualmente** com o teu clube preferido (artigos da marca, bilhetes, artigos/serviços relacionados com o clube)?

- ○ Menos de 100€ (1)
- ○ 101-500€ (2)
- ○ 501-1.000€ (3)
- ○ Mais de 1.000€ (4)

Fim do bloco: Questões iniciais

Início do bloco: Apoio ao tema

Definições de apoio ao tema

Caso não estejas familiarizado com alguns conceitos, tens aqui algumas definições.

- **O que é exatamente a Blockchain?**

Na sua essência, Blockchain é um tipo de registo digital. Imagina um livro onde todas as transações, sejam elas monetárias ou não, são registadas. Agora, pensa neste livro como sendo digital e partilhado por muitos computadores, tornando-o extremamente seguro e transparente.

- **Onde entra a Blockchain no mundo do futebol?**

Tal como noutros sectores, esta tecnologia tem vindo a fazer ondas no mundo do futebol, especialmente quando se trata de interagir com adeptos como tu. Aqui estão algumas maneiras pelas quais isso pode acontecer:

Colecionáveis digitais: Alguma vez quiseste uma recordação digital única do teu momento de jogo ou jogador favorito? Com a Blockchain, os fãs podem possuir "tokens digitais" chamados NFTs (Non-Fungible Tokens) que representam essas memórias especiais. Um NFT é como um certificado de autenticidade e pertença de algo único no Mundo. Quem tem um NFT, é o único proprietário desse pedaço digital.

Tokens de fãs e votação: A Blockchain pode dar aos adeptos direitos de voto através de tokens de adeptos especiais. Imagina ter uma palavra a dizer em algumas decisões do clube, como por exemplo, designs de camisolas.

Transparência: Já tiveste curiosidade em saber para onde vão os fundos do teu clube? As cadeias de blocos podem tornar mais transparentes as operações do clube, desde as transferências de jogadores às vendas de produtos.

O objetivo com este inquérito será perceber como é que os adeptos de futebol, se sentem em relação a estas possibilidades emergentes. Os seus pensamentos e preferências fornecerão informações valiosas sobre a forma como os clubes de futebol de todo o mundo poderão abordar e integrar a tecnologia Blockchain no futuro.

Quer sejas um guru da tecnologia ou alguém que está a ouvir falar Blockchain pela primeira vez, a tua opinião é importante.

Fim do bloco: Apoio ao tema

Início do bloco: Bloco 3**Por favor responde com base na tua experiência e/ou perspetiva na utilização de Blockchain relativamente à implementação desta tecnologia no contacto dos adeptos com os respetivos clubes.**

Q9 **Familiaridade**

	Discordo totalmente (1)	Discordo parcialmente (2)	Nem concordo nem discordo (3)	Concordo parcialmente (4)	Concordo totalmente (5)
Estou familiarizado com a tecnologia Blockchain. (1)	○	○	○	○	○
Estou familiarizado com algumas aplicações de Blockchain (NFTs, tokents digitais, etc.). (2)	○	○	○	○	○
Estou familiarizado com a utilização destas aplicações Blockchain. (3)	○	○	○	○	○
Estou familiarizado com os benefícios que obtenho com a utilização destas aplicações Blockchain. (4)	○	○	○	○	○

Quebra de página

Q10 **Confiança**

	Discordo totalmente (1)	Discordo parcialmente (2)	Nem concordo nem discordo (3)	Concordo parcialmente (4)	Concordo totalmente (5)
Sinto-me seguro ao fornecer informações sobre a minha privacidade pessoal através da tecnologia Blockchain. (1)	○	○	○	○	○
Não estou preocupado com a utilização de aplicações de Blockchain porque sei que as minhas transacções serão seguras e protegidas. (2)	○	○	○	○	○
Sinto-me seguro ao enviar informações sensíveis através da tecnologia Blockchain. (3)	○	○	○	○	○
As aplicações da tecnologia Blockchain não divulgarão nenhuma das minhas informações a terceiros. (4)	○	○	○	○	○

Quebra de página

Q11 **Utilidade percebida**

	Discordo totalmente (1)	Discordo parcialmente (2)	Nem concordo nem discordo (3)	Concordo parcialmente (4)	Concordo totalmente (5)
Penso que as aplicações de Blockchain me seriam úteis para o envolvimento dos fãs. (1)	○	○	○	○	○
Considero que a utilização de aplicações de Blockchain melhoraria a eficácia do clube em termos de envolvimento dos adeptos. (2)	○	○	○	○	○
Penso que a utilização de uma aplicação de Blockchain me permitiria ter uma ligação optimizada com o meu clube. (3)	○	○	○	○	○
Sinto que a utilização de uma aplicação de Blockchain melhoraria o desempenho do envolvimento dos adeptos. (4)	○	○	○	○	○

Quebra de página

Q12 **Facilidade de utilização**

	Discordo totalmente (1)	Discordo parcialmente (2)	Nem concordo nem discordo (3)	Concordo parcialmente (4)	Concordo totalmente (5)
Penso que a minha interação com o sistema Blockchain será clara e compreensível. (1)	○	○	○	○	○
Sinto que a interação com o sistema Blockchain não exigirá muito esforço mental. (2)	○	○	○	○	○
Considero que o sistema Blockchain é fácil de utilizar. (3)	○	○	○	○	○
Considero fácil conseguir que o sistema Blockchain faça o que eu quero. (4)	○	○	○	○	○

Quebra de página

Q13 **Características da tarefa**

	Discordo totalmente (1)	Discordo parcialmente (2)	Nem concordo nem discordo (3)	Concordo parcialmente (4)	Concordo totalmente (5)
Preciso de me sentir ligado ao meu clube de futebol em qualquer altura e em qualquer lugar. (1)	○	○	○	○	○
Preciso de aceder aos meus objectos de coleção (relacionado ao clube) a qualquer momento e em qualquer lugar. (2)	○	○	○	○	○
Preciso de obter informações sobre o meu clube de futebol em tempo real. (3)	○	○	○	○	○

Quebra de página

Q14 **Características da tecnologia**

	Discordo totalmente (1)	Discordo parcialmente (2)	Nem concordo nem discordo (3)	Concordo parcialmente (4)	Concordo totalmente (5)
A tecnologia de Blockchain fornece serviços omnipresentes. (1)	○	○	○	○	○
A tecnologia de Blockchain fornece serviços em tempo real. (2)	○	○	○	○	○
A tecnologia de Blockchain fornece serviços seguros. (3)	○	○	○	○	○

Quebra de página

Q15 **Compatibilidade entre tarefa e tecnologia**

	Discordo totalmente (1)	Discordo parcialmente (2)	Nem concordo nem discordo (3)	Concordo parcialmente (4)	Concordo totalmente (5)
As funcionalidades das aplicações Blockchain são muito adequadas para envolver os adeptos a um clube. (1)	○	○	○	○	○
As funcionalidades da tecnologia Blockchain são muito úteis para envolver os adeptos a um clube. (3)	○	○	○	○	○
As funcionalidades da tecnologia Blockchain são muito compatíveis com o envolvimento dos adeptos a um clube. (4)	○	○	○	○	○
As funcionalidades da tecnologia Blockchain são muito suficientes para envolver os adeptos a um clube. (6)	○	○	○	○	○
As funcionalidades da tecnologia Blockchain tornaram muito fácil a tarefa de envolver os adeptos a um clube. (7)	○	○	○	○	○

Quebra de página

Q16 **Intenção de adoção**

	Discordo totalmente (1)	Discordo parcialmente (2)	Nem concordo nem discordo (3)	Concordo parcialmente (4)	Concordo totalmente (5)
Partindo do princípio de que tenho acesso a aplicações de Blockchain, tenciono utilizá-las. (1)	○	○	○	○	○
Dado que tenho acesso a aplicações Blockchain, prevejo que as irei utilizar. (2)	○	○	○	○	○