Type of the Paper: Original scientific paper
Received: 10.06.2023.
Accepted: 04.07.2023.
DOI: https://doi.org/10.18485/edtech.2023.3.1.3
UDK: 004.4:796.332

Game-Changing Innovations: Exploring the Impact of Technology on Football

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Abstract

The football and IT sectors are distinct industries that possess significant potential to collaborate in their pursuit of enhanced performance and financial gain. The prevalent technologies utilized by football managers and marketers, including Digital Billboard Replacement, Goal Line Assistant, SOAT, and VAR, are presently fortified by Artificial Intelligence (AI), Machine Learning (ML), and Extended Reality (XR). The objective of this study is to investigate the practicality of their implementation in real-world scenarios, with the purpose of evaluating their efficacy and potential ramifications on the economy. The PRISMA methodology was employed as a research approach, and a thorough analysis of the scientific literature was conducted. Football is commonly associated with affluent individuals and substantial investments in players, including within the realm of sports betting. Football has been found to have a remarkable impact on the lives of numerous individuals, as evidenced by the World Homeless Cup Event, where it has served as a means of rescuing individuals from homelessness, career stagnation, and familial instability. The significant financial contributions made by affluent football players towards philanthropic endeavors and corporate social responsibility initiatives are distinct aspects that substantiate the impact of football in attaining Sustainable Development Goals. The findings of this study prompt numerous inquiries that I cordially invite us to address collectively.

The utilization of digital billboard replacement technology in football has been a topic of interest in recent years. The implementation of goal-line assistant systems, which incorporate artificial intelligence and machine learning, has been a significant development in sports. Additionally, the integration of extended reality technology has the potential to enhance the viewing experience for fans.

Keywords: Football, Artificial intelligence, Machine learning, Extended Reality

Introduction

This statement is accurate. The sport of football, commonly referred to as football in certain regions, has attained worldwide prominence, with advancements in technology playing a pivotal role in augmenting its diverse aspects. In recent years, the football industry has increasingly incorporated cutting-edge technological advancements to enhance training processes and conduct objective analyses of team performance, including that of opposing teams. This shift reflects the recognition that football has evolved beyond a mere sport and has become a complex industry.

In contemporary football, advancements in technology have enabled coaches to acquire empirical data on the physiological parameters and health status of players, as well as to monitor matches, in a direct and objective manner. This is in contrast to the past when coaches relied on technical sheets for such information.

The implementation of innovative technology has yielded significant improvements in diverse facets of football, ranging from the precision of judgements rendered by officials to the quality of the fan experience. With the ongoing evolution of technology, it is anticipated that further advancements will be made to augment the sport. The intersection and impact of digital billboard replacement, AI, ML, XR, World Homeless Cup, sponsorships, and Sustainable Development Goals (SDGs) can be analyzed through various perspectives. Below are several hypothetical situations:

The growing prevalence of digital billboards has opened up opportunities for businesses to utilize artificial intelligence and machine learning algorithms to develop customized advertisements that are informed by up-to-the-minute information, such as traffic flow or weather patterns. The utilization of XR technology has the potential to enhance the interactivity and engagement of advertisements, thereby improving the overall viewing experience for audiences. Moreover, corporations have the ability to utilize these technologies for monitoring the efficacy of their advertisements and promptly modify them to enhance their effectiveness.

The World Homeless Cup is a globally recognized football tournament that endeavors to promote consciousness regarding homelessness and social marginalization. Organizations have the opportunity to act as sponsors for this event,

leveraging it as a platform to advance their social responsibility endeavors and align with Sustainable Development Goals (SDGs) such as No Poverty, Zero Hunger, and Good Health and Well-being.

Through the utilization of AI and ML algorithms, organizations can conduct an analysis of the data produced by events, encompassing metrics such as the number of attendees and social media references, to assess the efficacy of their sponsorship and establish informed determinations for forthcoming events (Olszewski, 2021; Lindsey, 2019; Da Rocha, 2022).

Enterprises have the potential to create sustainable solutions that are in line with the Sustainable Development Goals (SDGs) by utilizing Artificial Intelligence (AI) and Machine Learning (ML) algorithms. Predictive analytics can be utilised by enterprises to enhance the efficiency of their supply chains and minimize wastage, thereby supporting the achievement of SDG 12, which pertains to Responsible Consumption and Production. Furthermore, corporations have the ability to utilize XR technology to develop immersive encounters that instruct customers about Sustainable Development Goals (SDGs) and motivate them to engage in proactive measures.

Corporate responsibility is a crucial aspect of professional sports, including football, as it has a substantial influence on both society and the environment. Therefore, football clubs bear a corporate responsibility to conduct their operations in a socially and environmentally responsible manner. The concept of corporate responsibility in football encompasses a range of practises such as advocating for diversity and inclusion, allocating resources towards community-based initiatives, mitigating the environmental effects of operations, and upholding equitable treatment of employees and other relevant parties. The UEFA Foundation for Children has launched the "Football for Good" initiative as an instance of corporate responsibility in the football industry. The objective of this program is to facilitate societal transformation and foster prospects for underprivileged youth via football-oriented initiatives. Furthermore, a considerable number of football clubs have adopted sustainability measures aimed at mitigating their carbon emissions and advancing ecological responsibility.

Certain clubs have incorporated sustainable energy systems, executed waste minimization and recycling initiatives, and allocated resources towards energy-efficient stadium architecture. Corporate responsibility within the football industry encompasses the imperative of guaranteeing equitable treatment and commensurate opportunities for all personnel, comprizing players, coaches, and support staff. This encompasses the advocacy of diversity and inclusivity, as well as the guarantee of equitable remuneration and favorable labor circumstances. The sources cited in the text are Mura (2020) and Lauren (2018).

In the realm of concrete, it can be asserted that technology advances in tandem with football in the subsequent scenarios:

The process of monitoring and training football players involves the utilization of various systems and software to provide objective and direct information on specific physiological parameters, statistical data on total distance covered, number of accelerations or decelerations, technical-tactical data, statistical data on activity during the preparation process, as well as analysis of their performance during matches. The Catapult system is widely utilized by coaches and physical trainers in Romania as a means of monitoring training efforts and recording relevant parameters. Football Catapult training involves the utilization of wearable technology and data analysis to monitor and enhance the physical capabilities of football athletes. Catapult is a corporation that manufactures portable gadgets capable of monitoring diverse metrics associated with athlete performance, including but not limited to velocity, distance, acceleration, and deceleration (Boyd, 2011; Haller, 2019).

The process of catapult training entails the utilization of diminutive sensors affixed to the bodies of players during both training and game sessions. The sensors are used to gather data on various physical metrics, which are subsequently subjected to analysis through machine learning algorithms. The resulting insights can be used to evaluate player performance and pinpoint potential areas for enhancement. The utilization of catapult training has the potential to facilitate the monitoring of players' workload, assessment of injury risk, and optimization of training regimens with the aim of enhancing performance. Catapult sensors can provide coaches with valuable data that can be utilized to modify training sessions and mitigate the risk of injury or overexertion for players. According to Wellman (2019), the data can be utilized to recognize the specific strengths and weaknesses of individual players and subsequently customize training programs.

Football XR training pertains to the utilization of virtual and augmented reality technologies for the purpose of augmenting the training and progression of football athletes. The term "extended reality" (XR) is an umbrella term that encompasses both virtual reality (VR) and augmented reality (AR) technologies. The utilization of Football XR training enables players to replicate game scenarios, enhance their decision-making abilities, and refine their technique within a secure and regulated setting. Additionally, it furnishes coaches with novel instruments for scrutinizing and overseeing player performance. Virtual Reality (VR) technology has the capability to offer players a comprehensive immersive experience, enabling them to perceive as if they are physically present on the pitch. The utilization of this approach can prove to be highly advantageous for honing tactical skills, executing set plays, and enhancing ball handling abilities within a simulated setting. In contrast, augmented reality (AR) has the potential to furnish athletes with instantaneous feedback and guidance while engaged in training sessions. The utilization of Football XR training is a novel methodology in football training that exhibits the capacity to enhance player performance and foster the growth of emerging talent, as evidenced by recent research conducted by Choi (2022) and Țoniș (2022).

The utilization of technology has been a significant asset in official matches, particularly in the implementation of the Video Assistant Referee (VAR) system. This technology has been endorsed by FIFA to ensure that referees make accurate decisions, thereby eliminating any ambiguity in the correctness of their verdicts. Systems such as Goal Line Assistant, SOAT (offside technology), or VAR (Video Assistant Referee) are employed for this purpose. The implementation of Video Assistant

Referee (VAR) has significantly transformed the sport of football by affording referees an enhanced perspective of pivotal junctures during a match, including but not limited to penalty verdicts and offside rulings.

The implementation of this technology has resulted in a notable decrease in errors committed by officials, thereby contributing to the attainment of more precise decisions (Das, 2022; Winand, 2021).

The introduction of Goal-line Technology (GLT) in football has provided an innovative solution for determining whether the ball has crossed the goal line or not. The utilization of cameras and sensors in this technology facilitates precise decision-making, thereby contributing to the eradication of contentious goals.

In contemporary times, football players have incorporated diverse forms of wearable technology, such as GPS trackers and heart rate monitors, into their training and game routines. According to Wellman (2019), this technology facilitates the monitoring of players' fitness levels, tracking of their movements on the pitch, and identification of any potential health issues by coaches and medical staff.

Virtual and augmented reality technologies are currently being utilized to augment the fan experience and offer immersive encounters.

Recent advancements in technology have enabled fans to utilise virtual reality headsets to obtain a comprehensive 360-degree perspective of the stadium, observe replays from various vantage points, and engage with the game in a more immersive manner (Choi, 2022; Țoniș, 2022).

Marketing has significantly benefited from the digital era by devising tactics for growth and retention through the utilization of various media platforms and social media networks, while also fostering a strong rapport with its followers. The practise of advertising involves the modification of its language and content to suit the specific cultural context of the country in which it is being disseminated. Digital Billboard Replacement technology enables this possibility.

The development of football strategy through the utilization of artificial intelligence (AI) and machine learning (ML) is a multifaceted and ever-changing domain that encompasses a variety of intricate elements and considerations, including but not limited to player placements, opposing team configurations, meteorological circumstances, and additional factors. The utilization of Machine Learning and Artificial Intelligence has the potential to analyze extensive data sets and offer valuable insights to aid coaches and players in making informed decisions (Knoll, 2020; Țoniș, 2022).

Player tracking and analysis is a widely used application of Artificial Intelligence (AI) and Machine Learning (ML) in football strategy. The utilization of computer vision and machine learning algorithms enables coaches to monitor the distinct movements and actions of players during both training and games. This data can be leveraged to enhance team strategies and tactics, as reported by Scott (2021).

AI and ML have potential applications in the domains of in-game simulations and predictive analytics. Through the examination of historical game data and the application of machine learning algorithms to detect patterns and trends, coaches and analysts can generate simulations to evaluate and enhance various game tactics.

The utilization of blockchain technology possesses the capability to revolutionize the manner in which football enthusiasts engage with their preferred teams, players, and fellow supporters. Kuleto (2022) has enumerated several potential applications of blockchain technology to enhance the football fan experience.

The implementation of blockchain-based ticketing systems has the potential to mitigate problems associated with ticket fraud and scalping. Every ticket would possess distinct characteristics that are resistant to alteration, and the process of transferring ownership between different individuals would be straightforward.

The implementation of blockchain technology has the potential to serve as a means of verifying and monitoring the ownership of football-related commodities, including but not limited to jerseys and collectables. The implementation of such a measure would guarantee the authenticity of merchandise for fans, while simultaneously opening up novel avenues for generating revenue for both teams and players.

The utilization of blockchain-based platforms has the potential to introduce novel avenues for fan engagement with their preferred sports teams and athletes, including but not limited to virtual meet-and-greet sessions and participation in team decision-making processes through voting mechanisms. According to Winand (2021), the implementation of this approach may foster a more immediate and egalitarian interaction between supporters and their respective football organizations.

The application of blockchain technology in the realm of fantasy football has the potential to establish decentralized platforms that enable enthusiasts to engage in player trading and competitive play with enhanced security and transparency.

The utilization of Artificial Intelligence (AI) to facilitate the prediction and decision-making processes associated with football betting is commonly known as Football Bet AI. The objective of utilizing artificial intelligence in football betting is to leverage data analytics and machine learning methodologies to produce precise prognostications and enhance the probability of successful wagers. Artificial intelligence algorithms possess the capability to scrutinise vast quantities of past data, encompassing team performance, player statistics, and meteorological conditions, with the aim of detecting patterns and trends. Subsequently, these algorithms can employ the aforementioned data to formulate prognostications concerning the results of soccer games. Aside from its ability to forecast match results, artificial intelligence for football betting can also be employed to enhance betting tactics. AI algorithms have the capability to analyse the odds provided by various bookmakers and detect instances of arbitrage, which enable bettors to generate profits by placing bets on all conceivable outcomes of a given match. This has been highlighted in the works of Knoll (2020), Yanmaz (2020), and Da Costa (2022).

The discourse surrounding the digitalization of football is ongoing, prompting us to contemplate the growing encroachment of the digital era upon the preeminent sport of football, yielding favourable outcomes.

Discussion

The convergence of Digital Billboard Replacement, Artificial Intelligence (AI), Machine Learning (ML), Extended Reality (XR), World Homeless Cup, sponsorships, and Sustainable Development Goals (SDGs) presents promising prospects for enterprises to devise inventive remedies that tackle societal and ecological predicaments, while simultaneously advancing their brand and augmenting business expansion.

The utilization of catapult training is a beneficial technique for football coaches and players seeking to enhance their physical aptitude and mitigate the likelihood of harm. Through the collection and analysis of player performance data, coaches are able to make informed decisions and optimize training programs with the aim of maximizing players' potential on the pitch. The utilization of Football XR training represents a novel and inventive method for enhancing football training, with the potential to optimise player performance and foster the growth of emerging talent.

Artificial intelligence (AI) and machine learning (ML) possess the capability to transform football strategy by equipping coaches and players with instantaneous insights and decision-making tools that are based on data. It is noteworthy that while AI and ML are valuable resources, the development of successful football strategies still heavily relies on human expertise and experience.

The implementation of blockchain technology has the capacity to establish novel degrees of transparency, security, and involvement in the football fan experience. It is noteworthy that the aforementioned applications are currently in their nascent phases of development, and it is plausible that a considerable amount of time may elapse before they attain widespread adoption.

The utilization of artificial intelligence in football betting has the capacity to enhance the precision of prognostications and augment the profitability of said activity. It is imperative to acknowledge that the absence of a foolproof algorithm renders winning unpredictable, thereby underscoring the indispensability of human judgement and decision-making in the realm of successful betting.

The implementation of corporate responsibility in football is imperative for securing the sport's enduring viability and favorable influence on both society and the environment.

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