ИНФОРМАТИКА И КОМПЮТЪРНИ НАУКИ
INFORMATICS AND COMPUTER SCIENCES

DIGITALIZATION IN THE FOOTBALL STADIUM OF THE FUTURE: CURRENT TRENDS AND FUTURE DEVELOPMENTS

Chris Alexander Braunstein
University of Library Studies and Information Technologies

Abstract: This publication examines the impact of digitalization on the football stadium experience. In an era where technology is permeating more and more aspects of daily life, digitalization has also made its mark on the football stadium. This study sheds light on the current changes associated with the integration of digital technologies into football stadiums and takes a look at potential future developments in this field.
Keywords: Digitalization, artificial intelligence, digital communication, stadium of the future

INTRODUCTION

In recent decades, the sweeping wave of digitalization has heralded a paradigm shift across a multitude of sectors, leaving no stone unturned. One such sector that has undergone a remarkable transformation is the realm of sports, with a specific focus on the globally adored sport of football. With its magnetic appeal, football draws in legions of enthusiasts from all corners of the world. However, it's not just the game on the field that has undergone a revolution; it's the entire experience surrounding it that has been redefined by the relentless march of digitalization. In today's digital age, this process has become increasingly sophisticated, offering a plethora of personalized offerings and interactive elements that were once unimaginable. At the forefront of this transformation are the innovative technologies that have seamlessly woven themselves into the fabric of the sports industry. Mobile applications, for instance, have become indispensable companions for fans embarking on their football pilgrimage. These apps serve as multifunctional tools, providing real-time updates, match statistics, and even virtual stadium tours, all at the fingertips of the user. Beyond mere convenience, these apps have become a portal to an augmented stadium experience, where fans can engage in polls, quizzes, and even order concessions from their seats, without missing a second of the action. The emergence of big data analysis and artificial intelligence (AI) has further propelled this digital evolution. The once-overlooked data generated during matches – from player performance to fan engagement patterns – is now a goldmine of insights. With the power of AI, this data can be deciphered, offering teams, sponsors, and marketers valuable information about their audiences. This, in turn, facilitates the creation of tailor-made experiences, from suggesting merchandise based on fan preferences to offering special promotions on match day. The confluence of these elements marks a profound transformation in the football experience, and this publication is poised to delve into three pivotal aspects of this multifaceted development. By examining the intricate interplay between mobile applications, big data analysis, and artificial intelligence, we seek to uncover the underlying

mechanisms that have redefined the way we engage with football. From personalized interactions to data-driven enhancements, the impact of digitalization on the sports industry is far-reaching and continues to unfold with every match, captivating not only sports aficionados but also those intrigued by the fusion of technology and passion.

RESEARCH METHODOLOGY

The research method of this publication is based on literature analysis. The approach relies on examining pre-existing data found in reputable research journals and studies. Furthermore, information from reports on international education and relevant online articles and news was also incorporated. The result is an examination of the current and future situation.

RESULTS

„Fans increasingly use technology to enhance their viewing experience, both inside and outside the venue. The preference for consuming sports content over smart phones, streaming platforms, and via social media has increased significantly as the technology has become more sophisticated. There are several ways in which fans are using technology, including to access scores, news, and insights, and to watch highlights (Capgemini 2023:2).”

An interpretation of the term "Digitalization" can be approached in various ways. The technical interpretation is the conventional approach. In this context, digitalization refers, on the one hand, to the conversion of information from an analog to a digital form, and on the other hand, it involves transferring tasks from humans to computers that were previously carried out manually. Digitalization is often equated with "digital transformation", although the latter pertains to the changes brought about by the use of information technologies. This transformation is now evident in all societal areas. Through digital transformation, aspects such as labor market dynamics, political decision-making, and legal frameworks undergo changes. For businesses, digital transformation holds particular significance. They operate in altered markets and modified value creation structures. Within the context of digital transformation, they primarily engage in adapting their core processes in terms of efficiency and customer-centricity, their customer interactions, products, services, and overarching business models. Companies are increasingly establishing management structures to systematically manage the opportunities and risks posed by digital change. Digital transformation brings about significant alterations in everyday life, the economy, and society through the use of digital technologies and techniques. The term is typically used in a narrower sense to denote changes in companies and industries. This involves differentiating between the dimensions of production, service offering, and customer interaction (cf. Hess 2019). The ongoing digitalization has not only changed our way of communicating, working, and receiving information, but also how we experience sports events. In the context of football, the integration of digital technologies within the stadium has played a significant role in strengthening fan engagement and creating a more intense and interactive experience. Digitalization enables direct and immediate communication between the club and fans, both before, during, and after the match. This is achieved through various channels:

Mobile Apps

In an online study involving 1,000 German sports fans, Facit Digital identified smart services that were considered truly useful from the fans' perspective. The study presented a digital service offering based on a hypothetical mobile app with 25 different functions to the target audience. Participants were asked to evaluate each function individually as well as the entire app. Subsequently, a Kano analysis was conducted to assess the utility of the digital offering for the fans. The results of the study confirm the assumption that certain digital services related to stadium visits are positively received by most fans and are even expected to some extent. Approximately 68% of the respondents stated that

they would use the described app. Among regular Bundesliga stadium visitors, this number rose to 77%, and among fans who are inclined to try new apps (App-Affine), the approval rate was nearly 90%. Regarding the stadium app, the analysis revealed that functions improving stadium comfort and transparency of the game were particularly relevant to fans. Thus, fans desired an app that enhances the stadium experience without distracting from the actual sporting event (cf. Facit 2018). Stadium operators can develop their own mobile apps to provide fans with real-time information, news, player statistics, and exclusive content. The app can also be used to provide updates on traffic and weather conditions. The mobile apps in the football stadium of the future have the potential to elevate the fan experience to new heights. Through enhanced information, virtual stadium experiences, and interactive features, these apps could create a deeper connection between fans and the club. However, challenges related to data privacy, security, and technological integration must be carefully addressed to ensure that the introduction of these apps leads to a positive and enriching stadium experience. The future of stadium technology is undoubtedly exciting, offering promising opportunities for both fans and clubs alike.

Social Media

"As social media will become even more critical to top-tier sports and media rights holders, production will seek to engage with young and mobile-savvy audiences more actively, developing tools to let them edit and share sports content more easily (WHU 2023:11)."

Experts in the field predict that in the future, viewers will show a preference for actively engaging in sports experiences rather than simply watching passively. This shift towards interactivity is deemed important, and there is a strong emphasis on introducing more immersive elements to bring the audience closer to the action. Consequently, upcoming consumers may enhance their viewing experiences through digital means, such as adding and toggling digital overlays. They could also regularly choose their desired camera perspectives, which might include viewing from the athlete's, head coach's, or referee's point of view (cf. WHU 2023:11). Social media integration allows fans to share experiences, connect with fellow supporters, and exchange opinions, fostering a virtual community. This trend has significantly impacted interactions and communication, including in football. Social media enhances fan engagement by enabling real-time discussions during matches, connecting fans with players and clubs, and facilitating the creation and sharing of user-generated content like photos and videos. This dynamic interaction has the potential to transform future football stadiums into hubs of vibrant community and interaction, forging stronger connections among fans, clubs, and players.

Enhanced Content (AR & VR)

"PwC analysis estimates the economic potential for Virtual and Augmented Reality to be $1.5 trillion worldwide and $104 billion for Germany in 2030. By 2030, 400,000 people will work with AR/VR in Germany, and 23 million worldwide (PWC 2019)."

Amid the hallowed grounds of the stadium, a new era of spectatorship is unfurling, one where digital screens are not mere observers but active participants in the symphony of sports. These screens, vibrant canvases of technological ingenuity, serve as portals that transcend the boundaries of traditional game action. Beyond the riveting back-and-forth on the field, these screens have become windows to a world where statistics, player profiles, and tactical analyses coalesce in real-time splendor. Yet, this revolution is not merely a showcase of technological prowess; it is a response to the ever-evolving landscape of fan expectations. In an age where innovation marches hand in hand with passion, the very definition of "content" has expanded. No longer confined to the boundaries of the match itself, the term now encompasses a panorama of insights and narratives that breathe life into the game.

Enter enhanced content-a tapestry woven with threads of Augmented Reality (AR) and Virtual Reality (VR). These technologies, once the realm of science fiction, now weave together a seamless narrative that transforms spectators into participants. With each touch of a button or a glance at a screen, fans find themselves ensconced in virtual realms that mirror the very pitches they revere. AR grants them a magic lens that fuses the digital with the physical, overlaying the unfolding match with intricate insights, a virtual playbook that demystifies the tactics as they unfurl in real time. Yet, the pièce de résistance lies within the realm of VR. Within this space, fans shed their roles as mere spectators, metamorphosing into champions, defenders, and goalkeepers. No longer bound by geographical constraints, they are transported to the heart of the action, feeling the adrenaline coursing through their virtual veins as if they themselves were donning the jersey.

This pivot to enhanced content heralds a renaissance in fan engagement, for it extends an olive branch of understanding, transcending the ephemeral boundaries of cheers and gasps. It's a journey where fans become connoisseurs, dissecting the strategies as they unfold, tracing the trajectories of passes, and immersing themselves in a symphony of knowledge. As the sun sets on one era of spectatorship, it rises on another, one where the digital and the tangible merge seamlessly. The football stadium of the future beckons-a theater where the screens are gateways, the narratives are immersive, and the understanding is profound. With each technological leap, the stadium experience spirals into new dimensions, igniting not just the fervor of the fans but the very essence of the beautiful game itself.

"Artificial intelligence is likely to play an essential role in supporting consumers and producers alike (WHU 2023:3)."

The mentioned study clearly indicates that in the future, there will be an increasing demand for digitally enhanced top-tier sports content. It is evident that the popularity of live data visualizations will rise. The audiences' primary concern is a personalized experience. Although some early forms of digitally enhanced sports content can already be experienced today (such as augmented graphics projected onto the field), it is anticipated that audiences will actively modify significant aspects in the future. However, most viewers are unlikely to consume top-tier sports content in a virtual environment using any form of Virtual-Reality (VR) device. The focus remains on the sports itself (cf. WHU 2023:3).

CONCLUSSION

Given the rapid advances in digitalization, the sports industry, especially football, has seized a unique opportunity to transform the traditional stadium experience and establish a closer connection between fans, clubs, and players. The introduction of digital technologies, especially through mobile apps, social media, and enhanced content, has elevated the fan experience to unprecedented heights. The integration of mobile apps has revolutionized communication between fans and clubs by providing real-time information, news, and personalized content directly into the hands of supporters. The ability to share real-time player statistics, weather conditions, and even interactive elements through a mobile platform creates an immediate and dynamic connection between fans and clubs. Social media has facilitated the creation of virtual communities where fans can share their passion, opinions, and experiences. Interacting with other fans, players, and clubs during matches through social media has elevated the stadium experience to a new level, creating an intense and emotional bond among all participants. Enhanced content such as Augmented Reality (AR) and Virtual Reality (VR) has the potential to transform the physical stadium into a virtual world of data and information. Through AR technologies, fans can experience real-time augmented statistics and tactical analyses, while VR technologies provide them with the sensation of being right in the midst of the game, even when they are not physically present. This offers a profound fan experience that transcends the boundaries of traditional stadium attendance. Overall, the digitalization and integration of innovative

technologies in the football stadium of the future will lead to a significant enhancement of the fan experience. Ongoing digitalization offers numerous opportunities to expand, deepen, and usher in an era of interactive fan experience in stadiums.

REFERENCES

Capgemini Research Institute (2023). A whole new ball game. Why sports tech is a game-changer, [viewed 18 August 2023]. Available from: https://prod.ucwe.capgemini.com/wp-content/uploads/2023/05/Final-Web-Version-Tech-in-Sports.pdf.

Facit Digita (2018). Digitales Stadionerlebnis (2018). Eine Studie von Facit Digital, [viewed 19 August 2023]. Available from: https://www.facit-group.com/de/studies/digital-stadium-experience.html

WHU – Otto Beisheim School of Management Center for Sports and Management (2023). CSM Research Report: The Future of Top-Tier Sports Product and Production in 2030, [viewed 20 August 2023]. Available from: https://media.dfl.de/sites/2/2023/03/Top-Tier-Sports-Product-and-its-Production-in-2030_WHU.pdf

Website References

Hess, Thomas (2019). Digitalisierung, [viewed 19 August 2023]. Available from: https://wi-lex.de/index.php/lexikon/technologische-und-methodische-grundlagen/informatik-grundlagen/digitalisierung/

PWC: 2030 werden in Deutschland 400.000 Menschen mit AR/VR arbeiten, ©2019 [viewed 19 August 2023]. Available from: https://www.pwc.de/de/pressemitteilungen/2019/2030-werden-in-deutschland-400000-menschen-mit-ar-vr-arbeiten.html

ДИГИТАЛИЗАЦИЯ НА ФУТБОЛНИЯ СТАДИОН НА БЪДЕЩЕТО: НАСТОЯЩИ ТЕНДЕНЦИИ И БЪДЕЩО РАЗВИТИЕ

Резюме: В тази научна публикация се разглежда въздействието на дигитализацията върху преживяването на посетителите на футболния стадион. В епоха, в която технологиите проникват във все повече аспекти на ежедневието, дигитализацията е оставила своя отпечатък и върху футболния стадион. Това изследване хвърля светлина върху настоящите промени, свързани с интегрирането на дигиталните технологии във футболните стадиони, и разглежда потенциалното бъдещо развитие в тази област.

Ключови думи: дигитализация, изкуствен интелект, дигитални комуникации, стадион на бъдещето

Chris Alexander Braunstein
University of Library Studies and Information Technologies
E-mail: chris.braunstein1@hotmail.de