Presenting a Model for the Applications of Artificial Intelligence in Sports Marketing: Enhancing Fan Engagement and Revenue Generation

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Abstract

Purpose : This study aimed to develop a comprehensive theoretical model of artificial intelligence (AI) applications in sports marketing, with a focus on enhancing fan engagement and generating revenue. It sought to bridge the gap between technical knowledge of AI and its practical application in the sports industry.

Methods : This qualitative study adopted Glaser's grounded theory methodology. Data were collected through in-depth, semi-structured interviews with 32 experts and managers in sports management, marketing, and information technology. The interview data were analyzed using open, axial, and selective coding in MAXQDA.

Results : The analysis yielded a model with six dimensions covering (1) strategic foundations and drivers of adoption, (2) transformation in fan engagement, (3) innovation in revenue generation models, (4) infrastructure requirements and data management, (5) implementation challenges and facilitating factors, and (6) ethical dimensions and future outlook. The findings suggest that AI can deepen fan engagement through hyper-personalization and immersive experiences. AI can also support revenue growth by improving existing revenue models and creating new revenue streams.

Conclusion : Integrating AI into sports marketing calls for a strategic transformation supported by a data-driven culture, appropriate infrastructure, and a human-centered approach to implementation. The proposed model offers sports managers a practical roadmap for guiding this transformation and addressing the human and organizational challenges of AI adoption.

Keywords: Artificial Intelligence, Sports Marketing, Fan Engagement, Revenue Generation, Grounded Theory.

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Introduction

Artificial intelligence (AI), as one of the most prominent contemporary technologies, is rapidly changing the face of various industries, and the sports industry is no exception. This technology, which includes machine learning and deep learning, possesses an extraordinary ability to analyze complex data and extract hidden patterns from vast volumes of information (Dindorf et al., 2023). In this research, artificial intelligence is defined as a collection of technologies and algorithms capable of learning from data, identifying complex patterns, and making automated decisions. In the context of sports marketing, AI is not merely a tool for improving the efficiency of marketing operations but also a theoretical framework for understanding fan behavior, predicting market trends, and creating deeper, more meaningful interactions with audiences. This research is grounded in fundamental theories in digital marketing and sports management, which emphasize the importance of data-driven decision-making, personalization of experiences, and dynamic two-way interaction between sports organizations and their fans (Chan-Olmsted, 2019).

In recent years, the sports industry has witnessed a digital revolution, leading to the creation of massive volumes of diverse and complex data. Sports organizations are faced with millions of hours of match videos, millions of social media messages, and billions of data points from sensors and wearable devices (Naraine & Wanless, 2020). While this wealth of data provides countless opportunities for better understanding fans and improving marketing strategies, it also presents significant challenges. The rapid change in consumer behavior in the digital environment and the growing expectations of fans for more personalized and relevant experiences have necessitated different and innovative marketing strategies. Furthermore, intense competition among sports organizations to attract and retain fans in an era with abundant entertainment options has placed considerable pressure on them. Additionally, financial pressure to increase diverse revenue streams, as traditional models (such as ticket sales and broadcasting rights) come under strain, has prompted sports organizations to seek innovative solutions (Stegmann et al., 2023).

Although some large and financially capable organizations are utilizing advanced AI technologies to analyze fan data and enhance their experiences, many smaller sports organizations and those in developing countries have yet to capitalize on the benefits of this technology. The current situation is characterized by several distinct features: a significant gap between theoretical knowledge and practical application, a lack of practical guidelines for implementing AI in sports marketing, widespread concerns about the privacy and ethics of using fan data, and the high costs of implementing AI technologies (Momenifar et al., 2024). Bibliometric studies indicate that the number of research publications in the field of AI in sports is increasing exponentially, with countries like China, the United States, and Germany leading these research efforts (Dindorf et al., 2023). However, research in the areas of sports marketing and fan engagement is significantly less developed compared to other sports domains (such as biomechanics, injury prediction, and athlete performance analysis) (Ghosh et al., 2023).

The existing literature on AI and sports emphasizes the importance of these technologies in improving various aspects of the industry. A comprehensive bibliometric study by Dindorf et al. (2023), which analyzed 1215 documents from the Scopus database, showed that research interest in AI and its subfields is growing exponentially. The study found that the top twenty percent of cited works accounted for 32.52% of all citations,

indicating a concentration of research around key issues. It also revealed that research is heavily focused on biomechanics, injury prediction, and new algorithms, while fields like sports economics, sports sociology, and sports education have played a secondary role (Dindorf et al., 2023). Complementing this view, the study by Ghosh et al. (2023), which examined machine learning algorithms and novel methods in sports analytics, showed that deployable systems for real-time sports analysis can leverage sensors, computer vision, and mobile- and wireless-based applications. These researchers identified three main areas: sensors, computer vision, and applications based on wireless technology. Studies show that various machine learning algorithms (including statistical learning, deep learning, and reinforcement learning) can be applied to solve different problems in sports analytics (Ghosh et al., 2023).

Naraine and Wanless (2020) presented one of the first studies that directly focused on sports management issues and artificial intelligence. They argued that although the sports industry is inundated with data, most sports organizations lag behind other industries (such as retail and communications) in using AI to manage and analyze this data. They introduced natural language processing as an important branch of AI that can be useful in four customer-centric areas: listening to the public narrative, automating the sales process, computer-generated content, and automated services. This work demonstrated that the sports industry is still in the early stages of AI adoption and that there are many opportunities for innovation (Naraine & Wanless, 2020). Beal et al. (2019) provided a comprehensive review of AI applications in team sports. They identified five main areas: predicting match outcomes, tactical decision-making, player investment, fantasy sports, and injury prediction. Although this study focused on technical aspects, it showed that AI can improve teams' strategic decision-making, which indirectly affects marketing strategies and fan engagement (Beal et al., 2019). Nalbant and Aydın (2022) directly focused on the relationship between AI technologies and digital sports marketing. They demonstrated that computer vision applications for match analysis, artificial neural networks for prediction, and virtual reality and augmented reality technologies can play important roles in sports marketing (Nalbant & Aydın, 2022). Recent studies by Keiper et al. (2023) also showed that ChatGPT and other AI tools can play a significant role in sports management education and even in planning sports events. These researchers showed that AI-based tools can produce high-quality content and can be used as a supplementary tool in sports education (Keiper et al., 2023). In another study, Keiper (2023) demonstrated that AI can increase the efficiency of sports event planning. Chan-Olmsted (2019), in her study on AI adoption in the media industry, showed that media and sports organizations can use AI to improve content production, personalization, and audience analysis (Chan-Olmsted, 2019).

Studies by Akbari et al. (2024), Pashaie et al. (2024), and Momenifar et al. (2024) have specifically focused on entrepreneurial strategies and AI applications in sports marketing. Akbari et al. (2024) showed that AI can personalize fan experiences, optimize advertising campaigns, and create new revenue models. They emphasized that entrepreneurial strategies in the context of AI should focus on product innovation, market penetration, and strategic partnerships (Akbari et al., 2024). The study by Pashaie et al. (2024) indicated that AI can significantly improve personalization and customer engagement in digital sports marketing. Using structural equation modeling, they showed that AI has a positive impact on personalization and customer engagement, although privacy concerns and satisfaction with non-human interactions remain challenges (Pashaie et al., 2024). Momenifar et al. (2024), in their mixed-methods study (qualitative-quantitative), identified eight practical

applications of AI in sports marketing: predicting sales and prices of sports products and services, identifying revenue growth opportunities, automating the sales process, personalized recommendation systems, satisfaction tracking, and advertising. They also identified five limitations for AI in this domain: limited understanding of human elements, privacy concerns, costs, and technical issues (Momenifar et al., 2024).

The main innovation of this research lies in presenting a comprehensive theoretical model for AI applications in sports marketing, centered on two fundamental axes—fan engagement and revenue generation. This model not only describes AI technologies and their applications but also encompasses the practical processes, implementation challenges, and creative solutions of sports organizations. Additionally, by integrating multiple bodies of literature (including sports marketing, information technology, sports management, and sports economics), this research offers a more comprehensive and balanced perspective on the subject. Another innovation is that the research focuses on solving the practical and real-world problems of sports organizations in implementing AI, rather than just on theoretical aspects. Accordingly, this research aims to present theoretical categories and concepts derived from real data and the practical experiences of sports organizations through the grounded theory method. Despite the increase in studies on AI and sports, comprehensive and practical research on AI applications in sports marketing—especially in the areas of fan engagement and revenue generation—is still insufficient. Most existing research focuses on describing technical applications and does not provide a deep understanding of the practical processes and real challenges faced by sports organizations in implementing these technologies. Furthermore, little research has directly focused on understanding how to combine AI with traditional and digital marketing strategies and how to create value for fans and sports organizations.

Based on these facts, the research question is posed: How do sports organizations effectively employ artificial intelligence in their marketing to enhance fan engagement, and what are the processes and mechanisms for using AI in revenue generation?

Materials and Methods

This research, aimed at developing a comprehensive theoretical model for AI applications in sports marketing, utilized Glaser's grounded theory methodology. Grounded theory is a qualitative approach that focuses on extracting foundational theories from empirical data and is particularly suitable for understanding complex and dynamic processes in relatively unexplored fields. This method was specifically chosen for this research because our goal was not only to describe the applications of AI in sports marketing but also to extract theoretical models and concepts formed based on the real experiences and deep understanding of experts and managers in sports organizations. Glaser's approach, unlike that of Strauss and Corbin, focuses on the dynamic process of analysis and theory development during data collection, allowing the theory to emerge naturally from the data without imposing predetermined conceptual categories.

The statistical population of this research comprised experts in the fields of sports management, sports marketing, information technology and AI, and managers of sports organizations who had practical experience in using or examining AI applications in sports marketing. This population included university professors specializing in sports management and marketing, managers of marketing and communication departments in various sports clubs and organizations, IT and AI specialists working in or collaborating with sports organizations, and sports industry professionals. The research sample was

selected using purposive sampling and snowball sampling. Purposive sampling was used for the initial selection of participants who met specific entry criteria, including at least five years of relevant experience, familiarity with AI or digital technologies, and direct or indirect experience with sports marketing. Snowball sampling was used to expand the sample through referrals from existing participants to other qualified individuals. The sample size in grounded theory is not predetermined but continues until theoretical saturation is achieved. For this research, the final sample size was 32 participants, at which point theoretical saturation was reached.

The primary data collection instrument in this research was the semi-structured in-depth interview. Interviews were conducted based on an open and flexible interview guide that included main questions but allowed for follow-up and deeper probing based on the participant's responses. The interview questions focused on key themes: the participant's experience with AI and digital technologies, applications of AI in sports marketing, the impact of AI on fan engagement, the role of AI in revenue generation, challenges and barriers in implementing AI, and successful solutions and strategies. In addition to interviews, secondary documents were also used, including reports from sports companies, internal documents of sports organizations (where accessible), and published academic and industry sources. These documents were used to deepen understanding and to confirm or challenge the information obtained from interviews. Interviews were audio-recorded with the informed consent of the participants and then fully transcribed. Each interview lasted approximately 45 to 90 minutes.

To ensure internal validity or credibility, several strategies were employed. First, data triangulation was used, specifically source triangulation, which involved multiple interviews with different participants and secondary documents. Second, member checking was utilized, where initial analysis results and extracted categories were presented to participants for confirmation or correction. Third, peer debriefing was conducted, where the results and analysis process were discussed with expert colleagues. Fourth, analysis of negative cases was performed, where cases or data that did not fit the main pattern were specifically examined and analyzed. To ensure external validity or transferability, thick and detailed descriptions of the research context, participants, and the data collection and analysis process were provided so that readers could make informed decisions about whether the research findings are transferable to other contexts. To ensure reliability or dependability, the entire research process was meticulously documented, creating an audit trail that included all decisions, changes, and reasoning made during the research.

The data collection method in this research was an iterative and simultaneous cycle. In the first stage, initial interviews were conducted with participants. Parallel to data collection, preliminary data analysis began. This approach, known as "simultaneous analysis," is a fundamental feature of the grounded theory method. The initial analysis helped identify preliminary categories and concepts, which were then used to design subsequent interviews. The data analysis method in this research was based on Glaser's grounded theory. Data analysis was conducted in three main stages: open coding, axial coding, and selective coding. In the open coding stage, the transcribed interview data were studied line-by-line or phrase-by-phrase, and initial categories were extracted. This process involved identifying key concepts and ideas in the text. In the axial coding stage, the extracted categories were examined in relation to each other, and the relationships between them were identified. The validation of the developed theory was carried out through several methods. First, the theory was compared with existing categories

and concepts in the research literature. Second, participant feedback on the final theory was used. Third, the theory was examined to discover its differences and similarities with existing theories. Validating the theory allowed for its confirmation or modification and ensured that the developed theory is trustworthy and usable. MAXQDA 2020 software was used for data analysis.

Results

This section presents the findings from the analysis of in-depth interviews with 32 experts and specialists in the fields of sports management, sports marketing, information technology, and artificial intelligence. The qualitative data collected were analyzed through the process of open, axial, and selective coding using MAXQDA 2020 software. The primary objective of this analysis was to identify concepts, categories, and their relationships to develop a comprehensive theoretical model for the applications of artificial intelligence in sports marketing, with a focus on fan engagement and revenue generation. First, the demographic characteristics of the research participants are presented, followed by the results of the coding process, which are described in the form of a conceptual model composed of selective, axial, and open categories.

Table 1: Demographic Characteristics of Research Participants

Variable	Characteristic	Frequency	Percentage
Field of Expertise	Sports Management	10	31.25
	Sports Marketing	9	28.13
	Information Technology & AI	8	25.00
	Sports Organization Manager	5	15.62
Education Level	Master's Degree	14	43.75
	Doctoral Degree	18	56.25
Relevant Work Experience	5 to 10 years	11	34.38
	11 to 15 years	13	40.62
	More than 15 years	8	25.00
Total		32	100

As shown in Table 1, the 32-person research sample exhibits a favorable diversity of expertise. The highest frequency belongs to experts in sports management (31.25%) and sports marketing (28.13%), indicating the research's focus on managerial and marketing dimensions. The presence of experts in information technology and artificial intelligence (25%) and senior managers of sports organizations (15.62%) also ensures the technical and practical depth of the collected data. In terms of education level, all participants hold postgraduate degrees (Master's or PhD), with 56.25% holding a doctorate. This high level of education signifies the participants' theoretical mastery and deep knowledge. Furthermore, over 65% of the sample has more than 10 years of work experience, which adds to the empirical and operational credibility of the expressed views and strengthens the validity of the research findings.

Table 2: Results of Open, Axial, and Selective Coding

Row	Interviewee Codes	Open Coding (Sample Concepts)	Axial Coding	Selective Coding
1	P2, P5, P11, P19, P25	Need for data-driven decision-making over intuitive decisions	Data-Driven Culture Building	Strategic Foundations and Drivers of AI Adoption

2	P1, P8, P14, P22	Shifting the mindset of traditional managers towards new technologies		
3	P5, P16, P21, P30	Training managers and staff to understand the importance of data		
4	P7, P12, P28	Establishing data analysis units within the organizational structure		
5	P3, P9, P18	Using management dashboards to monitor key indicators		
6	P4, P10, P15, P23, P29	Not falling behind competitors in attracting digital fans	Competitive and Environmental Pressures	
7	P1, P6, P13, P20	Growing fan expectations for personalized experiences		
8	P8, P17, P24, P31	Emergence of new business models in the sports industry		
9	P5, P11, P26	Pressure to increase non-matchday revenues		
10	P2, P19, P27	Impact of global technology trends on the domestic sports industry		
11	P1, P4, P9, P16, P25, P32	Aligning marketing goals with AI capabilities	Strategic Alignment	
12	P7, P14, P22, P28	Defining a clear roadmap for AI implementation		
13	P3, P11, P20	Integrating AI strategy with the overall organizational strategy		
14	P6, P18, P26	Identifying areas where AI creates the most value		
15	P10, P15, P21, P30	Defining Key Performance Indicators (KPIs) to measure project success		
16	P2, P8, P12, P19, P29	Allocating a specific budget for R&D in AI	Resource Allocation and Investment	
17	P5, P13, P23, P31	Investing in hardware and software infrastructure		
18	P1, P10, P17, P27	Attracting and retaining talent specializing in data and AI		
19	P4, P9, P24	Partnering with startups and technology companies		
20	P7, P15, P22	Creating pilot projects to evaluate return on investment		
21	P1, P5, P9, P14, P22, P28, P32	Providing personalized video and news content in the app	Hyper-Personalization	Transformation in Fan Engagement through AI
22	P3, P11, P18, P25	Intelligent recommendation systems for ticket and merchandise purchases		
23	P6, P15, P21, P29	Sending targeted marketing emails and notifications based on user behavior		

24	P2, P8, P17, P26, P31	Analyzing fan sentiment on social media		
25	P7, P13, P20, P27	Personalizing the in-stadium fan experience (food, parking suggestions)		
26	P4, P10, P16, P24, P30	Providing real-time and advanced stats and information during the match		
27	P5, P12, P19	Using augmented reality (AR) to display player information on the field	Creating Immersive and Engaging Experiences	
28	P8, P15, P23, P29	Offering virtual reality (VR) experiences of training sessions or locker rooms		
29	P1, P9, P17, P25	Gamification and creating challenges based on result predictions		
30	P4, P11, P22, P31	Automated generation of personalized highlights for each fan		
31	P6, P13, P20	Intelligent chatbots to answer frequently asked fan questions	Two-Way and Automated Communication	
32	P2, P10, P18, P26	24/7 AI-based customer support systems		
33	P7, P16, P24, P32	Sending automated alerts about match starts or ticket sales		
34	P3, P9, P14, P21, P28	Automating the management of comments and messages on social media		
35	P5, P12, P19, P30	Smart surveys and automated analysis of fan feedback		
36	P1, P8, P15, P23, P29	Identifying and empowering influencers and loyal fans in the digital space	Strengthening the Digital Fan Community	
37	P4, P11, P17, P25	Creating online platforms for fan discussion and interaction		
38	P6, P13, P20, P27	Analyzing social networks to understand fan group dynamics		
39	P2, P10, P16, P24	Hosting virtual events and online meet-and-greets with players		
40	P3, P9, P15, P22, P29, P32	Dynamic pricing for match tickets based on demand and game importance	Optimizing Ticket and Service Sales	Innovation in Revenue Generation Models Based on AI
41	P5, P12, P19, P26	Predicting spectator attendance to manage stadium resources		
42	P1, P8, P17, P25	Intelligent systems for selling membership packages and subscriptions		
43	P7, P14, P21, P28	Optimizing the sale of ancillary products and services on matchday		
44	P4, P11, P18,	Anti-scalping system and		

	P30	identification of ticket-buying bots		
45	P2, P10, P16, P24, P31	Analyzing data to identify the best advertising placements in the stadium	Enhancing the Value of Sponsorships	
46	P6, P13, P20, P27	Providing analytical reports to sponsors on their advertising ROI		
47	P1, P9, P15, P23	Identifying potential business partners based on fan demographic overlap		
48	P5, P12, P19, P26	Personalizing sponsorship proposals for different brands		
49	P8, P17, P25	Measuring sponsor brand visibility in broadcasts and on social media		
50	P3, P11, P18, P29	Predicting fan purchasing behavior in the online store	E-commerce and Merchandise Sales	
51	P7, P14, P21, P28, P32	Intelligent recommender systems for suggesting related products		
52	P1, P8, P16, P24	Smart inventory management based on demand forecasting		
53	P4, P10, P22, P30	Optimizing online advertising campaigns for merchandise sales		
54	P6, P13, P20, P27	Analyzing customer shopping carts to offer bundled deals		
55	P2, P9, P15, P23	Selling aggregated and anonymized data to business partners	Creating New Revenue Streams	
56	P5, P12, P19, P26	Offering premium video content (behind-the-scenes, analysis) for a subscription fee		
57	P8, P17, P25, P31	Developing sports betting platforms based on AI analytics		
58	P1, P10, P18	Tokenization and sale of fan tokens (NFTs)		
59	P1, P6, P13, P20, P27, P32	Aggregating data from various sources (ticketing, social media, app)	Data Integration and Management	Infrastructural Requirements and Data Management
60	P4, P11, P18, P25	Creating a 360-degree profile for each fan		
61	P8, P15, P23, P29	Cleaning and preparing data for analysis		
62	P2, P10, P17, P26	Using Customer Data Platforms (CDP)		
63	P5, P12, P19, P30	Implementing a data lake for storing large volumes of data		
64	P3, P9, P16, P24	Machine learning algorithms for fan segmentation	Analytical Tools and Algorithms	
65	P7, P14, P21, P28	Predictive models for customer churn (Churn Prediction)		
66	P1, P8, P15, P22	Using Natural Language Processing (NLP) to analyze fan comments		
67	P6, P13, P20, P27	Data visualization tools for managers		

68	P4, P11, P18, P25	Neural networks for analyzing complex behavioral patterns		
69	P2, P10, P17, P26, P31	Hiring data analysts and data scientists	Talent and Technical Skill Development	
70	P5, P12, P19, P30	Conducting training courses for marketing staff		
71	P8, P15, P23, P29	Collaborating with universities and research centers		
72	P3, P9, P16, P24	Outsourcing complex projects to specialized firms		
73	P1, P7, P14, P21	Compliance with data protection laws like GDPR	Data Security and Governance	
74	P6, P13, P20, P27	Transparency about how fan data is used		
75	P4, P11, P18, P25	Implementing security protocols to prevent data breaches		
76	P2, P10, P17, P26	Obtaining explicit consent from fans for data collection		
77	P1, P5, P9, P14, P22, P28, P32	High costs of purchasing specialized software and hardware	Financial and Infrastructural Barriers	Implementation Challenges and Facilitating Factors
78	P3, P11, P18, P25	High cost of hiring and retaining AI specialists		
79	P6, P15, P21, P29	Uncertainty about Return on Investment (ROI)		
80	P2, P8, P17, P26	Lack of necessary technical infrastructure in many organizations		
81	P7, P13, P20, P27	Resistance from traditional managers to change and new technologies	Organizational and Cultural Resistance	
82	P4, P10, P16, P24	Employee fear of job loss due to automation		
83	P5, P12, P19, P30	Existence of information silos and lack of collaboration between departments		
84	P1, P9, P17, P25	Absence of a data-driven decision-making culture		
85	P2, P10, P18, P26, P31	Complexity in integrating different systems and fragmented data	Technical and Executive Complexities	
86	P6, P13, P20, P27	Low quality and incompleteness of existing data		
87	P3, P9, P16, P24	Difficulty in translating business needs into technical models		
88	P8, P15, P23, P29	Need for continuous maintenance and updating of AI models		
89	P1, P7, P14, P21, P28	Support from senior management for innovative projects	Success Factors and Facilitators	
90	P4, P11, P18,	Starting with small, manageable		

	P25	projects to demonstrate early successes		
91	P5, P12, P19, P30	Creating multi-functional teams including marketing and technical experts		
92	P2, P10, P17, P26	Collaboration and partnership with technology companies and startups		
93	P1, P6, P13, P20, P27, P32	Fan concerns about the sale or misuse of their personal information	Privacy and Ethical Use of Data	Ethical Dimensions and Future Outlook
94	P4, P11, P18, P25	Need for full transparency in data usage policies		
95	P8, P15, P23, P29	Risk of creating discrimination in pricing or service delivery based on data		
96	P2, P10, P17, P26	Organizational responsibility for the security of fan data		
97	P5, P12, P19, P30	Possibility of reinforcing existing biases in data by algorithms	Risk of Algorithmic Bias and Inaccuracy	
98	P3, P9, P16, P24	Risk of misinterpreting the results of complex models (AI black box)		
99	P7, P14, P21, P28	Need for human oversight to prevent gross algorithmic errors		
100	P1, P8, P15, P22	Possibility of providing inappropriate or annoying suggestions to fans		
101	P2, P10, P17, P26, P31	Loss of human and personal interactions in customer service	Maintaining the Balance Between Human and Machine	
102	P6, P13, P20, P27	Fan feelings of alienation when facing fully automated systems		
103	P4, P11, P18, P25	Importance of the role of human creativity and intuition alongside AI analysis		
104	P5, P12, P19, P30	Using AI as an empowering tool for employees, not a replacement		
105	P1, P7, P14, P21, P28	Predicting player performance and match outcomes with higher accuracy	Emerging Trends and Future Prospects	
106	P3, P9, P16, P24	Smart and fully connected stadiums (Smart Stadiums)		
107	P8, P15, P23, P29	Greater integration of wearable technologies with fan experiences		
108	P2, P10, P17, P26	The metaverse and creating fully virtual fan experiences		

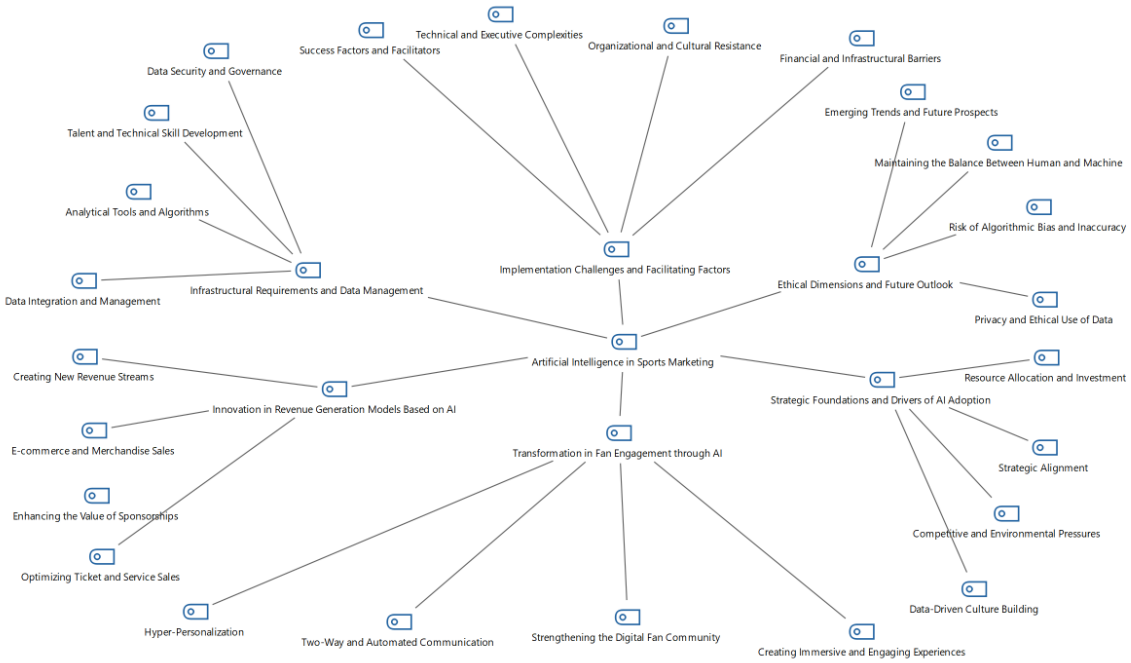

Figure 1. AI applications in sports marketing

The analysis of interview data led to the identification of six main selective categories that, together, form the conceptual model of AI applications in sports marketing. These categories include (1) Strategic Foundations and Drivers of Adoption, (2) Transformation in Fan Engagement, (3) Innovation in Revenue Generation Models, (4) Infrastructural Requirements and Data Management, (5) Implementation Challenges and Facilitating Factors, and (6) Ethical Dimensions and Future Outlook. This model demonstrates that the successful implementation of artificial intelligence is not merely a technical action but a strategic transformation that requires cultural, managerial, and infrastructural prerequisites.

Discussion

The analysis of in-depth interviews with 32 experts and managers, using Glaser's grounded theory methodology, yielded a six-dimensional model of artificial intelligence (AI) in sports marketing. The model comprises Strategic Foundations and Drivers of Adoption, Transformation in Fan Engagement, Innovation in Revenue Generation Models, Infrastructural Requirements and Data Management, Implementation Challenges and Facilitating Factors, and Ethical Dimensions and Future Outlook. Together, these dimensions explain why sports organizations adopt AI, how they use it to engage fans and generate revenue, and what conditions shape implementation.

The model addresses a gap in the literature identified in the bibliometric studies of Dindorf et al. (2023) and Ghosh et al. (2023), which documented substantial attention to applications such as biomechanics and performance analysis. In the marketing context, the findings position AI adoption as a strategic decision shaped by competitive and environmental pressures, the need to develop a data-driven culture, and alignment with organizational goals. This interpretation complements the account of slow AI adoption in the sports industry offered by Naraine and Wanless (2020) by identifying managerial resistance as a barrier and competitive pressure as a driver of change.

The findings on fan engagement build on Akbari et al. (2024) and Pashaie et al. (2024) by specifying four mechanisms through which AI can shape the fan experience. These

mechanisms include hyper-personalization, immersive experiences, automated communication, and the strengthening of digital fan communities. Hyper-personalization can, for instance, adapt the content a fan sees in an app or the offers they receive in a stadium based on their behavior in real time. Identifying these mechanisms helps explain how the relationships between AI use, personalization, and fan engagement described in earlier studies can take shape in practice.

The revenue dimension places applications such as sales forecasting and recommendation systems, identified by Momenifar et al. (2024), within a broader sports marketing strategy. Dynamic ticket pricing and improved sponsorship offerings illustrate ways AI can support established revenue streams. The sale of aggregated data and the introduction of fan tokens emerged as potential new sources of revenue. The model connects these opportunities to fan engagement by showing how more frequent and meaningful interactions can generate richer behavioral data that inform marketing decisions and help organizations identify new revenue opportunities.

The findings identified four infrastructural requirements for implementation. These include data integration, analytical tools, technical expertise, and data governance. The emphasis on data quality, security, and governance builds on the privacy concerns raised by Pashaie et al. (2024) and places these issues among the organizational conditions for effective implementation. The interviews also identified financial, organizational, and technical barriers. Participants emphasized cultural resistance alongside the cost and technical challenges discussed by Momenifar et al. (2024). Senior management support and pilot projects emerged as factors that can facilitate implementation.

Privacy, algorithmic bias, and the balance between automation and human judgment were recurring concerns in the interviews. These concerns are consistent with those reported by Pashaie et al. (2024). The findings suggest that how sports organizations address these issues can shape fan trust, particularly when AI personalizes interactions or processes fan data. Participants also emphasized the role of AI in supporting the creativity and judgment of marketing professionals while preserving the human interactions fans value. Smart stadiums and metaverse applications illustrate how this discussion may extend to emerging forms of fan engagement, consistent with the developments discussed by Keiper (2023).

Conclusion

The proposed model positions AI adoption in sports marketing as a strategic transformation that links fan engagement to revenue generation. More responsive and personalized fan experiences can produce data that help sports organizations improve existing revenue models and identify new opportunities. Realizing this potential depends on a data-driven culture, appropriate infrastructure, technical expertise, and the capacity to address financial and organizational barriers.

Sports managers can use the six dimensions to assess organizational readiness, identify gaps, and prioritize implementation. The model also supports a human-centered approach that incorporates privacy, addresses algorithmic bias, and preserves professional judgment in marketing decisions. Future quantitative studies can test the proposed relationships among the six dimensions and examine how they vary across sports organizations.

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