



VOLUME 1

AI, Sustainability and Digital Transformation: Shaping the Future of Business and Society

Technological Trends in the Event Management Market

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Abstract: The event management sector has experienced a significant technological transformation, creating both new opportunities and complex challenges for organizers and participants. This study explores emerging trends reshaping the planning and experience of events, with a focus on artificial intelligence (AI), which enables personalized program recommendations, chatbot interactions, and predictive analytics. Hybrid and virtual formats have become standard, offering interactive digital environments and gamified experiences. Technologies such as augmented and virtual reality (AR/VR) enhance engagement through virtual venue walkthroughs and immersive exhibitions. Smart devices, wearables, and Internet of Things (IoT) applications support access control, real-time analytics, and contactless transactions, while blockchain and non-fungible tokens (NFTs) add security and exclusivity to ticketing systems. Digital marketing strategies—like influencer outreach, short-form video content (TikTok, Instagram Reels), and AI-generated media—are also examined for their role in increasing event visibility and audience interaction. The study highlights sustainability efforts such as digital ticketing, energy-efficient infrastructure, waste reduction, and carbon offsetting. These innovations position technology not just as a logistical tool but as a driver of sustainable and impactful event design. Drawing on Hungary's recent experience in hosting international sporting events, we analyze fan engagement tools like dance cams, AI-powered look-alike cams, and personalized athlete intro cards. Expert interviews from the FINA World Championships (2022), World Athletics Championships (2023), and Swimming Championships (25m) (2024) offer insights into how such tools enhanced audience involvement and operational efficiency. The findings emphasize the strategic role of technology in enriching attendee experiences and delivering innovative, future-ready event solutions.

Keywords: Event Management, Innovations, Trends.

JEL Classification: JEL83

1. Introduction

Event management represents a dynamic and intellectually stimulating field of professional practice. Drawing on our experience, we can assert that no two events are alike; each presents unique challenges and opportunities for learning and adaptation. This inherent variability fosters continuous professional development and makes the field particularly attractive to those who pursue it as a vocation. The present study is grounded in these practical insights, with a primary focus on the role of emerging technological trends and innovations in contemporary event organization.

In the past decade, the event management sector has undergone a profound transformation driven by the rapid development and integration of new technologies. These innovations have reshaped nearly every dimension of event organization, from logistical planning and operational execution to audience interaction and post-event evaluation. Technologies such as artificial intelligence (AI), augmented and virtual reality (AR/VR), the Internet of Things (IoT), and blockchain are no longer futuristic concepts, but tangible tools that are being actively employed to enhance participant experiences and streamline management processes. As the expectations of audiences grow and digital engagement becomes increasingly essential, understanding the strategic application of these technologies has become vital for event professionals and researchers alike.

This paper aims to explore the transformative role of emerging technologies in modern event management, with a particular focus on fan engagement and experiential innovation. Specifically, the study investigates

how technologies such as AI-driven personalization tools, immersive digital platforms, and secure, transparent systems like blockchain are redefining how audiences interact with events. These developments are especially relevant in the context of large-scale international sports events, where technological integration can serve both as a differentiating factor and a driver of long-term value for organizers, participants, and stakeholders.

The relevance of this topic is underscored by the increasing competition within the global events industry, the shift towards hybrid and virtual formats accelerated by the COVID-19 pandemic, and the growing importance of sustainability in event planning. As event organizers strive to deliver memorable, inclusive, and efficient experiences, technology is becoming a central pillar in achieving these goals. Moreover, the digital preferences of younger generations and the widespread use of social media platforms such as TikTok and Instagram are prompting organizers to rethink traditional communication and engagement strategies, giving rise to a new era of interactive and data-driven event experiences.

To examine these dynamics, the study is guided by the following research questions:

1. How do AI-powered fan engagement tools influence audience interaction, emotional involvement, and overall satisfaction at international sporting events?
2. What are the operational and strategic benefits of implementing technologies such as IoT, AR/VR, and blockchain in event management?
3. In what ways do these technologies contribute to the long-term innovation, competitiveness, and sustainability of event planning practices?

The methodological approach chosen for this research is qualitative, centered on in-depth expert interviews. This method was selected due to its ability to capture nuanced, experience-based insights that go beyond surface-level observation. Interviews were conducted with professionals directly involved in the planning, development, and execution of fan engagement initiatives at three major international sports events hosted in Hungary: the 2022 FINA World Championships, the 2023 World Athletics Championships, and the 2024 Swimming Championships (25m). These events serve as rich case studies due to their scale, global visibility, and the variety of technological tools implemented—from AI-powered look-alike cams and personalized athlete intro cards to interactive audience activations.

The structure of the paper is as follows: the next section presents a comprehensive literature review that outlines key trends and theoretical frameworks related to technology in event management. This is followed by a detailed methodology section explaining the research design and interview process. The findings section then summarizes key insights from the interviews, illustrating how specific technologies impacted both audience experience and operational performance. The discussion section interprets these results in light of the research questions, highlighting implications for future practice. Finally, the conclusion offers a synthesis of the findings and recommendations for further research and technological innovation in the event sector. Through this investigation, the paper seeks to contribute to a deeper understanding of how technology is not only enhancing events operationally but also serving as a catalyst for engagement, innovation, and sustainable growth in the field of event management.

2. New trends in the Event Management Market

The sports event management industry has experienced rapid transformation due to the integration of advanced digital technologies, including artificial intelligence (AI), augmented and virtual reality (AR/VR), the Internet of Things (IoT), blockchain, and sustainability-focused innovations. These technologies improve operational efficiency, enhance fan engagement, and support stakeholder satisfaction, particularly in large-scale international sports events where audience expectations are increasingly digital and interactive

2.1. Artificial Intelligence and Chatbots

AI technologies facilitate dynamic personalization and predictive analytics within event contexts. Machine learning models analyze attendee behavior, enabling customized program recommendations and intelligent matchmaking, which ultimately enhance satisfaction and networking outcomes (Buhalis & Amaranggana, 2015; Wang et al., 2022). The Web Summit in Lisbon exemplifies this trend by utilizing AI-driven matchmaking to connect participants with shared interests (Web Summit, 2024). Additionally, chatbots serve as virtual assistants, providing instant responses regarding schedules, venue information, and ticketing, which significantly improves customer service (Gretzel et al., 2015). These AI systems also leverage big data from previous events to predict attendance and optimize resource allocation. *“AI systems can also continuously ‘learn from experience’ and therefore the route taken to the outcome might be different each time the AI system is run.”* (WTTC, 2024, pp9).

Functions in sports events:

- Personalized match and session recommendations
- Interactive Q&A and fan engagement support
- Real-time notifications for schedule updates

2.2. Hybrid and Virtual Events

The COVID-19 pandemic accelerated the adoption of hybrid event formats, combining in-person and virtual participation. This shift has been widely studied, showing increased accessibility and engagement, but also challenges in maintaining immersive experiences and community building (Getz & Page, 2020; Neuhofer et al., 2015). Apple Keynote and Microsoft Ignite demonstrate best practices in delivering high-quality streams with interactive features such as live polls and Q&A, which enhance attendee involvement (Apple, n.d.; Microsoft Ignite, n.d.). Virtual festivals like Tomorrowland’s Around the World leveraged 3D virtual spaces and multiple camera angles to mimic physical event dynamics (Filo et al., 2015). Virtual components of events such as FIFA Fan Fest and the NBA 2K League demonstrate how hybrid formats increase accessibility while challenging organizers to maintain immersive experiences and community building (Apple, n.d.; Microsoft Ignite, n.d.).

Functions in sports events:

- Remote participation for international audiences
- Interactive elements such as live polls, quizzes, and Q&A
- Virtual community building and engagement

2.3. Augmented and Virtual Reality (AR/VR)

Immersive technologies such as AR and VR enrich event experiences by facilitating novel ways to explore venues and products (Neuhofer, et al, 2015). AR applications at Coachella allowed attendees to experience performance visuals through mobile devices, fostering greater engagement (Sánchez-Cañizares & López-Guzmán, 2012). Similarly, the Mobile World Congress showcased VR demonstrations of emerging 5G tech, while New York Fashion Week offered fully virtual runway shows accessible remotely (Tussyadiah et al., 2018). Research suggests that immersive technologies increase emotional engagement and recall in event

settings (Hilken et al., 2017). VR solutions have been used for virtual stadium tours and live match simulations, enhancing emotional engagement and recall (Hilken et al., 2017). Examples include AR visualizations at UEFA Champions League matches and fully virtual fan experiences at swimming championships.

Functions in sports events:

- Virtual stadium exploration and match visualization
- Real-time data overlays and immersive fan experiences
- Interactive sponsor content and marketing activation

2.4. Smart Contracts and Vendor Management

Smart contracts serve as automated tools that streamline the logistics of events by enforcing specific terms, including deadlines and payment schedules, based on conditions that have been previously agreed upon. This automation plays a crucial role in minimizing administrative inefficiencies and reducing the likelihood of disputes among stakeholders (Chen et al., 2021). By leveraging this technology, event supply chains are poised for a significant transformation, enabling more agile and transparent relationships between vendors and organizers, ultimately enhancing the overall efficiency of the event planning process (Chen et al., 2021).

2.5. IoT and Smart Devices

IoT solutions like RFID-enabled badges and NFC smart wristbands are critical for streamlining event operations, enabling real-time crowd analytics, and improving security (Gretzel et al., 2015). Disney's MagicBand+ wristbands provide a seamless contactless experience integrating entry, payments, and ride interactions, exemplifying IoT's role in enhancing visitor journeys (Buhalis & Leung, 2018). Studies indicate that IoT-enabled environments allow data-driven event planning, including heatmaps and flow optimization, improving safety and satisfaction (Leung et al., 2013). CES utilizes RFID for real-time visitor tracking, enabling organizers to adapt spatial layouts dynamically (Wang et al., 2022). Real-time crowd tracking enables organizers to optimize stadium layouts, improve safety, and enhance the overall experience (Leung et al., 2013).

Functions in sports events:

- Contactless entry and cashless payments
- Real-time crowd flow and safety monitoring
- Personalized fan engagement and experiences

2.6. Blockchain and NFT Ticketing

Blockchain technology provides a tamper-proof solution for ticketing, significantly reducing fraud and resale abuses. Additionally, NFTs create new opportunities for innovative digital assets and exclusive VIP access (Regner et al., 2019; Ulrich et al., 2021). YellowHeart's groundbreaking blockchain ticket sales for Kings of Leon concerts were a pioneering effort in integrating NFTs with the delivery of exclusive content, thereby enhancing fan engagement (Müller et al., 2023). Coachella's 2022 NFT ticket pilot further demonstrates the potential of blockchain to create unique digital memorabilia while ensuring secure event entry (Coachella, 2022). Scholarly research underscores the capacity of blockchain to decentralize event management, thereby

enhancing transparency and fostering trust among stakeholders (Atzori, 2017). Early implementations in music events have inspired sports organizations to integrate NFTs for memorabilia, premium access, and interactive fan content, increasing loyalty and engagement (Müller et al., 2023).

Functions in sports events:

- Secure, transparent ticketing systems
- Exclusive digital content and collectibles
- Enhanced fan trust and decentralized management

2.7. Social Media and Digital Marketing

The use of short-form videos (TikTok, Instagram Reels), influencer partnerships, and user-generated content (UGC) increasingly drives event promotion and engagement (Zeng et al., 2021). VidCon's TikTok Live sessions and the NFL's AR-enhanced Super Bowl campaigns demonstrate effective digital engagement strategies (Li et al., 2020). Research underlines the efficacy of AI-powered content generation in enhancing marketing reach and personalization (Wang et al., 2022).

Functions in sports events:

- Interactive fan engagement through social media
- Personalized marketing and promotion
- Live streaming and behind-the-scenes access

2.8. Sustainable Tech solutions

Sustainability has emerged as a vital component of event management, with an increasing emphasis on digital tickets, renewable energy utilization, and waste reduction strategies (Mair & Jago, 2010). The Glastonbury Festival stands out with its initiative to eliminate single-use plastics and implement solar-powered stages, serving as a model for environmentally conscious event practices (Glastonbury, n.d.). Coldplay's "Music of the Spheres" tour showcases innovation through kinetic energy-harvesting dance floors, demonstrating how technology can engage audiences while minimizing environmental impact (Energy Floors, n.d.). Additionally, the carbon-neutral certification of the Google I/O Developer Conference illustrates the practicality of incorporating sustainability into large-scale tech events (South Pole, 2023). Stadiums and events increasingly adopt energy-efficient technologies, carbon-neutral certifications, and initiatives to minimize single-use plastics, catering to environmentally conscious fans (South Pole, 2023).

Functions in sports events:

- Reduced environmental footprint via sustainable technology
- Energy-efficient stadium operations
- Eco-friendly fan engagement experiences

Emerging technologies converge to create fan-centric, efficient, and sustainable sports event ecosystems. Challenges remain, including data privacy concerns, energy demands, and unequal access to digital

platforms. Future research should focus on responsible technology adoption, interoperability standards, and long-term impacts on fan experience and sports event economics (Getz & Page, 2020; Müller et al., 2023).

3. Methodology and results

3.1. Methodology

The topic of our research necessitated the application of two complementary methods to provide a comprehensive overview: both primary and secondary research were conducted. As secondary research, we primarily analyzed relevant literature related to digital technologies, artificial intelligence (AI), smart devices, social media, sustainability, and online and hybrid events. These topics are essential for the scope of our study, and thus both earlier and recent publications were reviewed. Given that this is a constantly evolving field, up-to-date knowledge is indispensable; therefore, we supplemented the literature review with insights obtained from interviews.

For the primary research, we conducted interviews with professionals working in event management whose expertise is relevant to the subject. Each interviewee has significant experience in organizing major events and works in different areas of the industry, which is reflected in the variety of perspectives—particularly regarding the importance and role of AI in event planning, organization, and execution. In total, we interviewed four experts who have recently and frequently engaged with AI, applying it in various phases of events, although the perceived usefulness and importance of AI differ depending on their professional domains. For instance, its perceived value varies between those who use AI in designing entertainment programs and those responsible for delivering these experiences to audiences. This divergence in viewpoints was the most notable; in other respects, there was broad consensus.

The interviews were conducted between June and July 2025, lasting between thirty minutes and one hour each. We chose interviews as our research method because they allow for an in-depth understanding of expert perspectives within the specific professional domain—in this case, the use of digitalization and AI in events. The process yielded positive experiences, with all interviewees being cooperative and forthcoming. We consider the number of interviews conducted to be sufficient for the current stage of research. All interviews followed a preliminary interview guide, ensuring comparability, while also allowing flexibility to reflect the specific expertise and experiences of each participant. In total, we asked our interviewees 11 open-ended questions covering topics such as the trends characterizing event management, our level of competitiveness, the use of digital technologies and artificial intelligence in event management, possibilities for audience entertainment, similarities and differences among the examined three events, and future trends in the use of technologies.

3.2. Results

The interviews were conducted in the summer of 2025 with individuals experienced in organizing sports events. We have had the opportunity to collaborate with them on multiple occasions, including at the events under study (FINA 2022 World Championships, 2023 World Athletics Championships, and 2024 Swimming Championships (25m)), enabling us to assess their professional expertise first-hand. The interviewed professionals were:

Gábor Varga, Presentation Manager, Sport Events

Gábor Korpás, Program Editor, Sport Events

Zoltán Mag, Television Director, Chief Director at sports events

Lajos Varga-Nagy, TV Technical Manager, Director at sports events

The interviewees' diverse professional backgrounds are reflected in the variation of opinions in certain areas of the findings. Overall, however, responses to most questions were aligned. While four interviews are insufficient for establishing definitive categories, there was a clear pattern: the two professionals responsible for sport presentation and program content shared largely similar views, as did the two TV directors, albeit from a different perspective.

All interviewees indicated 2017 as the year from which they began working on sporting events organized primarily by Sport Events. Prior to that, each had accumulated experience in various areas of event management, and all had worked for television channels in roles aligned with their professional expertise, thus possessing substantial broadcasting experience. This is a significant detail, as it means all participants have a clear understanding of what spectators and fans seek, and how their attention can be captured and maintained for both shorter and extended periods.

Following the first interview, it became evident that questions relating to digital technology were no longer particularly relevant, as it is virtually impossible to plan or execute an event without it (although, in our framework, these were still addressed alongside questions concerning artificial intelligence). In contrast, questions about AI were both timely and, in certain respects, divisive, as noted earlier.

Competitiveness

Respondents agreed that Hungary is competitive in organizing large-scale international sporting events, with budget being the most decisive factor, as many aspects depend on it. Naturally, there is a significant difference between an event held weekly and one staged every four years. In terms of audience entertainment, however, one interviewee noted that Hungary lags behind, as there is often a lack of conceptual input from clients, making it difficult to finance impactful program elements within a given budget. All participants concurred that engaging the audience is essential, as these moments create lasting memories and experiences—both before and after the competition itself—and thus play a crucial role in the overall event experience.

The role of digitalization in event management

As previously noted, digital technology is employed at every stage of event organization and is therefore considered a fundamental element. In contrast, artificial intelligence is approached with a degree of caution, as it is less familiar and still being learned; nevertheless, it is already being used in planning, lighting design, educational initiatives, and idea generation, as well as experimentally in graphic design. While the ease of implementation remains a question, AI has the potential to open new avenues in event management. Larger events, supported by more substantial technical resources, can more readily incorporate both digital and AI solutions, whereas smaller events typically do not employ them.

For spectators, it is essential to receive memorable experiences from entry to departure, and AI can contribute to this through various entertainment activities—though such applications are budget-dependent. The first such implementation occurred at the 2024 Swimming Championships (25m). However, there have also been instances (outside the scope of the events studied) where ChatGPT was used to prepare

quiz questions, but the system was unaware of recent rule changes, making it necessary to treat its proposed questions and answers with caution.

An important consideration is the extent to which professional organizations are open to adopting these technologies and regard them as significant for a given event. The interviews revealed that while some organizations are not receptive to sport presentation, others—such as the Handball Federation, Volleyball, Fencing, and Water Polo Federations—are open to it and even have dedicated staff responsible for such initiatives.

As previously noted, events cannot function without digital technology. Artificial intelligence introduces new possibilities, facilitating and accelerating organizational processes. For instance, it can be effectively used to draft running orders, contracts, and quizzes, or to quickly retrieve “consumable” information—although the generated content must be verified (as illustrated by an earlier example). AI represents an opportunity worth exploiting, as it can be intelligently integrated into the planning process or incorporated into entertainment elements. One respondent highlighted its usefulness for image manipulation, although this requires substantial programming expertise.

The ease of use and time requirements for implementing these technologies in event organization elicited somewhat differing responses, depending on the specific domain in which they are applied. Considering digitalization alone, respondents unanimously agreed that it is easy to use and reduces the time required for planning and organization, as previously mentioned. However, when focusing specifically on artificial intelligence, issues such as legal concerns, copyright, and the novelty of the technology itself often extend the required time, as its full scope of applications is not yet entirely clear. In addition, prompts must often be refined repeatedly for AI systems such as ChatGPT to generate satisfactory answers. Over time, as AI proficiency increases, searching for results and implementing solutions will become easier and faster.

The conceptualization and execution of an entertainment element often take longer, which does not always fit within an event’s time constraints. Consequently, AI-based entertainment is sometimes abandoned in favor of simpler games, particularly given the high costs associated with AI-driven activities. During preparations, an effective solution may be to employ an MC (master of ceremonies) capable of filling time in the event of a technical issue with AI implementation.

Audience entertainment

AI-powered entertainment—such as a face swap game, in which the face of a selected spectator is transformed into that of a famous individual—must be tested multiple times before being used in a live setting, as several potential sources of error may occur.

Spectators tend to enjoy games, a preference often influenced by the openness of the audience and their degree of engagement with the activities. Without such engagement, even elaborately designed games, which often require substantial financial investment, fail to resonate due to a lack of audience receptivity. Frequently, a minimalist approach proves more effective; for instance, activating the audience through collective shouting or coordinated wave motions can generate a stronger impact and enhance the overall experience more than more complex interactive tasks—such as requiring participants to play a game on their phones, imitate Hungarian words as foreigners, dance cam, catch virtual birds, become celebrity look-alikes using AI-assisted face-swapping technology, or mimic emojis. Consequently, continuous gameplay integration is not always feasible due to budgetary constraints or limited broadcast time.

The use of these digital technologies and innovations is also of interest from the athletes' perspective. Based on our analysis of international sporting events, it is observable that, especially during the initial days, some athletes experience discomfort (although not all) when required to enter the field through unconventional means—such as an introductory gate showcasing competitors or passing through a revolving gate. For this

reason, organizers often provide athletes with rehearsal opportunities to ensure they can enter the competition venue in a manner that preserves their comfort and concentration. Coaches frequently shield their athletes from these elements to maintain optimal focus.

From a broadcasting standpoint, however, it is essential to consider the visual presentation of athletes during live coverage, prompting the incorporation of deliberate show elements in how competitors approach the starting line. Thus, the reception of these performative aspects is highly individualized; some athletes may mentally disengage due to concentration demands, effectively being absent from the show element as they focus on their event. Modern awareness underscores the necessity of enhancing the appeal and engagement of competitions and their broadcasts for spectators and fans alike.

An alternative perspective regarding digital technology pertains to its widespread use in statistical data collection and performance measurement by athletes and their support teams. This demonstrates that digitalization manifests across multiple domains within sports.

All respondents agreed that the United States can be regarded as a leading example in the utilization of digital technology and artificial intelligence, followed by the United Kingdom, Saudi Arabia, and Qatar, with the latter two primarily due to financial resources. In these countries—particularly in the USA—the entertainment of spectators and fans, and notably entire families, is managed in a highly complex manner, reflecting the fact that these sporting events function as family-oriented programs.

Hungary is considered competitive in the use of digital technology and artificial intelligence within the domain of sports events, although this largely depends on the event's budget. Beyond openness, there is a need to boldly adopt these technologies and to further develop entertainment aspects, with the USA serving as a prominent example in this regard.

Comparison of the examined events

A key similarity across all three international sports events analyzed is that the respective international federations (swimming and athletics) evaluated them as highly well-organized, which is a significant accolade for Hungary and confirms its competitiveness in hosting major international sporting events. Nonetheless, the World Aquatics (WA) expresses a desire for new directions, citing a decline in the popularity of these sports. They believe that broadcasts must become more marketable, necessitating increased drama, excitement, and audience engagement from the spectators' perspective.

Since swimming competitions are held in enclosed venues, the spectator atmosphere tends to be darker and less vibrant compared to events such as water polo matches, which are often hosted in open facilities. Consequently, the sport presentation teams must consider these factors when designing entertainment elements.

A further similarity observed across the three examined events was the inclusion of various interactive games involving audience participation (e.g., kiss cams, dance cams). Additionally, all events employed the so-called intro gate or intro card, a modernized method for athlete presentation involving short introductory video clips projected onto LED screens, allowing athletes to showcase themselves as they wish. Each sporting event featured mascots designed to entertain and engage the audience, thereby enhancing the spectator experience. In the United States, the tradition and application of mascots are more extensive and multifaceted compared to Hungary, where their presence is primarily limited to photo opportunities.

An innovation first introduced at FINA 2022—the intro gate and intro card—was subsequently adopted at other sporting events, including the 2023 World Athletics Championships held in Hungary, setting a precedent that other countries later followed. The “walking DJ,” a performer carrying a DJ console on their shoulder while dressed as a disc jockey, also debuted at the Athletics World Championships and received great acclaim. While the concept holds potential for repeated use, it is challenging to find individuals capable

of effectively engaging the audience and sustaining a vibrant atmosphere in this role. Alongside the walking DJ, the live music medal plaza also represented a novelty. This concept, later emulated at events in other countries, involved postponing the medal ceremonies to the day following the competitions, prior to the afternoon or evening sessions. This arrangement allowed athletes to celebrate their podium finishes directly in front of the spectators, fostering closer interaction between athletes and fans.

Another innovation at the Athletics World Championships was the presence of live intro bands performing as finalists entered the competition arena.

In 2024, artificial intelligence was employed for the first time at the Swimming Championships (25m) to entertain spectators through interactive singing games—an approach not used previously. In addition, the intro gate, which debuted in 2022, was updated with a revolving gate mechanism.

The interviews clearly revealed that the nature of the on-site audience on a given day significantly influences outcomes. It was frequently observed that what worked successfully on one day did not necessarily achieve similar success at another time. Often, less is more; for example, activating mobile phone cameras in the evening, coordinated wave motions, or encouraging the audience to sing or wave their hands can have a much greater impact during an event. This indicates that while digital solutions are effective, they do not always achieve the desired effect. As previously noted, digital technologies tend not to function well at smaller events but have a much higher likelihood of success at large international competitions.

An illustrative counterexample can be found in the World Athletics Championships and the Swimming Championships (25m), where one of the most popular audience engagement programs was the “T-shirt cannon.” This device, which launches pre-packaged t-shirts using compressed gas, generated significant excitement, with spectators eagerly running to catch the apparel in the targeted zones. Many attendees appreciate receiving tangible items, and the t-shirt cannon served both as a physical giveaway and a memorable experience for the audience.

Another contemporary and much-discussed example highlights the drawbacks of digital technology use. Certain entertainment elements may pose significant risks; for instance, during a Coldplay concert in the summer of 2025, a segment featuring a couple who were later revealed not to be in a romantic relationship but instead had separate families, sparked widespread attention. The incident generated extensive online discourse and became a source of internet memes. From a research perspective, however, the focus lies not on the viral nature of the event but rather on the implications for entertainment programming. Specifically, it raises questions about the extent to which such entertainment is truly enjoyable for participants who may not wish to appear publicly, and concerns related to data protection regulations such as GDPR, as well as broader ethical and legal considerations.

Thus, while the application of these technologies can be innovative and engaging, their use also prompts numerous important questions. It was repeatedly noted that spectators often exhibited reluctance to participate in entertainment activities involving digital technology or artificial intelligence, frequently due to shyness or discomfort with public exposure, rendering such situations uncomfortable for them.

Future digital trends

The final section of the research focused on the anticipated changes in digital technology and artificial intelligence (AI) over the coming years, as perceived by the interviewed experts, and how these developments are expected to impact the organization of sporting events. All interviewees agreed that AI will continue to evolve and be increasingly utilized across a growing number of events, particularly as its most effective applications become better understood. Advancements are expected in lighting, sound technology, and imaging, alongside an expanded role for drones. AI will be progressively employed in visual

design, control systems, data analysis, automation, and the deployment of intro cards, as well as in entertainment games, which are likely to have shorter life cycles and will require openness to innovation.

Event organizers, however, hold a somewhat different perspective regarding the role and future of AI. While they concur that AI's use will expand and become necessary in many areas, they question whether investing substantial resources and attention into AI is always justified or cost-effective. Notably, AI is not currently used in program editing but is applied in design planning. As previously discussed, audience activation through simple means—such as coordinated clapping, t-shirt cannons, or communal singing—generates significantly stronger experiences and atmospheres than digital interactions like playing games on mobile phones or mimicking emojis. The emphasis lies on evoking emotions and promoting physical engagement.

Summary of the examined topics

Table 1. Result of the interview

Topic	Key Findings from Interviews	Comparative Insights
Competitiveness	Hungary is competitive in hosting large international sporting events; budget is the decisive factor.	Large-scale events allow more innovation than smaller or recurring events.
Audience Entertainment	Audience engagement is essential for creating memorable experiences.	Simple activation tools (clapping, singing, waves) often outperform digital games.
Digitalization	Digital technologies are fundamental and used in all phases of event management.	High effectiveness regardless of event type or size.
Artificial Intelligence (AI)	AI is in an early adoption phase; mainly used for planning, design, and idea generation.	Larger events are more capable of integrating AI solutions.
AI-based Entertainment	Innovative but costly and technically risky; requires extensive testing.	Frequently replaced by simpler, more reliable entertainment elements.
Athletes' Perspective	Reactions to show elements vary; some athletes experience discomfort.	Rehearsals help maintain concentration and acceptance.
International Comparison	The USA leads in digital and AI-driven entertainment, followed by the UK, Saudi Arabia, and Qatar.	Financial resources strongly influence implementation depth.
Future Trends	Increasing AI use, automation, drones, and advanced visual technologies.	Shorter life cycles of entertainment concepts and growing need for innovation.

Source: Own edited

In summary, the interviews provided valuable and insightful information that complements the theoretical framework outlined earlier. Given that event management is a highly practical discipline, the study prioritized presenting practical examples and firsthand experiences that can be readily applied by professionals in the field.

Based on the above, the following conclusions can be drawn in response to the research questions.

Regarding the first question (“How do artificial intelligence-driven fan engagement tools influence audience interaction, emotional involvement, and overall satisfaction at international sporting events?”), the interviews with experts clearly indicate that we are still in the early stages of understanding how and in what forms AI can be effectively applied to engage audiences, and therefore experience remains limited. As

mentioned, AI was first utilized for audience entertainment at the 2024 Swimming Championships (25m). This represented a novelty for both organizers and spectators. The reception of the face swap game was positive, with fans expressing enjoyment. Future inquiries will focus on identifying additional entertaining elements that can be developed and implemented to enhance audience engagement. Consequently, limitations arise primarily from available funding, creativity, and the demographic composition of the audience.

However, it is also important to emphasize—based on the interview data—that simpler audience activation methods such as collective singing, coordinated clapping, and wave motions produced greater emotional involvement and satisfaction among spectators. These traditional forms of engagement remain the most effective and reliable means of fostering audience participation at sporting events.

Regarding the second research question (“What are the operational and strategic advantages of applying technologies such as IoT, AR/VR, and blockchain in event management?”), the focus primarily lies on the perspectives of event organizers and sports presentation teams. In contemporary event management, these technologies are indispensable; for example, real-time data on the number of spectators present at the venue directly influences the type, frequency, and duration of interactive games conducted. There have been instances where, despite the original schedule including the use of a T-shirt cannon, its deployment was cancelled due to insufficient audience numbers. LED walls and other projection technologies significantly enhance the fan experience, as the mode of communication—through graphics, sound, and lighting effects—plays a critical role in how effectively information and content are conveyed to the audience. The responsibility of the sports presentation team is to design increasingly engaging and impactful virtual and other elements to entertain spectators, for example by creating fan zones, quiz tasks, and providing additional statistics and information.

The third research question addressed how these technologies contribute to the long-term innovation, competitiveness, and sustainability of event management practices. Based on both interviews and our own experience, it can be concluded that the use of digital technologies is fundamental, as they are employed across all areas of event organization. The availability of documents such as event scripts in cloud storage supports sustainability by reducing the need for printed materials compared to previous practices. Artificial intelligence, however, represents a somewhat different case, as it is relatively new, and limited experience exists regarding its precise and effective applications. AI facilitates preparatory work, for instance, by assisting in writing running orders or compiling quiz questions. Conversely, AI-based entertainment games present more complex and costly challenges. Nonetheless, AI enables innovative solutions, and with accumulating experience from event to event, increasingly competitive applications can be developed.

4. Conclusion

This study provides a comprehensive examination of the latest trends in digital and AI technologies within event management, with a particular focus on their application in Hungarian and international sports events. While digital technology is firmly established across all phases of event organization, AI remains in the early stages of adoption, constrained by budget, time, and familiarity. Tools that simultaneously enhance audience experience and operational efficiency offer the highest added value.

The results of the expert interviews conducted as part of the primary research reveal that while digital technology has become an indispensable prerequisite in all phases of event organization, the application of artificial intelligence remains in an experimental stage, often constrained by limitations in budget, time, or expertise. The findings indicate that the tools delivering the greatest added value are those capable of simultaneously enhancing audience experience and supporting organizational efficiency. At the same time, the interviews emphasize that audience engagement is often achieved most reliably through simple, low-cost methods (e.g., orchestrated applause, audience waves, T-shirt cannons).

Case studies from FINA 2022, the 2023 World Athletics Championships, and the 2024 Swimming Championships (25m) demonstrate Hungary's competitiveness in hosting large-scale international events, while also revealing opportunities for further development in entertainment and interactive elements. For successful future integration, expanding technical expertise, fostering creativity, and considering audience receptiveness will be essential.

Based on the interviews, a clear distinction emerges between the perceptions of digital technology and artificial intelligence (AI). While digitalization has become a fundamental and indispensable tool in event management, the application of AI remains largely experimental, primarily serving supportive functions such as planning and preparation.

A comparison of the examined events indicates that large international sporting events provide a more favorable environment for testing innovative digital and AI-based solutions, whereas the effectiveness and return on investment of these technologies are more limited at smaller-scale events.

In terms of audience entertainment, the interviews consistently highlighted that simple, emotionally engaging, and community-oriented activities (e.g., collective singing, clapping, waves, T-shirt cannons) often have a greater impact than costly and technologically complex digital games. This finding was recurrent across multiple events and respondents.

From an international perspective, Hungary can be considered competitive, particularly in terms of organizational quality and innovation. However, budgetary constraints and audience receptiveness represent significant influencing factors. The example of the United States demonstrates that the effective implementation of advanced technological solutions and complex entertainment concepts is closely linked to adequate financial and cultural resources.

The research findings contribute to the strategic and informed use of technological innovations in event management, aiming to enhance long-term competitiveness, sustainability, and the overall audience experience.

Conflict of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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