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Artificial Intelligence Adoption in Event Logistics: Barriers, Critical Success Factors, and Expert Consensus from a Delphi Study

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Abstract

Background: Artificial Intelligence (AI) is increasingly adopted across logistics and service operations, yet limited research explains how it supports back-end event logistics or what factors enable or hinder its implementation. This study investigates how AI can be applied across event logistics processes and identifies the key barriers and critical success factors shaping its adoption. *Methods*: A sequential exploratory qualitative design was employed. First, semi-structured interviews with experienced event professionals generated context-specific insights. These findings informed a two-round Delphi study with 10 experts, where items were prioritised and consensus assessed using Kendall's coefficient of concordance (W) and chi-square tests. *Results*: The results indicate that AI delivers the greatest value in pre-event planning activities, particularly scheduling and supplier coordination. Resistance to change and the lack of industry-specific AI tools emerged as the main adoption barriers, while technological infrastructure, system integration, and change management were identified as critical success factors. *Conclusions*: The study provides practical guidance for event organisers and technology providers by highlighting where AI investments are most likely to generate operational benefits and how organisational readiness can be strengthened. It also underscores the need for improved sustainability-focused tools and better data practices.

Keywords: artificial intelligence; event logistics; technology adoption; digital transformation; Delphi method; barriers and critical success factors; event management

Check for updates

Academic Editor: Mladen Krstić

Received: 20 January 2026
Revised: 5 February 2026
Accepted: 10 February 2026
Published: 12 February 2026

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1. Introduction

The emergence of new technologies has established Artificial Intelligence (AI) as a gamechanger in logistics and supply chain management. The global AI in logistics market was estimated at around USD 17.96 billion in 2024 and is expected to grow significantly by 2034 [1]. As the global events industry experiences rapid growth and increasing complexity driven by globalisation and rising customer expectations [2], event logistics, encompassing planning, transportation, and execution, have become the core of successful management. However, conventional event management remains plagued by repetitive tasks, resource allocation challenges, and human errors that can compromise the experience [3]. Consequently, understanding the drivers and barriers to adopting AI technologies is crucial for achieving projected economic growth [4].

The current literature acknowledges the wider impact of digital transformation on supply chains and logistics [5], noting AI's ability to enhance operational efficiency, resource allocation, and forecasting [6]. Within the specific context of logistics, there is a growing focus on implementing new technologies, such as machine learning and predictive analytics, to improve decision-making, automate processes, and minimise waste [7]. Research indicates that AI can forecast attendance, optimise supply chains, manage crowd flow, and compute transportation [8]. Additionally, attendee support during events can be enhanced through Chatbots and AI-powered apps [9,10]. Furthermore, researchers have recognised the growing importance of data-driven decision-making and smart technologies in the context of events [11].

Despite the acknowledged potential of these technologies, a crucial knowledge gap remains regarding how AI specifically supports back-end logistical procedures in event management, as most of the literature concentrates either on innovations that interact with customers or on the general adoption of event technology. Although the logistical complexity of events is well known, little empirical research has examined how AI tools are used across these stages. Even less is known about the organisational circumstances that facilitate the integration of AI and the obstacles that event professionals encounter while implementing it.

Although AI has been widely examined in supply chain management and logistics contexts, where studies demonstrate improvements in forecasting, optimisation, and operational efficiency [5–7], its application within event logistics remains comparatively underexplored. Existing research in events has predominantly focused on customer-facing technologies, such as chatbots, virtual assistants, and enhanced attendee experiences [9,11], while the back-end logistical processes that underpin event delivery, planning, scheduling, supplier coordination, and post-event evaluation, have received limited systematic investigation. This imbalance is problematic because event logistics differ fundamentally from traditional supply chains: they are temporary, highly time-constrained, resource-intensive, and characterised by demand uncertainty and one-off configurations [11,12]. As a result, insights derived from conventional SCM or logistics settings may not transfer directly to event environments.

Consequently, a clear knowledge gap exists regarding how AI can support operational decision-making in event logistics and what organisational conditions enable or hinder its adoption. Addressing this gap is critical both theoretically, to extend digital transformation research to temporary and project-based operations, and practically, to guide event organisers in prioritising investments. Therefore, this study uniquely focuses on identifying where AI adds value across event logistics processes and systematically examining the barriers and critical success factors influencing its implementation through an expert-based exploratory and Delphi approach.

To address these deficiencies, this study aims to investigate the implementation of AI in event logistics. The research is intended to broaden both the academic and practical domains of knowledge by identifying the key critical success factors and barriers pertaining to the innovation of event management. To achieve this, the study is guided by three specific research objectives: to define how AI technologies may impact event logistics processes; to identify barriers related to technology integration in event logistics; and to examine the critical success factors for AI adoption in event logistics.

To achieve a comprehensive understanding of this phenomenon, a mixed-methods qualitative research design was employed. Following exploratory interviews, the Delphi method was applied to a panel of experts to validate the findings and identify consensus. The results confirmed that AI is perceived as most beneficial in early-stage event processes such as planning and scheduling, while resistance to change and the lack of industry-specific AI tools emerged as the most pressing barrier. Furthermore, the success of AI implementation was shown to rely primarily on robust technological infrastructure, system integration, and effective change management. From a practical perspective, this offers clear guidance to event organisers and technology providers on where to focus resources and how to anticipate implementation challenges.

2. Theoretical Framework

This section synthesises the literature specifically relevant to the study's analytical focus rather than providing a broad review of events or artificial intelligence more generally. It concentrates on three constructs that directly inform the research design: (1) the characteristics of event logistics processes, (2) the application of AI within event and logistics contexts, and (3) the barriers and critical success factors influencing AI adoption.

2.1. Events

Events are unique interactions between the environment, participants, and management systems [12], which require rigorous design and production to satisfy defined strategic goals [12]. While they serve to bring people together [13], the organisation of such events presents enormous and complex logistical challenges, ranging from infrastructure design and transportation to inventory management and production scheduling, regardless of the event scale [14].

For successful event logistics, it is essential to manage multiple logistics processes, involving production and technical staff, supplies, products, and information during Pre Event, On Event, and Post Event, depending on the type of event, the relative importance of each phase may vary [13]. These phases are essential for the seamless execution and closure of the event, and the movement of large and complex equipment, alongside the integration of innovative technologies, underscores the importance of pre-event planning and real-time management [15].

The first phase, Pre-Event, ensures all resources are in place when needed, including the delivery and setup of equipment, facilities, and services, ensuring timely arrivals of performers and attendees, and preparing the site [15]. For effective logistics planning, events hinge on accurate demand forecasting, as resource needs, such as food and drinks, seating and transportation, are often proportional to the anticipated audience size, to decide on optimal order quantities for these resources the process of inventory management is crucial, ensuring the availability of essential resources and talent for event success [14].

During the event, communication is critical for attendees to access necessary information and for event staff to coordinate effectively. The logistics manager's role and responsibilities are crucial, including effectively managing and communicating with other managers to connect every aspect of the event [13]. Logistics focuses on the movement and coordination of people, equipment, and goods within the site. This includes managing crowd flow, transportation systems (e.g., shuttle buses, pick-up and drop-off points), and communication plans for routine operations and emergencies, ensuring safety and maintaining order at an event [15].

Ultimately, the Post-Event evaluates the organisation's success and the differences between what was planned and performed and measures the event's outcomes [13]. In this phase, operations involve reversing many pre-event activities, beginning with the safe dispersal of attendees. This requires careful planning to manage traffic flow, public transportation, and taxi services, especially when large crowds leave simultaneously [15]. For an event to succeed, it hinges on having the correct elements in the right place at the right time. Logistics demands meticulous organisation and planning to consistently complete several duties, such as forecasting, production planning, inventory management, and transport planning [14].

https://doi.org/10.3390/logistics10020048

2.2. AI in Events

Recent digital transformation has reshaped event planning and delivery [16]. Technology has streamlined the event planning process, transforming how events are planned, executed, and evaluated. Due to the use and application of new technologies, many of these improvements have been made to the service, including time efficiency, productivity, and efficient delivery of processes [17].

The last decade has seen the emergence of more innovative Information and Communications Technology (ICT), which the global event business has used to increase productivity and satisfy consumer needs [18]. Event management has been making use of many new ICT trends, but AI stands at the forefront of technological innovation through a novel form of intelligence that can synthesise multiple concepts simultaneously, making it a powerful tool in strategic applications [17], AI integration has the potential to revolutionise the industry and present fresh chances for efficacy, efficiency, and competitiveness [4].

AI is frequently used in events to provide a highly customised experience, monitor crowds, track changes in crowd density over time in a particular area, and take corrective action, such as staffing up and making announcements to the public [18]. Event organisers, whose primary goals include capturing participants' attention and sparking excitement, increasingly adopt the latest technologies to maintain interest and engagement [17] and to offer innovative solutions for event planning and execution [3].

This technology presents a range of benefits to stakeholders, including enhanced customer interactions, reduced costs associated with event participation, a competitive advantage, information that can be leveraged for marketing purposes, the ability to digitise manual processes, and the creation of added value through new products and services [17]. The future of event management will be shaped by AI's ongoing development, which presents exciting opportunities and barriers that the sector must overcome to keep events successful in satisfying the changing demands of organisers and attendees [3].

2.2.1. Barriers

AI can transform event logistics by improving efficiency, delivering personalised experiences, and making intelligent decisions [3]. However, introducing this technology has many barriers that can constrain its use. Different authors present several reasons for these barriers, including technological, financial, organisational, and related ethical considerations.

Technical limitations and the need for high financial investments are some of the most significant barriers to integrating AI in the logistics of events. To support AI software and tools, event planners need to spend on hardware and IT infrastructure, as much data is generated, but it is useless unless the data is precise, understood, and has meaning; thus, quality data analysis tools are essential [19]. AI digital projects, require significant investments into assets, and each time there is a possibility of developing a digital project, it is important to prepare a business case and do the ROI calculation [16], these infrastructure requirements can be challenging for smaller event planners to meet, as they often have fewer resources and less technical expertise at their disposal [3]. AI implementation is based on strong technical know-how, critical technical standards, including staff knowledge, availability and usability of data, and tremendous work to implement and document reasonable solutions [19]. Therefore, developing, installing and maintaining this technology can be costly, making it hard for smaller event planners with stricter budgets to allocate capital to AI initiatives when other more pressing financial needs exist, such as venue costs, marketing or staff salaries [3].

Integrating AI with existing processes and workflows is a big challenge [4]. In an event, several network participants, multiple departments, and businesses are involved, and collaboration is required due to the complexity of the logistics network and underlying

https://doi.org/10.3390/logistics10020048

processes [16]. This gives rise to the issue of the reliability of AI, since errors or malfunctions could significantly impact how events turn out, interfering with vital functions and possibly resulting in chaos and inconvenience for both event planners and guests [3].

All the changes in workflow and business processes combined with the employees' lack of expertise and lack of knowledge can lead to internal resistance [19], the insufficient comprehension and confidence in AI are significant obstacles to its adoption, individuals still do not entirely grasp what AI entails and how it can be applied [4], potentially resulting in scepticism, reluctance to embrace it and the fear of losing their jobs [16]. Also, the human touch in event planning could be diminished, human factors have played a key role in crafting unforgettable and significant event experiences, AI-powered chatbots and virtual assistants can effectively manage attendee questions, yet they might not offer the empathy and insight that human agents deliver, which could result in a less tailored and engaging experience for attendees [3].

AI systems process massive amounts of attendees' data, and associated with that, data protection and privacy concerns are raised, resulting in worries around security and potential leaks, and calling attention to critical ethical questions that must be addressed appropriately [3]. This is particularly important for events, once private data is collected and stored, including names of attendees, contact information and even payment information, due to the increased number of self-service functions and commercial data available [16]. Without adequate protection, registration and attendee data may fall into the wrong hands and be used for identity theft, fraud, or other malicious purposes [3].

2.2.2. Critical Success Factors

It is just as crucial for industry stakeholders as for researchers to recognise critical success factors aiding effective AI adoption in their work. Regarding AI applications, some primary concerns revolve around data privacy and security. As Halim et al. [3] pointed out, there is a wide gap in policies delineating how transparency is put into practice concerning data gathering and processing, which is a prerequisite for a dependable, strong data management framework that emphasises security and compliance governance, renders AI systems explicable, thus enabling stakeholder trust [4]. Considering recent technological advancements for the use of AI in event management, there is a need for strategic foresight to ensure the engagement of assistive technology policy for easy-to-use, well-supported AI vendors that allow scaling and remote pilot testing before full implementation alongside the organisational IT staff to bypass integration barriers [3]. Similarly, Cubric [4] noted that initial test runs with piloting the AI systems should also facilitate realisation and remove bottlenecks alongside mitigation strategies for deploying workflows intended to maintain operational continuity.

Remarkable leadership is of utmost importance throughout digital transformation, especially when dealing with constant fluctuations in the market. Leaders must keep track of emerging technological developments and serve as change agents within the organisation by providing them with direction and enabling them to work autonomously [16]. This can also be described as "active leadership", where decisions are made inclusively at all levels while ensuring optimum participation of the stakeholders. Empowering leaders also gives the support required to integrate Logistics 4.0 through sophisticated finances and technology [20]. Planning on a high level related to the firm's direction, including organisational alignment, is a function of leadership. As with every AI or IoT application, the objectives and outcomes must be clear and articulated. Hence, constructed to ensure the outlined expectations and requirements are delivered by the AI solutions [4]. For AI-backed business initiatives, automatic alignment with other organisational goals is preferable for cohesion and long-lasting effectiveness. It is not only effective for easier execution but also aligns with strategy and justifies investment in sophisticated technology like big data analytics [20]. The author also stressed the importance of having clear and measurable targets while dealing with AI solutions.

Introducing Artificial Intelligence into any event requires active stakeholder participation, preparatory evaluations, and building trust through reliable and explainable systems [4]. Besides these practices that help lower the human and operational impacts of AI technological disruption, open-ended training and seminars to help all employees adapt to digital tools are also critical [3,16]. By offering training, organisations can enhance knowledge transfer, cultivating an innovative organisational culture that actively engages employees in the AI integration processes and mitigates change resistance [20].

In summary, the literature indicates that while AI has been extensively studied in logistics and supply chain management, its operational application within event logistics remains fragmented and largely centred on attendee-facing technologies. Moreover, barriers and success factors identified in broader digital transformation research suggest that both technological readiness and organisational change capabilities are critical for adoption. These insights guided the identification of the three analytical dimensions examined empirically in this study: processes, barriers, and critical success factors.

3. Methodology

A dual-stage design was adopted to combine exploratory depth with structured validation. In emerging research areas where empirical evidence remains limited, qualitative interviews are commonly used to surface context-specific insights and generate preliminary themes, while the Delphi method is subsequently employed to refine, prioritise, and validate these themes through expert consensus. This sequential approach enhances both conceptual richness and methodological rigour, allowing initial findings to be systematically assessed and stabilised across multiple expert judgments. Such combinations of exploratory inquiry followed by consensus-building techniques are widely recommended when investigating novel or rapidly evolving technological phenomena [21,22].

The dual-stage design was intentionally made to achieve both in-depth exploratory insights and the thoroughness of expert validation. The first phase of interviews was essential to delve into aspects that were either inadequately addressed or unclear in the current literature, particularly concerning the practical use of AI in logistical event processes, the obstacles to its adoption, and the key success factors that support its implementation. Considering the novelty and intricacy of AI applications in the events industry, these interviews facilitated the identification of context-specific challenges rooted in professional practice. Building on these insights, the Delphi method was subsequently utilised to refine and prioritise the identified themes, employing a structured and iterative process to reach a consensus among a varied group of experts. This methodological approach is consistent with recognised best practices for investigating new and developing phenomena, where a lack of empirical data necessitates expert opinions. The integration of exploratory methods with consensus-building strategies not only strengthened the credibility of the research findings but also maintained the study's relevance to practitioners while ensuring it was strategically sound.

3.1. Interviews

Since there were points that were not clear from the literature review, it was necessary to collect additional data and go into the field, so an exploratory study was made to understand logistics processes that would be most advantageous to apply AI to and that make the most sense to invest in. This study analysed some of the barriers and critical success factors of using AI in events. The data were collected through semi-structured interviews, conducted between 6 January and 15 January, each lasting approximately 30 min. For this study, 2 participants were selected, both working in the field of event management, both were men and were between 40 and 47 years old. Each participant was interviewed separately, and this was done via Zoom. The interviews were recorded and then transcribed.

Semi-structured interviews were selected because they provide a balance between consistency and flexibility. While a common interview guide ensured that all participants addressed comparable topics, the open-ended format allowed respondents to elaborate on practical experiences, challenges, and examples of AI use that may not be captured through predefined survey instruments. This format is particularly appropriate for exploratory studies in complex operational environments, as it enables the identification of unanticipated issues and practitioner perspectives that can inform subsequent instrument development.

The interview participants were selected using purposive sampling, targeting professionals with substantial experience and decision-making responsibility in event logistics and operations. Given the exploratory nature of the study and the specialised knowledge required to discuss AI applications in back-end event processes, priority was given to depth of expertise rather than sample size. Both participants had extensive professional backgrounds in event planning and logistics management, enabling them to provide informed and practice-based insights into technological adoption challenges. This approach is consistent with exploratory qualitative research in emerging technological domains, where expert informants are used to surface key themes and generate initial conceptual categories rather than to produce statistically representative findings [5].

It is important to note that the interview findings should be interpreted as preliminary and non-generalisable. The purpose of this phase was not to reach saturation or broad representativeness, but to identify salient issues and practitioner perspectives that could inform the subsequent Delphi study. Following recommendations for research on emerging technologies, exploratory interviews are often employed to structure and refine items before consensus-based validation with a broader expert panel [21]. Accordingly, the interviews served as an initial scoping step, while the Delphi method provided the primary mechanism for validation and prioritisation of results.

Although the number of interview participants was limited (n = 2), this is consistent with the exploratory purpose of this phase. The objective was not statistical representativeness or thematic saturation, but rather to obtain in-depth insights from experienced professionals capable of identifying salient operational issues and informing item development for the subsequent Delphi study. In exploratory qualitative designs addressing emerging technologies, small samples of expert informants are frequently used to generate focused, practice-based knowledge that can later be validated through broader consensus techniques.

An interview guide was also created and used in all interviews, consisting of 4 questions (Table 1).

Table 1. Interview's questions and objectives.

Question	Objective	Author
Question 1: Which logistical processes (pre-event, during, post-event) do you think AI has the most potential to improve?	Objective 1: To define the emerging AI technologies that may impact event logistics processes.	Ersoy et al. [13] Dowson et al. [15]
Question 2: If you have experience with this technology, can you share specific examples of how you have used AI in event logistics?	Objective 1: To define the emerging AI technologies that may impact event logistics processes.	Saroop Roy, B.R. [18]
Question 3: What do you see as the biggest barriers to AI adoption in event logistics?	Objective 2: To identify barriers related to technology integration in event logistics.	Hangl et al. [19] Halim et al. [3]
Question 4: What key factors do you believe will drive the successful adoption of AI in the events industry?	Objective 3: To examine the critical success factors for AI adoption in event logistics.	Cichosz et al. [16] Halim et al. [3]

3.2. Delphi Method

To build upon the insights obtained during the initial qualitative phase of this study, the Delphi method was employed to refine and prioritise the key themes previously identified. The items evaluated in the Delphi rounds, covering processes where AI can be applied in event logistics, potential barriers to its adoption, and critical success factors for its implementation, were derived from the thematic analysis of expert interviews. This sequential and complementary design ensured methodological coherence: while the interviews served an exploratory purpose, allowing for the emergence of context-specific issues grounded in practice, the Delphi method enabled structured consensus-building among a broader panel of experts.

The Delphi technique was chosen as a systematic consensus-building method suited to complex and uncertain decision contexts. Through iterative rounds of anonymous ranking and controlled feedback, the approach reduces the influence of dominant individuals and encourages independent expert judgement, leading to more reliable convergence of opinions. Delphi has been widely applied in technology forecasting and emerging innovation studies, where expert knowledge is essential and large-sample quantitative data may not yet be available [21,23]. Its structured nature makes it particularly suitable for prioritising adoption barriers and success factors.

This technique is a structured, iterative process designed to elicit and refine expert opinions through multiple rounds of anonymous feedback, to reach consensus. The iterative design ensures that experts can reassess their judgements based on collective feedback, leading to more accurate and informed conclusions over time [21], and it is particularly well-suited for addressing complex or emerging topics where empirical evidence may be limited and expert judgment becomes essential [22]. Delphi has shown strong utility in identifying trends and supporting decision-making under uncertainty, and studies have demonstrated its effectiveness in anticipating the impacts of emerging technologies and guiding strategic decisions [21].

Data was collected online during June 2025, using Qualtrics software, where experts were selected based on their experience and professional involvement in the events management area. A total of 10 experts were invited to participate, ensuring a diverse yet knowledgeable panel. Participants were advised that participation could involve multiple rounds, with each round estimated to take 5–8 min. Conducting the rounds electronically increased geographic reach and scheduling flexibility, which proved critical for engaging international experts across time zones.

The Delphi process consisted of 2 rounds. For Round 1, a structured questionnaire was distributed, based on the literature review and the interviews conducted. Participants were asked to rank the key terms, the importance/relevance of logistical processes at events using AI, and the barriers and critical success factors of using AI in event logistics. In each question, of each key term, the first position of the rank refers to the most important/relevant topic, and the participant was invited to add a topic that had not been mentioned and that they considered useful. Since there was no consensus in the rankings in Round 1, Round 2 was done. For Round 2, participants received the results elected by the majority in the previous round and were once again requested to rank each key term.

To evaluate the degree of consensus among the panel of experts in this Delphi study, Kendall's coefficient of concordance (W) was employed. Kendall's is a widely accepted non-parametric statistical measure that quantifies the agreement among multiple experts who rank the same set of items [23]. It is particularly suited for Delphi studies, where the primary goal is to assess the convergence of expert opinions across successive rounds.

According to Kendall and Smith [24], Kendall's coefficient of concordance (W), Equation (1), is calculated by the division between the sum of squares of the deviations of sums of ranks from the mean (S) and the normalising factor that depends on both the number of items (n) and the number of experts (m). Here, m^2 $(n^3 - n)/12$ is the maximum possible value of S, occurring if there is complete unanimity in the rankings, so that W may vary from 0 to 1, where 0 indicates no agreement, or completely random rankings, and 1 indicates perfect agreement among all experts.

$$W = \frac{12S}{m^2(n^3 - n)} \quad (1)$$

The interpretation of Kendall's follows well-established thresholds in Delphi studies. According to Schmidt [23], values of W below 0.3 suggest weak agreement, values between 0.3 and 0.5 indicate moderate consensus, and values above 0.7 reflect strong to very strong consensus (Table 2).

Table 2. Values of *W*.

W	Interpretation
0.1	Very weak agreement
0.3	Weak agreement
0.5	Moderate agreement
0.7	Strong agreement
0.9	Unusually strong agreement

Source: adapted from Schmidt [23].

In all Delphi rounds, the number of experts (m) was 10. The number of ranked items (n) varied by dimension: seven items for event logistics processes and six items each for barriers and critical success factors. Participants were required to provide complete rankings without ties to ensure comparability across responses. Kendall's coefficient of concordance (W) was complemented by a chi-square significance test ($\chi^2 = m(n - 1)W$) to assess whether the observed agreement differed significantly from chance. This procedure is commonly recommended when applying Kendall's W in Delphi studies to establish the statistical robustness of expert consensus [23,24].

4. Results and Discussion

4.1. Interviews

The data collected through interviews with event industry professionals was analysed using a qualitative content analysis approach. The process began with open coding, identifying recurring themes, and assigning codes to relevant segments of the transcripts to ensure that the findings accurately reflect industry perspectives. These codes were categorised into three tables: barriers to AI adoption, critical success factors for AI implementation, and processes within event logistics in which AI is used.

Starting with the event logistics processes where AI is used (Table 3), both the interviews and the literature review highlighted that this technology is valuable in all phases of event planning. AI is primarily useful in pre-event planning, particularly in the creative part of theme creation, layout design, and scheduling, because AI platforms are capable of producing 3d visualisations of event setups, significantly accelerating the design process and enabling better communication among stakeholders, including caterers, audiovisual teams, and decorators. This aligns with Ergen [17], who argued that AI provides powerful tools for strategic planning and creativity, enhancing stakeholder efficiency and coordination. Furthermore, Saroop Roy, B.R. [18] and Halim et al. [3] support that AI helps address complex logistics scenarios through simulations and modelling tools, increasing reliability in the planning phase. The literature further underscores the importance of accurate forecasting and inventory management as part of pre-event logistics [14,15], and although this was not explicitly detailed in the interviews, the underlying themes of resource allocation and efficiency suggest a similar application in practice.

Table 3. Event logistics processes where AI is used or needed.

Code		Extracts from Interviews
1.	Pre-event Planning and Design	"AI helps create themes, generate mood boards, and develop 3d layouts for event spaces." "Instead of spending hours designing event setups manually, we now use AI to generate different layout options quickly."
2.	Scheduling and Supplier Coordination	"AI can suggest the best setup times for each supplier to optimise event assembly and logistics." "For large events, AI helps us avoid scheduling conflicts by organising supplier arrival and setup times."
3.	Catering and Resource Management	"AI predicts food and drink quantities to minimise waste and optimise per capita distribution." "AI can suggest the most efficient way to allocate catering resources, reducing over-ordering."
4.	Queue and Crowd Management	"AI can analyse crowd flow and suggest improvements in venue layout for better movement." "We use AI-based heat maps to monitor crowd density and prevent bottlenecks in key areas of the event."
5.	Live Event Support and Assistance	"AI-powered chatbots provide real-time answers about the event schedule and logistics." "We integrated AI assistants in our event app to help attendees navigate different sessions without staff intervention."
6.	Post-event Feedback and Analysis	"AI can generate surveys, collect feedback, and analyse attendee responses to improve future events." "Instead of manually analysing event surveys, AI processes feedback instantly and highlights key areas for improvement."
7.	Sustainability Impact Assessment	"AI calculates carbon footprint based on event location, transportation, and resources used." "We use AI to determine the most eco-friendly event venue based on attendee travel distance and sustainability factors."

During events, both sources emphasised AI's key role in real-time operational support. Interviewees described tools for crowd and queue management, where it is possible to analyse attendee flow patterns, predict congestion points, and inform decisions regarding space layout adjustments, reflecting the literature's discussion on logistical coordination, communication systems, and safety [13,15]. Similarly, AI chatbots serve as virtual helping points, answer attendee questions, and manage personalised agendas, aligning with literature that recognises virtual assistants as boosting engagement and service efficiency [3,17].

The analytical capabilities of AI are very important in the post-event phase. Collecting and interpreting feedback helps event managers understand what works well and needs improvement, supporting continuous development for future events. This mirrors the findings of the literature that recognises AI's value in outcome measurement and debriefing [13]. Furthermore, a notable addition from the interviews was AI's emerging role in sustainability efforts, helping track carbon footprints, optimising catering to reduce waste, and enhancing overall resource efficiency.

Regarding the barriers to AI adoption (Table 4), the interviews revealed that one of the biggest challenges is resistance to change, especially among experienced professionals who have developed and refined their traditional practices over time. Hangl et al. [19] and Cubric [4] suggest that scepticism toward AI and fear of job displacement are key human barriers. This was strongly reflected in the interviews, particularly in creative roles such as graphic designers or 3d planners, as AI tools become increasingly capable of producing layouts, visuals, and event-branding materials, and professionals in these fields may feel that their creative contributions are being undermined or replaced by automated systems.

Table 4. Barriers to AI adoption in event logistics.

Code	Extracts from Interviews
1. Resistance to Change	"Some people are very used to doing things in a certain way and resist opening their minds and introducing AI into the context." "I think there's going to be some resistance from people who have worked in the field for a long time and don't want to change their methods."
2. Job Displacement Concerns	"A lot of designers make a living out of these 3Ds. . . AI is starting to take over that part." "For a designer, they're not happy seeing AI replace their job." "Creatives are still hesitant to use AI for major event branding because it removes the human creative touch."
3. Lack of Industry-Specific AI Products	"Companies haven't yet developed products specifically for the events industry, and we're picking up bits from here and there." "There isn't yet a fully developed AI software that meets all event logistics needs; we are adapting existing tools from other industries."
4. High Costs of AI Software	"The existing software is still costly. . . budget restrictions make it difficult to invest in AI solutions." "Small event companies don't have the budget to integrate AI tools, which limits their ability to experiment with the technology."
5. Accuracy and Trust Issues	"We still don't know if AI makes mistakes or not, and sometimes we have to be very careful." "AI needs to be trained properly; if it makes an error, it could lead to a logistical disaster at an event."
6. Need for Large Data Input	"AI is useful when all the data already exists. . . if it's something completely new, it doesn't have that information." "We're now starting to teach AI to understand event logistics better, but it still requires a lot of manual input to be effective."

The lack of industry-specific AI solutions highlighted by interviewees corroborates Cubric's [4] concerns about poor workflow integration and reliability issues. Both interviewees emphasised that while AI tools exist, most are general-purpose and not tailored to the specific requirements of event logistics. As a result, practitioners often need to adapt tools from other domains (e.g., marketing and supply chain management), which may limit the effectiveness of tools or increase the complexity of their integration. Both sources also mentioned financial constraints. The high costs of hardware and integration complexity [3,16,19] were directly extracted in practice by the interviewees who mentioned budget constraints, especially in SMEs, and difficulty adapting general-purpose tools to event-specific needs. Although many AI tools offer substantial long-term cost-saving potential, initial investment, particularly in advanced platforms or customised software, can be prohibitive for small and medium-sized event companies operating within tight budgetary margins.

Finally, another critical barrier mentioned in both sources is data quality and availability, including the need for substantial, high-quality data inputs for AI to be effective. Literature emphasises that AI is only as effective as the data it is trained on [19], and the interviews confirmed that data scarcity, especially as many events are unique and context-dependent, historical data may not always be available, making it difficult for AI systems to generate reliable outputs in novel situations. Likewise, accuracy and trust remain concerns, with some event professionals hesitating to rely on AI for mission-critical logistics decisions without human oversight.

Despite the above-mentioned barriers, both interviewees and the literature revealed various factors that significantly enhanced the viability and success of AI implementation in event logistics (Table 5).

Table 5. Critical success factors for AI in event logistics.

Code		Extracts from Interviews
1.	Technological Infrastructure	"People are still afraid of artificial intelligence... but I think there needs to be investment, a lot of investment in software." "The existing software is still costly, which means that when we're organising an event with budget restrictions, it's difficult to invest in AI." "We are adapting existing software, but nothing is fully developed for events yet."
2.	System Compatibility and Integration	"Companies haven't yet developed AI products specifically for the events industry, so we are picking up bits from different tools." "AI tools must work with our websites and event management systems to provide real-time responses and streamline logistics." "AI can optimise processes, but it must be able to integrate with different software we already use, from catering management to attendee registration."
3.	Knowledge and Skills Development	"Many people don't know how to use AI properly... we need to teach AI and train people on how to work with it." "Some event professionals only use AI for personal tasks, not realising its potential for logistics and planning." "AI can generate event simulations, but only if the people using it know how to input the right data and instructions."
4.	Change Management and Adoption	"There will be resistance... people are used to working in a certain way and don't want to change." "Some professionals worry that AI will replace their roles, especially designers and planners." "Creatives embrace AI for idea generation, but logistical teams are still sceptical about its efficiency in operations."
5.	Data Collection and Quality	"AI needs data to work... It needs information, and we must feed it before it can predict or analyse logistics." "If we don't have past data on things like crowd movement or catering demand, AI can't make accurate predictions." "AI works well for forecasting, but only after multiple events where it has learned from real attendee behaviour."
6.	Regulation and Ethical Considerations	"We still don't know if AI makes mistakes or not... we must be cautious with its use." "AI-generated content can raise ethical issues, like creating digital clones of speakers or simulating personas for marketing." "Companies need to establish rules on how AI-generated recommendations are used, especially for financial and security decisions."

One of the most prominent factors was the importance of the technological infrastructure. While there is increasing interest in using AI tools, the interviewees highlighted the limited availability of tailored software, emphasising the need for platforms that integrate seamlessly with existing tools, underscoring the need for investment in developing and acquiring AI technologies that can directly support event-specific requirements. This reinforces Halim et al. [3] and Cubric [4], who highlight that interoperability is key to scaling AI applications effectively. Khan et al. [20] also highlight the role of Logistics 4.0, suggesting that AI must be implemented in harmony with broader digital transformations. Related to this is the compatibility and integration of the system since AI solutions must be able to communicate effectively with existing systems that organisations already use for event planning and management, as identified by the interviews.

Resistance to change emerged as a consistent theme, with some professionals hesitating to change the established workflows or being sceptical about AI's reliability. To overcome these psychological and cultural barriers, fostering openness and confidence in AI's role in event logistics is essential. Also, the resistance to AI often stems from a lack of knowledge [19], many professionals remain unfamiliar with how to use it effectively, which brings another key factor to be identified: the need for knowledge and skills development, particularly for those involved in logistical planning, where the potential of AI remains underexplored. Both sources advocate that training and education are essential for bridging this gap; internal workshops and continuous professional development are prerequisites for building digital readiness [16,20].

The quality and availability of data were also highlighted as critical. AI must be underpinned by reliable, accurate, and ethical data practices [4], and interviewees also noted that for AI to deliver meaningful results, such as forecasting attendance, optimising catering, or managing crowd flow, it must be trained using accurate and sufficient data. In many cases, especially for new or unique events, such data may not yet exist. This highlights the importance of establishing robust data collection practices and ensuring that historical data are consistently gathered and organised for future use.

Finally, concerns about regulation and ethics play an essential role in the success of this technology in events. Although AI offers significant potential, its reliability and the ethical implications of its use remain uncertain. Interviewees expressed concern about automated content creation, persona simulation, and data-driven decision-making. The literature [3,16] supports this perspective, arguing that a lack of oversight can undermine trust and deter adoption. This implies a need for cross-sector collaboration between technology providers, event associations, and policymakers to develop guidelines and standards. The participants acknowledged the need for clearer frameworks to govern AI use, ensuring its integration into events is both responsible and transparent.

After the initial coding phase, where key topics were identified, axial coding was used to organise and deepen the analysis. The second stage of the qualitative study focused on identifying core categories and exploring the relationships between the conditions, strategies, and consequences associated with AI adoption in event logistics, synthesising the data, and offering a more integrated understanding of the phenomenon. Axial coding was structured around the previously coded primary thematic areas: barriers to adoption, critical success factors, and logistical processes where AI is used or needed.

The axial coding results show that AI supports event logistics processes across three main phases: pre-event planning, real-time event management, and post-event analysis. This practical categorisation aligns closely with the literature, reinforcing and expanding on theoretical perspectives (Table 6).

Table 6. Axial coding of processes where AI is used.

Axial Code	Related Initial Codes	Description
Pre-Event Planning and Automation	Pre-event Planning and Design, Scheduling and Supplier Coordination	AI assists in event layout, scheduling, and optimising supplier logistics.
Real-Time Event Management and Assistance	Queue and Crowd Management, Live Event Support and Assistance	AI improves event flow, crowd control, and live attendee assistance.
Post-Event Analysis and Sustainability	Post-event Feedback and Analysis, Sustainability Impact Assessment	AI helps collect insights and assess environmental impacts for future improvements.

https://doi.org/10.3390/logistics10020048

Concerning Pre-Event Planning and Automation, the interviewees emphasised the need for AI to automate design for layout, scheduling, and supplier coordination, which corroborates Dowson et al. [15] and Haugen [14], who argue that efficient logistics entail precision forecasting and preparation before the event. Using AI to generate 3D visualisations and simulate site configurations also supports Ergen's [17] claim that AI contributes to strategic planning through synthesising complex inputs to good decisions. Proceeding to the real-time Event Management and Support, the function that artificial intelligence undertakes in events, namely crowd and queue management, and also via live chat support using chatbots, resonates with literature highlighting communication and speed in real-time logistics. The complexity of handling people, commodities, and services on-site is dissected by Ersoy et al. [13] and Dowson et al. [15]. AI brings value through the monitoring of crowd numbers and adjusting operations in advance [18], layering an intelligent automation layer on top of conventional logistical processes. Finally, in post-event Analysis and Sustainability, AI helps to deal with attendee feedback and the metering of sustainability effects, such as carbon footprint and wastage minimisation, an increasing topic in practice, not yet articulated in the literature. While Ersoy et al. [13] refer to post-event evaluation as important, and Halim et al. [3] suggest AI examination, sustainability focus contributed by practitioners suggests that success measurement now incorporates environmentally friendliness alongside efficiency.

Regarding the barriers, the axial coding revealed three key categories: technological resistance, lack of readiness, and financial/resource constraints. These align with the barriers identified in the literature but also provide granular insights into how they are experienced in practice (Table 7).

Table 7. Axial coding of barriers to AI adoption in event logistics.

Axial Code	Related Initial Codes	Description
Technological Resistance	Resistance to Change, Job Displacement Concerns	Professionals resist AI due to traditional workflows and the fear of job loss.
Limited AI Readiness in the Industry	Lack of Industry-Specific AI Products, Accuracy and Trust Issues	AI tools are not yet fully tailored for event logistics, leading to hesitation.
Financial and Resource Constraints	High Costs of AI Software, Need for Large Data Input	AI adoption is expensive and requires substantial data input, limiting smaller firms.

The professionals interviewed pointed out that there is a resistance to change, particularly due to traditional workflows and job displacement apprehensions, concerns echoed by Hangl et al. [19] and Cubric [4]. Literature describes how the unawareness of AI and self-efficacy leads to resistance, further compounded by fear of losing the "human touch" during event planning [3]. These cultural problems are deeply rooted and form a significant barrier to technological change. Respondents indicated that most tools available are generic as opposed to event organisation-specific and therefore hard to integrate, something emphasised by Cichosz et al. [16] and Halim et al. [3]. Such incongruence creates mistrust and fear. Failure to adapt and industry-specific AI solutions remain a root cause barrier to actualisation.

These findings are broadly consistent with prior research emphasising AI's strengths in forecasting, optimisation, and planning within logistics environments [6,7]. Similar to supply chain settings, experts prioritised pre-event planning activities, where structured data and repetitive tasks allow AI to generate reliable predictions. Studies in events have also noted the value of AI for operational coordination and decision support [3,17,18]. However, the present results extend this literature by demonstrating that, within event logistics, planning and scheduling functions are perceived as substantially more suitable for AI than real-time or post-event tasks. This suggests that the temporary and uncertain nature of live event operations may limit the immediate applicability of automation compared with more predictable pre-event processes.

Appealing to Financial and Resource Constraints, substantial investment cost for infrastructure, and the purchase of large, high-quality datasets were major concerns in practice. This is also reiterated by Hangl et al. [19] and Cichosz et al. [16], who point out that AI not only requires capital, but also huge data handling capacity. The issue is particularly dominant for small and medium-sized event firms, which may utilise short-term operational requirements to trump long-term digital transformation.

Focusing on the critical success factors, axial coding also identified three main groups: technological infrastructure, human and organisational readiness, and ethical data governance (Table 8).

Table 8. Axial coding of critical success factors to AI adoption in event logistics.

Axial Code	Related Initial Codes	Description
AI Readiness and Infrastructure	Technological Infrastructure, System Compatibility and Integration	AI adoption in event logistics requires investment in advanced software, tools, and seamless integration with existing systems. The lack of industry-specific AI solutions poses a challenge.
Human and Organisational Adaptation	Knowledge and Skills Development, Change Management and Adoption	Successful AI implementation depends on training professionals, overcoming resistance, and fostering AI literacy within event teams. Many hesitate due to fear of job displacement or lack of AI expertise.
Data and Ethical Governance	Data Collection and Quality, Regulation and Ethical Considerations	AI in events relies on high-quality data for accurate predictions. Ethical concerns, such as transparency, decision-making responsibility, and compliance, must be addressed to ensure responsible AI use.

Respondents cited the importance of system compatibility and robust technology infrastructure, which Cubric [4] and Halim et al. [3] highlight by emphasising pilot testing, modular structure, and vendor assistance. This is supported in the literature through suggestions of Logistics 4.0 models and the necessity for technological alignment with organisational strategy [20].

The information highlights the importance of knowledge creation, resistance management, and training, particularly in enabling workers to transition towards AI and digital tools. This aligns with Cichosz et al. [16] and Khan et al. [20], who emphasise smart organisational cultures and leadership as change agents. Interviewees emphasised the requirement for open-ended training and vision of how AI can complement, rather than replace, current functions.

The barriers identified in this study largely mirror those documented in broader digital transformation and logistics research, particularly resistance to change, data limitations, and high implementation costs [16,19]. This alignment reinforces the view that organisational and cultural factors often outweigh purely technical challenges in AI adoption. Nevertheless, the results also reveal context-specific nuances. Unlike continuous supply chains, event operations are temporary and project-based, which restricts the accumulation of historical data and complicates system integration across multiple short-term stakeholders. These characteristics amplify trust and reliability concerns and explain why experts placed particular emphasis on the lack of industry-specific tools. Thus, while the categories resemble prior findings, their manifestation in event logistics introduces additional operational constraints not fully captured in traditional SCM contexts.

Literature always emphasises the need for data quality, ethical disclosure, and regulatory compliance [3,4], all of which are also reflected in the interviewees' concerns. Real-world practitioners pointed out that data privacy and trust in algorithms are recurring concerns. In addition, ethical use of AI output and explainability of decisions remain a prerequisite for uptake, especially in sensitive use cases with customer interaction or monetary transactions.

The prioritised critical success factors similarly resonate with established digital transformation literature, which highlights the importance of infrastructure readiness, system interoperability, and leadership support [4,16,20]. However, the present findings refine these principles for the event context. Rather than large-scale, long-term technological investments typical of permanent logistics systems, experts emphasised flexible, rapidly deployable, and user-friendly solutions that can function within compressed event timelines. Training and change management were also considered particularly important due to the frequent use of temporary or rotating staff. These distinctions suggest that success in event logistics depends not only on technological sophistication but also on adaptability and ease of implementation, thereby extending existing theory to a more transient operational environment.

4.2. Delphi Method

Based on the data obtained previously and to assess consensus among the expert panel, Kendall's coefficient of concordance (W) was used across two Delphi rounds. Kendall's W is an established non-parametric statistic for measuring agreement among multiple raters assigning ranks to a common set of items. It ranges from 0 (no agreement) to 1 (perfect agreement), with thresholds indicating weak, moderate, or strong consensus [23].

The objective of the Delphi method was to achieve expert consensus on three key dimensions of AI use in events: (1) event logistics processes where AI is most useful (Table 9), (2) main barriers to AI adoption (Table 10), and (3) critical success factors for its effective implementation (Table 11). These items were ranked by a panel of experts across two iterative rounds.

Table 9. Items of processes where AI is used.

Item	Description
Item 1	Pre-event Planning and Design
Item 2	Scheduling and Supplier Coordination
Item 3	Catering and Resource Management
Item 4	Queue and Crowd Management
Item 5	Live Event Support and Assistance
Item 6	Post-event Feedback and Analysis
Item 7	Sustainability Impact Assessment

Table 10. Items of barriers to AI adoption.

Item	Description
Item 1	Resistance to Change
Item 2	Job Displacement Concerns
Item 3	Lack of Industry-Specific AI Products
Item 4	High Costs of AI Software
Item 5	Accuracy and Trust Issues
Item 6	Need for Large Data Input

In Round 1 of the Delphi method, the experts were asked to rank the pre-defined items in each of the three dimensions separately (Table 12). The aim was to capture the panel's unmoderated initial reactions and have a baseline to compare in round two.

https://doi.org/10.3390/logistics10020048

Table 11. Items of critical success factors for AI adoption.

Item	Description
Item 1	Technological Infrastructure
Item 2	System Compatibility and Integration
Item 3	Knowledge and Skills Development
Item 4	Change Management and Adoption
Item 5	Data Collection and Quality
Item 6	Regulation and Ethical Considerations

Table 12. Results of the 1st round of Delphi.

	Pre-Event Planning and Design	Scheduling and Supplier Coordination	Catering and Resource Management	Queue and Crowd Management	Live Event Support and Assistance	Post-Event Feedback and Analysis	Sustainability Impact Assessment	*W*
			1st Round					
Processes	1	2	4	6	5	3	7	0.49
Barriers	5	6	1	3	2	4	-	0.39
Success Factors	4	1	3	6	2	5	-	0.26

For the dimension concerning the processes on which AI would be most useful, Kendall's *W* was 0.49. This score indicates a moderate level of expert agreement. While total agreement was present over early-stage functions like "Pre-event Planning and Design" and "Scheduling and Supplier Coordination", other items saw major deviation in rankings. For example, "Catering and Resource Management" and "Post-event Feedback and Analysis" were located in mid-rank positions, while "Sustainability Impact Assessment" was consistently ranked lower. These results suggest that while participants shared some understanding of AI's potential in strategic planning, views remained divergent regarding its role in operational or post-event contexts.

In the second dimension, relating to barriers to AI adoption in events, Kendall's *W* was 0.39, this lower value reflects a weak level of consensus. Although some agreement existed on the relevance of "Resistance to Change" and "Lack of Industry-Specific AI Products", other obstacles, such as cost or issues of trust, differed in the severity and relevance amongst experts, and this could be due to the diversity of professional experience and technological maturity level among respondents.

The third dimension, relating to the critical success factors for AI implementation, showed the lowest level of consensus, with Kendall's *W* of 0.26. This indicates a high degree of divergence among expert views. No success factor stood out in terms of dominating the rankings, and participants entered the discussion with varying assumptions and priorities. The failure of convergence in this arena can be attributed to the multidimensional nature of AI integration that transcends infrastructure, human skillset, data quality, and regulatory frameworks.

Overall, the first round served its diagnostic purpose by revealing conflict among expert opinions and identifying areas requiring more attention. The moderate to low agreement rates detected justified completing the Delphi process to Round 2, where participants were asked to reconsider their rankings after reviewing the results selected by the majority in Round 1. This iterative step, a core element of the Delphi methodology, aimed to reduce disagreement and facilitate the convergence of expert perspectives through structured reflection. Experts were also given the opportunity to propose additional items in Round 1. Although a small number of suggestions were made, these largely overlapped conceptually with existing categories or reflected more specific operational examples rather than distinct constructs. Following standard Delphi practice, only items that were both conceptually unique and proposed by more than one expert would be retained. As no suggestions met these criteria, the original set of items was maintained for Round 2.

The results from Round 2 (Table 13) demonstrate a clear increase in consensus across all three dimensions. In the AI-useful event process dimension, Kendall's *W* grew intensely from 0.49 to 0.81. The high value indicates close agreement among the experts, which means that an agreement was reached on the strategic significance of AI in some phases of event processes. "Pre-event Planning and Design", "Scheduling and Supplier Coordination", and "Catering and Resource Management" were always ranked in the top three positions. In contrast, "Sustainability Impact Assessment" remained at the bottom of the ranking, reinforcing the perception that AI's role in sustainability-related tasks is either underdeveloped or less immediate in the current event context. For transparency, the degree of agreement was statistically tested for each dimension. For the processes dimension ($m = 10$; $n = 7$), Kendall's $W = 0.81$ corresponded to $\chi^2(6) = 48.60$, $p < 0.001$, indicating strong and statistically significant consensus. For barriers ($m = 10$; $n = 6$), $W = 0.73$ yielded $\chi^2(5) = 36.50$, $p < 0.001$. For critical success factors ($m = 10$; $n = 6$), $W = 0.70$ resulted in $\chi^2(5) = 35.00$, $p < 0.001$. These results confirm that agreement among experts was unlikely to have occurred by chance and supports the reliability of the prioritisation outcomes.

Table 13. Results of the 2nd round of Delphi.

	Pre-Event Planning and Design	Scheduling and Supplier Coordination	Catering and Resource Management	Queue and Crowd Management	Live Event Support and Assistance	Post-Event Feedback and Analysis	Sustainability Impact Assessment	*W*
				2nd Round				
Processes	1	2	3	6	5	4	7	0.81
Barriers	4	6	1	3	2	5	-	0.73
Success Factors	4	2	1	5	3	6	-	0.70

The identical trend of growing consensus was observed in the barrier dimension, with Kendall's *W* growing from 0.39 in Round 1 to 0.73 in Round 2. The result shows high agreement and illustrates the convergence of the panel on the greatest challenges to AI adoption. Re-ranking established the relative priority of barriers, leading to a consensus opinion that "Resistance to Change", "Lack of Industry-Specific AI Products", and "Job Displacement Concerns" are the most relevant barriers. This change reflects that, after considering the group input, the experts concluded that cultural and organisational readiness is a more critical challenge than technological or budget constraints.

In the final dimension of key factors for the adoption of AI, Kendall's *W* rose from a low 0.26 to a strong 0.70, indicating an important step towards a more unified perspective from previously divided opinions. The Round 2 results laid more emphasis on technical foundations and change management strategies. Priorities such as "Technological Infrastructure", "System Compatibility and Integration", and "Change Management and Adoption" came out on top, reflecting a recognition that both technical readiness and organisational alignment are important for the integration of AI.

In summary, the second round of Delphi provided high degrees of consensus on the three dimensions. The structured feedback process enabled the experts to consider the general view of the panel, resulting in more consistent and stable rankings. The results validate the iterative process of the Delphi technique and confirm that the process was effective in achieving convergence of expert opinion on the main enablers and barriers to the adoption of AI in event logistics.

The combination of qualitative interviews and the Delphi method enabled a complementary and sequential exploration of how Artificial Intelligence can be effectively integrated into event logistics. The first phase, based on semi-structured interviews, allowed for an in-depth understanding of practitioner perspectives, resulting in the identification of three core analytical dimensions: processes in which AI can be applied, barriers to its adoption, and critical success factors. These qualitative findings provided the empirical foundation for the second phase, where the Delphi method was used to validate and prioritise the items identified. Through two iterative rounds, expert consensus was reached on the most critical elements within each dimension. Specifically, the Delphi results confirmed that AI is perceived as most beneficial in early-stage event processes such as planning and scheduling, while resistance to change and the lack of industry-specific AI tools emerged as the most pressing barriers. Furthermore, the success of AI implementation was shown to rely primarily on robust technological infrastructure, system integration, and effective change management.

By relating the exploratory insights from the interviews with the consensus obtained through the Delphi method, the study provides a well-rounded and validated understanding of the conditions under which AI can be successfully adopted in the events sector, enhancing the internal validity of the findings and also strengthening their theoretical and practical relevance. Theoretically, the study contributes a structured framework for AI adoption in event logistics, integrating both bottom-up practitioner insight and top-down expert prioritisation. From a practical perspective, it offers clear guidance to event organisers and technology providers on where to focus resources, how to anticipate implementation challenges, and what organisational enablers to develop.

This study explored how AI can be effectively applied in event logistics, focusing on three central dimensions: the processes where AI is most beneficial, the main barriers to its adoption, and the critical success factors for its implementation. Adopting a sequential mixed-method approach, the research combined the depth of qualitative inquiry with the structure of quantitative validation, using semi-structured interviews followed by the Delphi method. This methodological design enabled a comprehensive understanding of both practitioner insights and expert consensus, aligning with the growing recognition in the literature of the value of combining exploratory and confirmatory phases in research on emerging technologies.

The findings from the interviews revealed a complex landscape in which AI is perceived as a promising but still underdeveloped tool in the context of event logistics. Through codes, many items for the three categories emerged—event processes, barriers, and success factors—which formed the basis for the Delphi inquiry. These categories are consistent with the themes identified in prior literature, which emphasise the multifaceted impact of AI on organisational processes, workforce dynamics, and technology integration [16]. The Delphi method, applied in two rounds, enabled the prioritisation of the items derived from qualitative analysis. Consensus increased across all three dimensions, as demonstrated by the rising values of Kendall's W, validating the relevance and coherence of the items identified.

In terms of processes, the findings confirmed that AI is perceived to be most effective when applied in the early stages of event logistics, particularly in planning, scheduling, and resource coordination. This aligns with the literature that identifies AI's strengths in pattern recognition, forecasting, and optimisation [14]. On the other hand, tasks such as sustainability assessment and live crowd management were ranked lower, suggesting that either these areas are less developed technologically or less understood by practitioners in the current context.

An interesting divergence emerged between the qualitative and Delphi phases concerning sustainability. While interview participants highlighted AI's growing relevance for tracking carbon footprints, reducing waste, and supporting environmentally responsible decisions, the Delphi panel consistently ranked "Sustainability Impact Assessment" as the lowest priority across rounds. This apparent mismatch suggests that, although sustainability is conceptually recognised as important, its operationalisation through AI

https://doi.org/10.3390/logistics10020048

remains comparatively immature. Several explanations may account for this pattern. First, sustainability-related applications often require longitudinal and high-quality environmental data, which many event organisations do not systematically collect. Second, available AI tools for sustainability assessment are still limited and less integrated into mainstream event management systems compared to planning or scheduling functions. Third, organisational readiness may prioritise immediate operational efficiencies over longer-term environmental metrics. Consequently, experts may perceive sustainability as strategically desirable but not yet practically actionable.

This gap highlights an important avenue for future research and development. The low prioritisation does not necessarily reflect a lack of importance, but rather a lack of technological maturity and measurable performance indicators. Accordingly, future work should focus on developing event-specific AI tools capable of capturing environmental data in real-time, integrating sustainability dashboards into logistics platforms, and establishing standardised metrics to evaluate ecological outcomes alongside operational efficiency. Framing sustainability as both a technological and measurement challenge may help bridge the divide between strategic intent and practical implementation.

5. Conclusions

Regarding barriers, resistance to change, lack of industry-specific AI solutions, and job displacement concerns were identified as the most significant obstacles. These concerns mirror those noted in existing research, where organisational culture and perceived threats to employment have been shown to hinder AI integration across industries [16]. Although several of the identified barriers—such as resistance to change, high costs, and data limitations—have been reported in broader logistics and supply chain AI research [16,19], the findings of this study provide important contextual nuances specific to event logistics. Unlike continuous supply chains, events operate as temporary, one-off projects with limited historical data and compressed planning horizons, which constrains the training and reliability of AI systems. Experts also emphasised the scarcity of event-specific AI tools, forcing practitioners to adapt generic software designed for other industries, thereby increasing integration complexity. Furthermore, creative and design-oriented roles (e.g., layout and 3D visualisation) expressed heightened job displacement concerns, reflecting the hybrid operational–creative nature of event work. These context-dependent manifestations suggest that barriers documented in traditional logistics environments cannot be directly transferred to event settings and highlight the need for tailored technological solutions and adoption strategies.

The success factors prioritised by experts, technological infrastructure, system integration, and change management, further underscore the interdependence between technological readiness and human acceptance. Similar to the barriers, many of the critical success factors identified, such as technological infrastructure, system integration, training, and change management, are frequently discussed in broader digital transformation and logistics research [16,20]. However, the present study contributes by revealing how these factors take on distinct characteristics within event logistics. Because events are temporary, time-bound, and project-based operations, technological solutions must be rapidly deployable, interoperable, and capable of functioning reliably in short setup windows rather than within stable, continuous systems. Experts emphasised the need for plug-and-play tools that integrate with multiple vendors (e.g., registration, catering, venue, and transport platforms), alongside fast, practical training that prepares rotating or seasonal staff. These requirements highlight that success in event contexts depends less on large-scale infrastructure investments and more on flexibility, usability, and rapid organisational alignment.

This context-specific interpretation extends existing logistics literature and underscores the need for AI solutions tailored to the operational realities of events.

From a broader theoretical perspective, this study also contributes to the growing body of research examining Artificial Intelligence adoption in logistics and supply chain management. Recent reviews and research roadmaps emphasise the need for sector-specific investigations to understand how AI applications and adoption conditions vary across operational contexts [25,26]. While much of the existing evidence concentrates on manufacturing and continuous supply chains, event logistics represents a temporary, project-based environment with distinct planning horizons, data availability constraints, and coordination requirements. By focusing on this underexplored setting, the present study extends prior frameworks and demonstrates how established AI adoption principles manifest differently in event-based operations, thereby responding to calls for more context-sensitive empirical research.

The results of this study yield several recommendations for practitioners aiming to leverage AI in the event sector. Firstly, priority should be given to integrating AI technologies into the early planning phases of event logistics, such as scheduling and supplier coordination, where the potential for efficiency gains and decision support is greatest. Secondly, organisations must approach AI implementation not merely as a technical upgrade, but as a transformational process that requires cultural adaptation. Change management strategies are essential to reduce resistance among staff and ensure a smoother transition to digitally augmented workflows. Furthermore, the development of AI tools tailored to the specific needs of event logistics should be encouraged. Co-creation between developers and end-users can enhance relevance and usability, a point repeatedly emphasised by experts during the Delphi rounds. In addition, a strong digital infrastructure and seamless system integration are vital to supporting AI functionality, particularly in contexts that demand real-time responsiveness, such as live event operations. Finally, attention must be given to data strategy: effective data collection, quality assurance, and analytical capability are foundational to the successful deployment of AI in any operational environment.

While this study offers valuable insights, some limitations should be mentioned. The qualitative phase was based on a relatively small sample of interviewees, which may not fully capture the diversity of experiences within the global event industry. Similarly, the Delphi panel, while composed of experts, may reflect regional or sector-specific biases, potentially limiting the generalizability of findings. Additionally, given the rapid evolution of AI technologies, some findings may become less relevant over time as both tools and user familiarity advance.

Future research could build upon the present study by adopting longitudinal designs to examine the real-world implementation and outcomes of AI in event logistics. Expanding the Delphi panel to include a broader and more internationally diverse group of participants could also enhance the robustness and applicability of findings across different cultural and operational contexts. Comparative studies between various types of events, such as corporate, cultural, or sporting events, may reveal sector-specific needs and challenges related to AI integration.

Author Contributions: Conceptualization, S.M. and A.L.D.; methodology, S.M. and A.L.D.; software, S.M.; validation, A.L.D. and L.P. investigation, S.M.; resources, L.P.; data curation, S.M.; writing—original draft preparation, S.M. writing—review and editing, A.L.D. and L.P.; funding acquisition, L.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval were waived for this study, since written informed consent was obtained for the in-depth interviews before each session. In the survey, a link to the online survey platform was sent by social media and partners' social media, and at no times was contact established between researchers and participants. Moreover, the interview script and the personal questionnaire did not include any information and on histories, thus complying with the recommendation regarding informed consent of points 3.5 and 3.6 of ISCTE 'Ética da Investigação' (https://www.iscte-iul.pt/assets/files/2018/10/11/1539270104878_codigo_conduta_etica_na_investigacao_iscte_iul.pdf, accessed on 13 May 2025). As such, all data accessible to the researchers were stripped of respondents' names, addresses, or birth dates and cannot be linked back to them. The study also adopted EU Regulation 2018/1725 regarding EU privacy data.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

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