



# Curtain call for AI: Transforming theatre through technology

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## ABSTRACT

The creative and cultural industries, including theatre, are significantly affected by the development of artificial intelligence (AI). In the theatre sector, there is a need for a deeper understanding of the impact of AI in this area, but the amount of research on this topic is extremely limited. The aim of this paper was to explore, within a complex framework, the applications of AI in the operational, support and artistic areas of theatre. The study also sought to understand the concerns of theatre practitioners regarding the application of AI and to formulate recommendations for its effective integration. To address the research questions, a series of 24 semi-structured interviews were conducted, employing grounded theory methodology with theatre practitioners who already actively utilising AI in their work were or exploring its potential impact. The findings of the study indicate that the adoption of AI-based solutions in operational and support areas is predominantly a bottom-up initiative, primarily in marketing, audience management and sales. In contrast, experimentation with AI is more prevalent in independent theatres and contemporary productions within the artistic domain. However, opinions on the utilisation of AI remain divided. The study emphasises the significance of human creativity and the necessity for a nuanced exploration of the role of AI in theatre. It advocates for transparency, collaboration, education, regulation and policy advocacy to ensure responsible AI integration.

## 1. Introduction

Recent years have seen considerable change in the creative and cultural sectors due to digital advancements, resulting in profound alterations to the value chain. These changes relate to shifts in business strategies, stakeholder interactions and the management of intellectual assets. Consequently, the capacity of cultural and creative institutions to innovate is paramount for both value creation and effective adaptation to the evolving digital environment [25]. The presence of artificial intelligence (AI) in theatre, encompassing script generation and audience engagement, underscores its capacity to transform artistic and operational functions [5]. According to Oksanen et al. [17], we are currently witnessing a substantial phase of AI transformation, marked by the increasing difficulty in distinguishing between artworks created by humans and those generated by AI systems [17]. However, research on AI in theatre remains fragmented, often focusing on isolated applications rather than offering a holistic perspective. This study addresses this gap by examining the multifaceted role of AI in theatre, encompassing artistic creation, production, and management processes.

The integration of artificial intelligence (AI) in theatre has evolved from early applications in lighting and sound automation to more sophisticated creative roles, such as scriptwriting and set design [19].

Notable AI applications in theatre include the THEaiTRE project, which utilised deep neural networks to generate scripts, refined through human curation, resulting in the experimental theatre play "AI: When a Robot Writes a Play" [20]. AI-driven tools can support scriptwriting, as demonstrated by Teampau [27], which combines machine-generated dialogues and human structuring. Piotr Mirowski and his colleagues developed Dramatron, which employs large language models (LLMs) with hierarchical story generation to enhance script coherence through structured generation and prompt chaining. It is important to highlight that, in addition to the artistic field, artificial intelligence is also increasingly prominent in theatre operational and support processes [16].

In conclusion, the influence of artificial intelligence on the creative and cultural sectors, particularly theatre, is becoming increasingly evident, though research in this area remains limited. Existing studies often focus on specific sub-areas, mainly exploring artistic applications, while overlooking AI's potential in operational and support functions. This article offers a holistic examination of AI in theatre, addressing its diverse applications across these areas. As one of the first empirical studies on the topic, it aims to highlight the potential uses of AI, identify challenges, and provide recommendations based on interviews with theatre experts.

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In order to investigate these developments in a systematic fashion, this study employs the grounded theory methodology. This involves conducting 24 semi-structured interviews with theatre practitioners who either actively use or are exploring AI. This approach facilitates the identification of emerging themes and challenges. Furthermore, the study explores the potential of AI to contribute to operational functions, including data analysis, marketing automation, ticket sales and resource management, emphasising the transformative impact of AI on both the artistic and operative facets of theatre.

The contributions of this research are threefold. Firstly, it provides a comprehensive analysis of AI's applications in theatre, thereby bridging the gap between artistic and operational perspectives. Secondly, it highlights key challenges and opportunities associated with AI adoption in theatre. Thirdly, it offers practical recommendations for the responsible integration of AI within the industry. By situating this study within the broader discourse on AI in the creative sectors, it aims to enhance scholarly understanding and inform theatre practitioners and policy-makers about the evolving role of AI in theatre production and management.

The structure of this paper is as follows: [Section 2](#) provides a review of the relevant literature, outlining the potential applications of AI in theatres while also addressing the associated concerns and challenges. Building upon this, the research gaps section identifies and synthesises the key gaps in the existing body of knowledge. [Section 3](#) presents a detailed description of the research methodology. The subsequent section, [Section 4](#), discusses the findings, including the potential applications of AI-based solutions in both operational and support functions, as well as in artistic domains. Additionally, this section examines the concerns and perspectives related to AI adoption in theatres and offers best-practice recommendations for its effective implementation. Finally, [Section 7](#) concludes the study by summarising the key insights.

## 2. Literature background

### 2.1. The potential benefits and opportunities of AI integration in theatres

This section explores the findings from studies that have identified potential use cases of AI in the creative and cultural sector, particularly in enhancing content production, creation, and distribution. According to the report of the European Commission, the benefits of AI are particularly evident in smaller companies and independent creators, with improvements in efficiency, decision-making support, and the emergence of innovative subscription models through machine learning, deep learning, and AI recognition tools. Strategically integrating AI has been shown to result in cost reductions, enhanced efficiency, increased audience engagement, and the generation of inspiring outputs, providing a competitive advantage to those who effectively adopt it [7]. According to the World Economic Forum's report (2018), AI plays a pivotal role in assisting creators to match content more effectively with audiences. Using advanced algorithms based on neural networks, the system learns and categorizes user preferences with increasing accuracy over time. This enables creators and institutions to curate and recommend content that is tailored to the specific interests and tastes of individual users [28].

Based on Maiti [14], the application of AI-based solutions in theatres can fundamentally alter the conventional frameworks of theatrical movement representation. It can transform and enhance traditional conceptions of movement by broadening the scope of human motion, redefining choreographic authorship, and seamlessly integrating technology with audience engagement. Furthermore, Ren [19] highlighted the advantages of AI's capacity to analyse extensive datasets and produce content based on identified patterns and structures. This capability enhances efficiency and expands the range of theatrical possibilities.

The potential productivity aspect of AI in the cultural sector has been the focus of other studies. Peukert [18] advanced the argument that AI systems have the potential to enhance productivity in companies by

reducing production costs or facilitating the creation of a more diverse range of products [18]. While machines that emulate human creativity offer the greatest gains in productivity, the author underscored the necessity to evaluate the risks of cultural automation when assessing the welfare benefits of AI. Anantrasirichai & Bull [1] posited that AI will become an increasingly prevalent tool in creative industries, assisting in acquisition, production, post-production, delivery, and interactivity. This development is attributed to advancements in computing, storage, and communication technologies, facilitating AI integration within networks. The authors also mentioned that technology in creative endeavours will remain human-centred, thus enhancing rather than replacing human creativity.

In addition to the potential for expansion of the boundaries of theatre and improved understanding of audience needs, AI has the capacity to play an important role in the dissemination and preservation of culture. Based on Caramieux [4], artificial intelligence offers cultural institutions the prospect of enhancing the wide dissemination of cultural content and preserving cultural heritage. In connection with this, Dobás et al. [6] emphasized the application of artificial intelligence-based tools for the processing and utilization of cultural heritage. Their research focuses on the digitalization of public collections, including the sharing of costume designs, metadata related to theatrical works, and essential information on individual theatre performances. In this context, the authors explore the potential of utilizing artificial intelligence to process endangered or limited-access collections, as well as digital and historical sources, through the demonstration of a sample project.

In conclusion, it is evident that AI has the potential to transform the creative and cultural sector by enhancing content production, distribution, and audience engagement. It offers clear benefits to smaller companies improving efficiency and fostering innovation. The role of AI in curating personalised content, redefining theatrical movement, and boosting productivity highlights its value. Moving forward, AI will be crucial in preserving cultural heritage and expanding creative possibilities, while balancing technological advancements with human creativity.

### 2.2. Challenges and considerations in AI implementation in theatres

In addition to the potential uses of AI and the opportunities for its implementation in various industries, a plethora of concerns have been identified. For instance, Zeng and Zhang, Zhang and Zeng [29,31] emphasised the necessity of balanced AI-energy policies for optimising energy efficiency, while Bhagat and Kanyal [2] underscored the importance of human oversight in healthcare. In a similar vein, Kamalnath et al. [11] underscored the critical need for rigorous risk management and validation processes in the banking sector. Nonetheless, [12] conducted a study on the attitudes towards the utilisation of AI in the arts, the findings of which indicated that the participants exhibited less positive attitudes towards AI in the arts and culture compared to fields such as medicine and real estate. The studies discussed in this section indicate that AI's impact raises concerns regarding ethics, the law and creativity.

In terms of potential concerns, Caramieux [4] has focused on the transition of traditionally human-performed services to AI-based algorithms in the creative and cultural sector. This transition gives rise to questions related to the control and quality assessment of content generated by AI. In addition, the application of AI in theatres gives rise to challenges in the domains of authorship, ownership, and copyright infringement regarding AI-generated content. Frosio [8] emphasized that the increasing accessibility of generative AI technology to a broader audience has given rise to controversies, particularly with respect to text generation that mimics specific writers' styles. In a manner analogous to the conclusions of Caramieux's (2020) research, Frosio [8] also highlighted that this has intensified ethical concerns regarding plagiarism and the appropriation of artistic work, further exacerbating threats to creative economies and emphasizing the need for strong intellectual

property protection measures [4,8].

In terms of artistic fields, the integration of AI-based tools in theatre has been explored by Ren [19] with a particular focus on scriptwriting. The research suggests that while AI has made strides in script generation and supporting the creative process, human playwrights bring a profound depth of emotional and cultural insight. The unique life experiences, perspectives and artistic voice of human playwrights enable them to create narratives that resonate with authenticity, a quality that AI systems may find difficult to emulate [19]. In addition, the artistic domain of theatre was the focal point of an exploration by Branch et al. [3] into the potential application of AI in live theatre, with a particular emphasis on improvisation. To this end, the researchers engaged in discourse with experts and audiences regarding the associated challenges. The study identified several prevalent concerns, including issues of copyright and the potential misappropriation of artists' work through image generation, which could adversely affect the creative economy. Other concerns encompassed the appropriateness of AI-generated images, their representational biases, and the devaluation of human creativity due to automation.

In their work, Piotr Mirowski and his colleagues developed *Dramatron*, a system that leverages large language models (LLM) to hierarchically generate scripts and screenplays. Their analysis revealed gender biases in the outputs, indicating a need for further exploration of narrative creation and performance across different cultural groups [16]. The authors' emphasis on concerns regarding plagiarism is consistent with the observations of Caramieux and Frosio [4,8]. Mirowski et al. [16] emphasised the need for transparency and clear guidelines for the use of copyrighted material in AI-generated content, and suggested strategies such as search engine queries and plagiarism detection tools to address these concerns. Furthermore, Shumakova et al. [24] identified additional concerns pertaining to the risks associated with unregulated generative AI in the creative industry. These include the proliferation of illegal content, diminished originality, unfair labour market disruptions, competitive advantages, public scepticism, and potential associations with extremist activities. The authors emphasised the critical necessity of establishing legal frameworks to enforce accountability among AI developers, proprietors, and users.

In addition, the integration of AI in the creative and cultural sector is accompanied by concerns regarding the quality of the resulting content and the presence of cultural biases. The dissemination of AI-based tools is hindered by language diversity, particularly in the context of natural language processing. Significant challenges have been identified, including the amplification of misinformation, the risks of manipulation through data monopolies, excessive reliance on AI for decision-making, and the structural transformation of job roles in the creative process [7]. Maiti [14] emphasised substantial concerns pertaining to the implementation of AI in theatres, particularly its capacity to substitute for human artists and exert an influence on employment prospects. As AI technology advances, it may encroach upon roles traditionally occupied by human performers, consequently engendering disruptions in industry employment.

It is evident that the implementation of AI is accompanied by numerous challenges, including ethical and legal concerns. However, it is imperative to address the technological dimensions of this issue. In this context, Zhan [30] has underscored a salient technological concern, cautioning that the cultural sector may incur a risk of excessive reliance on AI, which could potentially erode human creativity and critical thinking skills. Such reliance could impede innovation and result in a diminution of cultural diversity. Roselli et al. [21] have expressed concerns regarding the biases that are inherent in the training of AI models, highlighting risks in historical data patterns, feature selection, and training objective representation. These biases may arise from dataset mismatches and data manipulation, leading to skewed outcomes, and AI models also struggle with unseen cases and spurious correlations.

In conclusion, the integration of AI in theatres poses a series of intricate challenges, many of which are commensurate with broader AI-

related issues across various industries. These challenges encompass legal, ethical, labour market, and technological concerns, in addition to questions of quality and the delineation between human and AI-generated works. Nevertheless, extant research has focused predominantly on challenges within the artistic domain, while the implications for theatres' operational and support functions remain comparatively under-explored. This underscores the necessity for a more comprehensive approach to examining AI's role in the theatre sector.

### 2.3. Research gaps

A review of the extant literature reveals a paucity of empirical research on the application of AI in theatres, largely due to the novelty of the topic. The existing research is primarily focused on artistic applications, typically within a specific sub-field, such as scriptwriting. However, these studies fail to consider the digital transformation of theatres within a comprehensive framework and the related application of AI. Furthermore, the operational and support departments of theatres have been largely overlooked in the existing research, necessitating further investigation to understand their potential for AI integration and the risks involved. The paucity of recommendations to assist theatre professionals in effectively implementing new technologies and comprehending the associated risks underscores the need for further research in this area.

## 3. Research methodology

The review of the relevant literature indicates that AI has a substantial impact on the theatre sector. However, given the emerging nature of this field, empirical studies remain relatively limited in number. Existing research predominantly concentrates on artistic applications, often focusing on only a subset of this domain. Nevertheless, the digital transformation of theatres, along with the integration of AI, should be approached within a comprehensive framework that encompasses both operational and support functions, in addition to artistic processes. Such an approach would facilitate the more effective implementation of new technologies by theatres and artists alike.

The present research is, therefore, of an exploratory nature, with the aim of assessing the fields of application and possibilities of artificial intelligence within theatres, covering both the artistic departments and the operational, support departments. In addition, concerns and perspectives on the application of AI will be explored, and related recommendations will be made to help theatres implement AI more effectively and address the challenges that arise.

Due to the limited amount of research available in the field, the present research serves as an exploratory study. In line with this, a grounded theory methodology has been applied, which is useful in cases where little knowledge is available about a particular phenomenon, as it aims to provide a more detailed description of the phenomenon under study through the construction of an explanatory theory [9]. Following a thorough consideration of the characteristics of each interview type, it was determined that semi-structured interviews would be the most appropriate framework for qualitative research. The utilisation of semi-structured interviews enables the researcher to pose open-ended questions [22], and obtain in-depth information from the interviewees while ensuring flexibility [15]. Semi-structured interviews are a common qualitative research method where the interviewer prepares a set of guiding questions but has the freedom to explore new topics that may arise during the discussion. This method is particularly useful in exploratory research, which aims to gain a deeper understanding of a phenomenon, rather than testing specific hypotheses [13].

The research involved interviewing theatre experts who are already using AI in their work or actively exploring its potential impact. In the research, the objective was to diversify the experts and perspectives by conducting interviews with a range of relevant individuals, including theatre streaming service providers, the head of a media production

company, actors, theatre executives, a university researcher specialising in theatre AI, and the head of an international theatre professional organisation.

The research involved 24 interviews, conducted online and offline between December 2023 and June 2024. The interviews usually lasted between 45–60 min and in order to increase the reliability of the research and reduce bias, the interviewees were always assured of anonymity. The interviewees consented to their statements being cited anonymously in the form of quotes, and to the aggregated results of the interviews being presented in the article following data processing. An interview guide (see Appendix A) was prepared prior to the interviews, containing the main themes and questions of the research. In accordance with the recommendations of Rubin and Rubin [23], the guideline did not prescribe a fixed sequence of questions but instead outlined the key topics that were intended to be addressed during the interviews. The primary themes encompassed the following subjects, as illustrated in Appendix A:

- I. Digital transformation & AI in theatres
- II. Audience perspectives & data-driven insights
- III. AI in creative processes
- IV. AI in theatre operations
- V. Partnerships, collaboration, and skill development
- VI. Ethical considerations and the future of AI in theatre

In all cases, the websites of theatres, individual institutions and other publicly available materials were reviewed to triangulate the data. The list of interviewees is summarised in Table 1, alongside the topics primarily covered during the interviews, which were tailored to each interviewee's expertise and experience. The subjects addressed in the interviews correspond with those outlined in Appendix A. However, it is important to note that certain questions were posed even if the interviewee did not yet have specific experience with the given topic, in order to gain a deeper understanding of the challenges and potential objections associated with each application area.

The data were collected and analysed iteratively in accordance with the recommendations of the grounded theory methodology. In addition, memos were kept throughout the research to record ideas that emerged during the data collection process to help inform the researcher's orientation and theory development [10]. In all cases, audio recordings of the interviews were made and a verbatim transcript of the interviews was produced and processed using QSR NVivo Software. Following the recommendations of Strauss and Corbin [26], the study was based on three main coding stages, which are open, axial and selective.

In the initial coding stage, a line-by-line scan was employed to comprehend the nature of the data and identify the primary key terms. Subsequently, during the axial coding phase, the terms that had been identified during the open coding phase were grouped into categories based on shared concepts. In the third stage, selective coding, core categories were created that form the basis of the theory, based on the relationships identified in the text. The analysis of the data has led to the identification of five application areas for AI in the operational and support areas, and five in the artistic areas. The study has also identified the main concerns and perspectives for the application of AI in theatre, and made recommendations for theatres and artists based on the interviews.

#### 4. Research results

The aim of this research was to explore how AI can be applied in theatres, covering both operational and support areas, as well as artistic areas. The research shows that, although theatres have always been the arena for technological development, in many cases a lag in the digitalisation of theatres can be identified, especially in operational and support areas, compared to other industries. This backlog is mainly due to the high cost of development, scarcity of financial resources for

**Table 1**

List of interviewees.

| ID | Position                                             | Institution/Company                             | Key topics during the interview |
|----|------------------------------------------------------|-------------------------------------------------|---------------------------------|
| 1  | Founder, CEO                                         | Theatre streaming company                       | I, II, III, V, VI               |
| 2  | Marketing Director                                   | Theatre streaming company                       | I, II, III, IV, VI              |
| 3  | Founder, CEO                                         | Theatre streaming company                       | I-VI                            |
| 4  | CEO, Producer                                        | Media production company                        | I-VI                            |
| 5  | Sales Director                                       | Theatre                                         | I-VI                            |
| 6  | Marketing and Communications Director                | Theatre                                         | I, II, IV, VI                   |
| 7  | Communications and Marketing Director                | Theatre                                         | I-VI                            |
| 8  | Theatre Director                                     | Theatre                                         | I, II, III, V, VI               |
| 9  | Associate Professor, Researcher                      | University                                      | I, II, III, V, VI               |
| 10 | Deputy Director, EU Projects and Innovation Director | Theatre                                         | I, III, V, VI                   |
| 11 | Assistant Manager of EU Projects                     | Theatre                                         | I, III, V, VI                   |
| 12 | AI Researcher/Actor                                  | Technology company, Independent theatre group   | I, II, III, V, VI               |
| 13 | Executive Director                                   | International professional theatre organisation | I, II, III, V, VI               |
| 14 | Actor, Music composer                                | Independent theatre group                       | I, II, III, V, VI               |
| 15 | Theatre Director, Actor                              | Independent theatre group                       | I-VI                            |
| 16 | Theatre Director                                     | Theatre                                         | I-VI                            |
| 17 | Theatre Director                                     | Theatre                                         | I-VI                            |
| 18 | Actor                                                | Theatre                                         | I, III, V, VI                   |
| 19 | Founder, CEO                                         | Theatre streaming service                       | I, II, III, V, VI               |
| 20 | Financial Director                                   | Theatre                                         | I, IV, V                        |
| 21 | Assistant Professor, Researcher                      | University                                      | I, II, V, VI                    |
| 22 | Actor                                                | Theatre                                         | I, III, VI                      |
| 23 | Theatre Director                                     | Theatre                                         | I, III, IV, V, VI               |
| 24 | Marketing Director                                   | Theatre                                         | I, II, III                      |

theatre, lack of digitalisation capabilities, and management and organisational challenges. The research shows that independent theatres are experimenting more with AI-based solutions, compared to state-owned and municipally-run theatres.

In the following, the fields of application of AI identified during the interviews are presented, with a special focus on the operational, support and artistic fields.

##### 4.1. Application possibilities of AI-based solutions in operational and support departments

In the case of applications in operational and support departments, it can be observed that AI-based solutions can help theatres primarily in the areas of marketing and improving the audience experience. In theatres it is often the case that responsibilities for digitisation are unclear. There is often no one person in charge of digitalisation and many organisations lack a clear digitalisation strategy. The use of these tools therefore tends to be a bottom-up initiative within theatres, mainly in the areas of sales, marketing, communication and audience management. As illustrated in Table 2, the following discussion outlines the potential applications of AI-based solutions in operational and support departments. In addition, it summarises the related key functions and benefits, as well as the challenges and potential risks.

**Table 2**

Potential applications of AI-based solutions in the operational and support areas of theatre.

| Potential application                                         | Key functions and benefits                                                                                                                                                                                                                                                                                                                                                                                                                                | Challenges, potential risks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Data-driven insights</b>                                   | <ul style="list-style-type: none"> <li>Collecting and integrating data from ticket sales, online interactions, and audience feedback</li> <li>Conducting deeper analyses to identify correlations and trends</li> <li>Enhancing the understanding of audience behaviours and preferences</li> <li>Facilitating detailed audience segmentation for targeted engagement</li> <li>Support for the development of data-driven marketing strategies</li> </ul> | <ul style="list-style-type: none"> <li>Lack of a centralized database, leading to inconsistencies and redundancy</li> <li>Challenges in data organization and standardization</li> <li>Absence of a comprehensive data strategy</li> <li>Deficiencies in digital competencies and analytical skills</li> <li>Limitations in technological infrastructure</li> </ul>                                                                                                                                                                                      |
| <b>Personalised recommendations</b>                           | <ul style="list-style-type: none"> <li>Personalised recommendations based on theatre-goers' preferences, behaviour, and feedback</li> <li>Enhancing audience experience by suggesting relevant performances</li> <li>Boosting ticket sales through tailored suggestions</li> <li>Supporting targeted marketing strategies through AI-driven recommendations</li> <li>Engaging a wider audience by recommending a diverse range of performances</li> </ul> | <ul style="list-style-type: none"> <li>Inaccurate data may lead to irrelevant, low-quality recommendations</li> <li>Privacy concerns related to collecting and using personal data</li> <li>Over-reliance on AI could reduce exploration of less popular performances</li> <li>Integration challenges with existing theatre systems and platforms</li> </ul>                                                                                                                                                                                             |
| <b>Producing marketing content, tracking marketing trends</b> | <ul style="list-style-type: none"> <li>Assisting in the production of marketing content such as newsletters, program brochures, and flyers</li> <li>Assisting in the creation of social media content, developing content strategies, and helping to generate ideas and structure content</li> <li>Contributing to improved research and understanding of theatre marketing trends</li> </ul>                                                             | <ul style="list-style-type: none"> <li>Underutilization of social media: Some theatres still face challenges in effectively utilizing social media for marketing purposes</li> <li>Ongoing need for human oversight: Final content production still requires significant human input for quality and relevance</li> <li>Difficulty in replicating artistic and stylistic integrity: Theatre marketing content often embodies a unique style and language, including artistic and literary elements, that is difficult to replicate accurately</li> </ul> |
| <b>Chatbot</b>                                                | <ul style="list-style-type: none"> <li>Integrating chatbots into theatre websites in a cost-effective manner to streamline operations</li> <li>Answering common viewer questions and assisting with ticket purchases</li> <li>Supporting navigation across website content, improving overall user experience</li> </ul>                                                                                                                                  | <ul style="list-style-type: none"> <li>Limited scope: Chatbots may struggle to handle complex or specific queries, requiring human intervention</li> <li>Customer experience: Excessive reliance on chatbots could diminish personal interaction and customer service quality</li> <li>Technical issues: Chatbots may malfunction or provide</li> </ul>                                                                                                                                                                                                  |

**Table 2 (continued)**

| Potential application                  | Key functions and benefits                                                                                                                                                                                                                                                                                                                                                                                                                                             | Challenges, potential risks                                                                                                                                                                                                                                                                                                           |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Accessibility, support services</b> | <ul style="list-style-type: none"> <li>Reducing the load on audience management and increasing viewer satisfaction and engagement</li> <li>Overcoming language barriers by creating automatic subtitles (e.g. streaming theatre performances)</li> <li>Supporting the hearing impaired by generating real-time subtitles for performances</li> <li>Providing support for visually impaired audience members through automatically generated audio narration</li> </ul> | <ul style="list-style-type: none"> <li>inaccurate responses, potentially undermining user satisfaction</li> <li>Challenges in ensuring subtitle accuracy and context</li> <li>Limited accuracy in narration alignment with performance details</li> <li>Subtitle timing and quality issues may disrupt audience experience</li> </ul> |

#### 4.1.1. Data-driven insights

AI tools have the potential to support theatre professionals in making data-driven decisions by aggregating and structuring data from ticket sales, online interactions, and audience feedback, as well as conducting deeper analyses to uncover correlations. This enables a more comprehensive understanding of audience behaviours, facilitates detailed segmentation, and supports the development of data-driven marketing strategies. The potential application of AI for data-driven insights was also highlighted by Interviewee 10: *"We had a project a few years ago, during COVID, for data analysis using an AI algorithm. It focused on box office data analysis and identifying different audience segments in the theatre. We developed this project in collaboration with a company specializing in AI and big data analysis."*

However, several challenges hinder the effective utilisation of audience data. A fragmentation of data across multiple sources, combined with improper organisation, is a common issue. This fragmentation restricts the strategic application and effectiveness of the data in decision-making processes. The absence of a centralised database is also problematic, leading to inconsistencies and redundancy. Furthermore, the absence of a comprehensive data strategy prevents organisations from leveraging data insights for decision-making. Deficiencies in digital competencies and analytical skills can also limit the ability of theatre professionals to interpret and act on data-driven insights. Finally, the limitations of technological infrastructure pose significant challenges, as many theatres are not equipped with the necessary systems to efficiently collect, store, and analyse audience data. It is imperative to address these challenges to maximise the potential of AI-driven decision-making in the cultural sector.

#### 4.1.2. Personalised recommendations

The utilisation of artificial intelligence (AI) in the domain of theatre has the potential to analyse the preferences, behaviour, and feedback of individual theatre-goers, thereby enabling the delivery of personalised recommendations for specific performances and events. This includes, for instance, directors' and writers' meetings. Some theatres have shifted beyond traditional methods, such as websites and newsletters, to engage audiences by integrating complex applications that leverage AI-driven recommendations. These personalised suggestions have the capacity to support increased ticket sales and revenue generation, whilst also enhancing the overall audience experience by offering more relevant and tailored performance recommendations.

However, the efficacy of AI in this context is impeded by several challenges. Inaccurate data may result in irrelevant, low-quality recommendations, thereby diminishing audience engagement. Privacy concerns regarding the collection and utilisation of personal data may

deter theatre-goers from fully engaging with personalised recommendations. Furthermore, over-reliance on AI could lead to a diminished focus on less popular performances, thereby restricting the diversity of recommendations. Finally, integration challenges with existing theatre systems and platforms may complicate the seamless implementation of AI-driven recommendation tools.

#### 4.1.3. Producing marketing content, tracking marketing trends

LLM solutions have the capacity to facilitate the production of marketing content, including newsletters. In addition, several theatre marketing experts have highlighted the potential of AI-powered tools to assist in the creation of programme brochures, flyers and other creative materials. At present, the integration of social media is becoming a pervasive phenomenon, though certain institutions continue to demonstrate a notable absence in this domain. As Interviewee 4 highlighted: *"Most theatres now use social media, but the level of professionalism in content production varies significantly. Some still follow trends from a decade ago, while others adopt cutting-edge strategies from leading brands—leveraging AI for content creation and implementing multi-channel approaches. Meanwhile, some rely solely on Facebook. The key challenge is audience engagement across multiple platforms. There's a pressing need for progress in this area, as many theatres are falling behind and missing opportunities to target their audiences more effectively."*

These tools have the capacity to support theatres in the production of social media content and the development of content strategies. While LLM solutions can generate ideas and structure content, the production of final content still necessitates significant human intervention. A notable challenge in content production is that theatre marketing content often embodies the distinctive style and language of the respective theatre, incorporating unique artistic and literary elements that LLM solutions cannot or can reproduce only to a limited extent. This was supported by Interviewee 7, who stated: *"I recently attended a training course, and I want to emphasize how important it is for others to invest in their own development as well. That's why I participated in an AI training course, where we discussed topics like the role of AI in marketing. Throughout the course, I kept thinking about how I could incorporate the speaker's insights and tips into my work. On one hand, this is challenging because the work we do is highly individualized, unique, and original, which makes it difficult for current AI applications to replicate. Unlike traditional marketing or PR writing, we create sensitive, artistic, and literary content that AI is not yet capable of producing effectively."*

#### 4.1.4. Chatbot

Advances in technology have enabled the integration of AI-powered chatbots into theatre websites in a more straightforward and cost-effective manner. These chatbots are designed to address the most frequently asked questions, facilitate ticket purchases, and assist with navigating the website's content. Additionally, they can contribute to audience management by reducing the workload in the audience management area, enhancing efficiency, increasing viewer satisfaction, and fostering engagement. The utilisation of chatbots for the provision of prompt responses to routine inquiries enables human staff to allocate their time to addressing more complex issues, thereby enhancing the overall customer experience. As Interviewee 5 mentioned: *"I plan to start developing a chatbot next year to create a helpful section on our website where an AI solution will answer general questions. We are often quite busy, and many inquiries we receive are about basic information. Time is money for us, and additionally, many people are anxious and prefer not to call a human contact."*

However, it should be noted that several challenges persist. Primarily, chatbots often encounter difficulties in addressing more complex or highly specific queries, necessitating human intervention for a satisfactory resolution. Moreover, an overreliance on chatbots may lead to a reduction in personal interaction, which could potentially have a negative impact on the customer service experience. Furthermore, there is a risk of technical malfunctions or inaccurate responses, which could

diminish the user experience, lead to dissatisfaction, and potentially harm the theatre's reputation.

#### 4.1.5. Accessibility, support services

The utilisation of AI-based tools has the potential to transcend linguistic boundaries, as evidenced by their application in the realm of theatre streaming. As highlighted by Interviewee 1, the CEO and founder of a theatre streaming company: *"If you skip the borders, AI will basically eliminate the language barrier, so you can watch automatically dubbed theatre in high quality."* It can thus be concluded that the utilisation of these tools enables the generation of automated, high-quality subtitles for theatrical performances. This, in turn, serves to promote cultural dissemination and enhance audience reach. Moreover, they can assist visually impaired individuals by providing audio narration and support the hearing impaired through automatically generated subtitles. Notwithstanding these advantages, several challenges persist. Ensuring the accuracy of subtitles and maintaining contextual integrity across languages pose significant challenges, with the potential to adversely impact the viewer experience. Furthermore, there is a risk that the alignment of audio narration with performance details and timing may not always meet expectations, potentially diminishing its effectiveness for visually impaired users. Similarly, the quality and timing of subtitles for the hearing impaired may present challenges, with the potential to disrupt the overall experience for these audiences.

### 4.2. Application possibilities of AI-based solutions in the artistic fields of theatres

The use of AI-based solutions in the arts is mainly observed in independent theatre companies, contemporary plays or younger directors, who are typically more open to innovative technological solutions. It can be said, however, that these solutions can primarily play a supporting role in artistic departments. As illustrated in Table 3, the following section summarises the potential applications in the artistic domain. This encompasses the key functions and benefits, as well as the associated challenges and risks.

#### 4.2.1. Scriptwriting

In the domain of scriptwriting, several pilot projects have been undertaken with the objective of producing a complete theatre script with minimal human intervention. However, these projects have frequently arrived at analogous conclusions. Interviewees have emphasised that AI-based solutions developed for these projects encounter challenges in maintaining the context of the generated text over an extended period. As Interviewee 12 noted: *"We developed an AI tool to write scripts interactively with the writer... We tested it with playwrights, screenwriters, and industry professionals who write themselves. To summarize, they found it useful for idea generation and word building, but they felt it couldn't write a play—or anything—on its own."*

These solutions often result in inconsistencies, and logical gaps and inconsistent dialogue can be identified in the generated texts. Challenges have also been identified in the realm of characterisation, particularly regarding the absence of emotional diversity, and in the development of character pathways, which are often found to be incomplete and lacking in the intricacy and detail that characterisation in human creation exhibits. This deficiency complicates the process of staging the work. In numerous instances, works created with the aid of AI-based tools exhibit a paucity of the nuances and forms of human creativity that, in the context of a theatrical work, would enable a nuanced presentation of the plot with detailed descriptions of the circumstances. According to the interviewees, it is imperative to assess the quality and appeal of AI-generated content, as well as to interrogate the value of creative output and the acceptance of mediocrity in artistic endeavours. The interviewees further posit that AI-based tools are more likely to emerge in lower-end, mass-produced culture, such as soap operas.

It was further noted by several interviewees that AI-based tools are

**Table 3**  
Potential applications of AI-based solutions in the artistic fields of theatres.

| Potential application                     | Key functions and benefits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Challenges, potential risks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Scriptwriting</b>                      | <ul style="list-style-type: none"><li>• Automation of repetitive scriptwriting tasks</li><li>• Facilitation of research through automated exploration, summarization, analysis, and comparative study of existing works</li><li>• Support for ideation and the development of writing proficiency</li><li>• Provision of automated suggestions, editing, and proofreading functionalities</li><li>• Delivery of evaluative feedback pertaining to narrative coherence and character development</li><li>• Enhancement of authorial efficiency, enabling a focus on higher-value creative processes</li></ul> | <ul style="list-style-type: none"><li>• AI may struggle to maintain narrative consistency, leading to logical gaps and inconsistent dialogue</li><li>• AI may fail to create emotionally diverse or detailed characters</li><li>• AI-generated scripts can lack the nuance and depth of human creativity</li><li>• AI-generated content may raise questions about its artistic value</li></ul>                                                                                                                                                               |
| <b>Support for the work of dramaturgs</b> | <ul style="list-style-type: none"><li>• Providing comprehensive analysis of scripts, ensuring consistency in tone and style</li><li>• Gathering relevant historical and cultural context to add authenticity and depth</li><li>• Helping dramaturgs understand and respond to audience preferences effectively</li></ul>                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"><li>• AI may lack the ability to capture human creativity and intuition, affecting the subtleties in dramaturgy work</li><li>• Over-reliance on AI could reduce the richness of human-driven interpretation, making it difficult to reflect the creative vision of the dramaturg</li><li>• AI-generated insights may lack emotional and cultural nuance that human experts bring to their analysis and interpretation</li><li>• Difficulty in maintaining context over long-term use, leading to inconsistencies</li></ul> |
| <b>Artistic translation</b>               | <ul style="list-style-type: none"><li>• Support for the translation of theatre work (e.g. for participation in international events and cultural exchanges)</li><li>• Providing preliminary insights into content from different languages, enhancing understanding and preparation for artistic translations</li><li>• Increasing efficiency and accessibility</li></ul>                                                                                                                                                                                                                                    | <ul style="list-style-type: none"><li>• AI tools may miss cultural subtleties, nuances, and artistic interpretation that human translators provide</li><li>• AI may struggle to preserve the artistic essence and intended meaning of the original work, which is essential in artistic translation</li><li>• AI lacks the deep cultural understanding necessary to accurately translate the emotional and contextual aspects of a performance.</li></ul>                                                                                                    |
| <b>Improvisation</b>                      | <ul style="list-style-type: none"><li>• Supporting the creative process, AI enables collaboration between human artists and conversational agents, fostering innovation</li><li>• Adding unexpected elements to the narrative, AI-generated text can be influenced by audience input or previous interactions</li><li>• Encouraging experimentation, AI</li></ul>                                                                                                                                                                                                                                            | <ul style="list-style-type: none"><li>• AI's structured format may disrupt the fluidity of human improvisation</li><li>• AI may struggle to replicate the dynamic nature of human dialogue</li><li>• The shift to coherent AI content challenges traditional improvisational techniques</li><li>• The role of AI in creativity raises concerns about artistic authenticity</li></ul>                                                                                                                                                                         |

**Table 3 (continued)**

| Potential application                 | Key functions and benefits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Challenges, potential risks                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Costume, set and visual design</b> | <ul style="list-style-type: none"><li>• enables the exploration of diverse approaches in improvisational theatre</li><li>• Automate repetitive tasks and increase efficiency</li><li>• Optimize energy usage and resource management in lighting systems and technical domains for sustainability</li><li>• Optimize materials and resources for greater sustainability</li><li>• Support design work, e.g. by creating mood boards and generating design ideas</li><li>• Facilitate the creation of immersive and interactive experiences through technological inputs</li><li>• Enable more experimentation and creative exploration</li></ul> | <ul style="list-style-type: none"><li>• Risk of over-reliance on AI, limiting original creative input</li><li>• AI may not fully capture cultural, historical, or emotional nuances</li><li>• AI-generated designs may become repetitive or overly standardized</li><li>• Potential limitations in adapting designs to specific practical constraints</li></ul> |

best suited for the automation of repetitive tasks, as art is considered a unique and creative process. Consequently, AI-based tools are regarded as more conducive to scriptwriting and creative processes. These tools can, for instance, assist writers and researchers in their research endeavours, enabling them to explore, summarise, analyse and compare previous works more efficiently. This, in turn, can foster the generation of new ideas and the development of writing skills. Furthermore, AI can assist writers through automated suggestions, editing, and proofreading, in the capacity of a virtual assistant, providing immediate feedback on aspects such as plot consistency and character development. These support functions are designed to enhance the efficiency of artists, enabling them to focus on more value-added processes within their work.

4.2.2. *Support for the work of dramaturgs*

AI-based applications have the potential to support the work of dramaturgs in several areas, enhancing the efficiency and depth of their work. These applications offer comprehensive text and language analysis, allowing dramaturgs to gain deep insight into scripts and ensuring consistency in tone and style. Furthermore, AI can assist in gathering relevant historical and cultural context, which contributes to a play's authenticity and depth. Moreover, AI tools have the potential to enhance audience engagement through interactive digital programs and analytics, enabling dramaturgs to better understand and respond to audience preferences. However, challenges exist, such as AI's potential inability to fully capture the nuances of human creativity and intuition, and the risk of over-reliance on AI, which may diminish the richness of human interpretation. Additionally, AI-generated insights may struggle with emotional and cultural nuances, and maintaining long-term context can prove difficult.

4.2.3. *Artistic translation*

The integration of artificial intelligence has the potential to serve as a valuable instrument in the field of translation support, facilitating the comprehension and translation of theatre works from diverse linguistic backgrounds. This technological advancement plays a pivotal role in enhancing the inclusivity of these works in international events and broader cultural exchanges. By employing AI-powered translation tools, theatre professionals can obtain preliminary insights into the content of works from different linguistic contexts, thereby enhancing their comprehension and preparation for artistic translations.

While AI-powered translation tools offer significant benefits in terms

of efficiency and accessibility, it is important to recognise their limitations in the artistic realm. While these tools can provide accurate translations to a certain degree, they lack the nuanced understanding, cultural sensitivity, and creative interpretation that human translators, especially artistic translators, bring to their work. The role of an artistic translator is not confined to mere linguistic translation; rather, it encompasses the task of capturing the essence, nuances and cultural subtleties of a work, thereby ensuring that its artistic integrity and intended meaning are preserved and effectively communicated to diverse audiences. This was also supported by interviewee 7: *“Our Artistic Council meets every year, and they read works in many countries in Europe or from many countries in the world, and it makes a big difference here to be able to put a foreign language work into one of these translations, and before you commission an artistic translation, you get an idea of what the work is. It can't replace the role of the artistic translator, I don't think, it can't replace the role of the costume designer, but it can help our work.”*

#### 4.2.4. Improvisation

Another domain in which artificial intelligence-based solutions find application in the theatre is improvisation, in which human improvisers collaborate with conversational agents to create theatrical shows. Throughout the improvisation process, human artists dynamically respond to sentences generated by AI-based chatbots, often resulting in unexpected developments and new directions for the theatre productions. The text passages provided by the chatbots are usually generated either from audience input or in response to what the artists say during improvisation.

A notable point of contrast between human conversation in improvised contexts and interactions with chatbots is the fluid, overlapping exchanges characteristic of the former, in contrast to the structured, turn-taking nature of the latter. The analysis of interviews indicates that existing technology primarily caters to the sequential question-answer format of chatbot interactions, which may limit its compatibility with the nuanced complexities of spontaneous human dialogue. This statement is also corroborated by Interviewee 14, who stated: *“I recently saw a development that generates music from my prompts. This could potentially be used on stage, but it has some limitations because improvisation, by nature, is a spontaneous process. The current experience is that if we create a prompt and provide a framework or stylistic information to such an application, it generates something, but it doesn't adapt in real time. We're not yet at the point where AI can seamlessly respond to another person on the fly”*.

Furthermore, the evolution of AI in artistic practice and in improvisation has witnessed a transition from utilizing glitch aesthetics to navigating the challenges posed by AI-generated content that seemingly makes sense. This shift has prompted a critical reassessment of artistic methodologies, particularly in live improvisative performances, necessitating a re-evaluation of show structures and approaches to accommodate changing public perceptions and expectations surrounding AI's creative capabilities.

The overarching objective of integrating AI-based solutions within improvisational performances is not to replace human artists, but rather to enhance and complement the creative process. The application of these solutions enables the enrichment of narratives through the introduction of unpredictable elements and facilitates the experimental exploration of various formats.

#### 4.2.5. Costume, set and visual design

The utilisation of AI-based solutions has the potential to provide substantial support to costume, set and visual designers by enhancing the visual experience. These tools automate repetitive tasks, increase efficiency and generate design ideas, thereby fostering creativity. In addition, AI can expedite the creation of design variations, optimise materials and resources for sustainability, and provide data-driven insights, allowing designers to focus on higher-value and more creative aspects of their work. The integration of AI in lighting systems and other technical domains further promotes sustainability by optimising energy

usage and resource management, aligning with the broader environmental goals of contemporary theatre.

Furthermore, AI-based tools have the potential to facilitate the design process by creating mood boards, which can assist in concept creation, provide inspiration, and help convey the aesthetic and mood of a project more easily. These tools can also enhance communication with clients by acting as a source of inspiration, bringing together a variety of images, textures, colours, and styles that express the desired mood and tone. Moreover, AI-based tools can assist designers in creating more immersive and interactive experiences using technological inputs. For set and scenic designers, this may entail the creation of interactive visual components or dynamic stages that respond to the movement of actors (via motion capture), performance, and even audience feedback. These tools facilitate novel possibilities for experimentation and creative exploration in artistic creation, enabling designers to extend the limits of their work. As Interviewee 23 noted: *“In set design, image and video creation tools are already integrated into design software, and as technology advances, this trend will intensify, further transforming how designers in theatre visualize and execute their concepts”*.

Whilst there is considerable potential for AI-based solutions to enhance the efficiency and expand the creative possibilities for costume, set and visual designers, their integration must be approached with caution. An overreliance on AI may constrain original creative input and intuition, as these technologies may struggle to fully capture the cultural, historical and emotional nuances that are essential to design. Additionally, AI-generated outputs risk becoming repetitive or overly standardised, which may stifle innovation. Furthermore, AI may encounter difficulties in adapting designs to the specific practical constraints of different venues and production environments. Therefore, it is imperative to ensure that human creativity and practical considerations remain central to the design process for the effective and responsible use of AI in theatrical design.

#### 4.3. Concerns and perspectives on the use of artificial intelligence in theatres

The paper presents several potential areas for the application of AI in the artistic domain, and experimental projects are already underway, primarily in the context of independent theatres and contemporary plays. However, it is crucial to emphasise that, in contrast to the operational and support fields, the application of AI in the artistic domain gives rise to a number of concerns among theatre professionals, and there is no consensus among professionals regarding the integration of technology.

The perspectives on AI within the theatre artistic field are varied and complex, with some professionals intrigued by AI's potential to foster innovation, and keen to integrate it into their creative processes, while others exhibit a more cautious stance, particularly influenced by developments in the film and television industries. The successful negotiations by writers and actors in Hollywood to regulate AI usage have resonated with many theatre practitioners, leading them to scrutinise the associated risks more comprehensively. In relation to this, Interviewee 8 remarked: *“There are some, I think, who are more concerned about what it will mean for the field in the long run. There is who have been paying attention to the strikes by actors, writers and Hollywood. There was an enormous action that was about writers for film and television and actors who work in film and television negotiating a contract that would limit the studio's ability to use AI in unregulated ways. And they won, which was great.”*

Institutions within the theatre industry find themselves at a crossroads, grappling with the question of how to define their stance towards AI. The dilemma lies in whether to invest in and promote AI-driven innovations or to adopt a more cautious approach. This institutional ambivalence underscores the broader challenges faced by the theatre community in navigating the complexities posed by AI.

While the interviewees recognise the potential benefits of AI in terms of its application in theatre management and its role as a facilitator of

the creative process, they also express concerns regarding its impact on labour dynamics, artistic creativity and value. Their discourses elucidate the challenges that AI precipitates within the creative continuum, its impact on the valuation of artistic output and the overarching socio-economic paradigms within the theatre industry.

The utilisation of artificial intelligence in artistic pursuits has been met with apprehension by some, who perceive it as a form of digital commodification. This transformation has the potential to diminish artists' autonomy and ownership over their creative output. Contrary to conventional digital commodification, which involves the mere abstraction and repackaging of creative work, AI models have the capacity to exert a more profound influence on the creative process, potentially usurping control from human creators. According to the respondents, this phenomenon is poised to initially manifest in the domain of applied arts. Concerns have been raised by artists regarding the potential transformation of creative output into a more mainstream form, driven by algorithms that serve to enhance their own values. There is an underlying concern about the loss of artistic value and the experience of creating art, with artists expressing that art-making is a pleasurable and personally fulfilling activity that they do not wish to delegate to machines. As Interviewee 8 said: *"...We've been rather focused on how the instantaneous and ubiquitous processes of digital commodification rob audiences of access to aesthetically rewarding experiences and serve to further impoverish artists while also dispossessing them of full creative control... They don't merely abstract and repackage creative work or subject them to different economic demands. They do something arguably much worse. They take the creative act out of the hands of people altogether... This is obviously not true in all cases for all people, for all artworks. But I'm talking here about the sort of big text and image models"*.

The push towards AI-driven automation is often perceived as a corporate endeavour to circumvent compensating artists adequately, framing it as a labour and financial issue rather than an aesthetic one. A critical question that must be posed is the duration of time that will elapse before AI-generated work becomes indistinguishable from that of human creation, thus giving rise to concerns regarding the potential replacement of human labour. Consequently, the fear of job loss emerges as a significant concern among theatre professionals, as stated by Interviewee 18: *"Many people around me have expressed fear about losing their jobs or having them change in ways that feel beyond their control."*

The artistic merit of AI-generated content, particularly large language models and generative AI, is a subject of concern for many artists. The opacity of the underlying datasets and processes used to train AI models is a significant issue. While these tools can produce convincing and plausible outputs, they lack the transparency and comprehensibility of traditional artistic processes. Additionally, there is a risk that AI-generated work may be perceived as lacking in depth or predictability, as truly impactful art is often characterised by its ability to be unexpected and to disrupt established patterns. Since AI inherently relies on existing data, it tends to reproduce existing patterns rather than creating novel ones, which may be viewed as a limitation by some artists. The unpredictability and opaqueness of AI-driven creations may, therefore, diminish their artistic appeal and relevance in the eyes of many artists.

In addition, the potential risks associated with AI in the artistic domain include concerns over deep fakes, forgery, content saturation, and the unpredictability of content consumption. The current technological landscape is deemed inadequate in addressing these challenges, necessitating a more cautious and responsible approach to AI integration in art. As Interviewee 16 mentioned: *"The question arises of how we can deal with royalties and copyrights. Deep fakes and counterfeiting may also emerge in culture, and customers could be overwhelmed by a tsunami of content that becomes unmanageable. It is unpredictable how we will consume content and verify what is legal, as the technologies are not yet ready"*.

Overall, the use of AI-based solutions raises several concerns among theatre professionals. These concerns encompass the erosion of artistic value, the digitalisation of art, the loss of artistic and creative pleasure,

the proliferation of deep fakes in the arts, and financial and social issues. This necessitates a more detailed examination of the applications of the technology and a deeper understanding of the potential impacts.

4.4. Suggestions for the use of AI in theatres

The findings of this study demonstrate the existence of variability in perspectives regarding the integration of artificial intelligence within theatrical contexts among professionals in the field, along with a recognition of associated challenges. In order to effectively harness artificial intelligence-based tools within theatrical practices, it is imperative that there is a heightened level of comprehension and collaboration within the theatre profession. The following recommendations are proposed to enhance the theatre realm's understanding of the advantages of artificial intelligence-based tools and to effectively navigate the associated challenges and risks (Table 4).

4.4.1. Transparency and ethical considerations

The interviewees asserted the paramount importance of transparency in the utilisation of AI tools and methodologies. The establishment of clear communication regarding the application of AI ensures accountability and fosters trust among users, artists and audiences. In the context of theatre productions, it is imperative to ensure that the audience is informed about the specific applications of AI. This transparency will enable audiences to discern between elements created by humans and those created by machines.

Furthermore, it is crucial to establish and adhere to ethical boundaries, safeguarding data and ensuring a secure testing environment that encourages exploration and learning without compromising privacy.

4.4.2. Collaboration, support, and accessibility

In order to collectively resist potential negative implications of AI, it is essential to build solidarity within the artistic community. A supportive and inclusive environment must be fostered, in which shared learning, resource-sharing, and the development of collective strategies to harness AI responsibly and ethically are promoted. The emphasis on the production of diverse and innovative work necessitates addressing systemic issues, fostering inclusivity, and creating platforms that amplify voices from diverse backgrounds.

In addition to collaborative endeavours within the theatre industry, it is imperative for theatre professionals to engage in interdisciplinary collaborations with experts and researchers from diverse scientific domains, thereby dismantling disciplinary boundaries. Through such

**Table 4**  
Recommendations for using AI in theatres based on interview insights.

| Key considerations                               | Actionable strategies                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Transparency and ethical considerations</b>   | <ul style="list-style-type: none"><li>• Importance of transparent AI usage for accountability and trust</li><li>• Establishing ethical boundaries to safeguard data and privacy</li></ul>                                                                                                                                                                                                       |
| <b>Collaboration, support, and accessibility</b> | <ul style="list-style-type: none"><li>• Fostering unity within the theatre community to collectively address AI's potential negative impacts</li><li>• Promoting inclusivity, shared learning, and collective strategies</li><li>• Engaging with experts from diverse scientific fields to enhance understanding and implementation of AI solutions, breaking disciplinary boundaries</li></ul> |
| <b>Educational initiatives</b>                   | <ul style="list-style-type: none"><li>• Incorporating AI education into theatre programs for skill development</li><li>• Creating interactive spaces to foster curiosity and ethical decision-making</li></ul>                                                                                                                                                                                  |
| <b>Regulation and policy advocacy</b>            | <ul style="list-style-type: none"><li>• Advocating for robust regulation and ethical guidelines in AI use</li><li>• Respecting human artists and audiences through informed decision-making</li></ul>                                                                                                                                                                                           |

initiatives, they can enhance their comprehension of the technological background of emerging solutions, facilitating the efficient implementation of AI-based solutions and mitigating associated risks. As Interviewee 17 emphasised: *"I would highlight the importance of collaboration: it's easier to collaborate from a distance, allowing the creative process to extend beyond the traditional walls of the theatre. Development and writing can become much more collaborative, even with audience involvement. It's essential to be open to collaboration, and learning together, for example, with startups, is also needed in the cultural sector. Some stage directors are already very open to this."*

#### 4.4.3. Educational initiatives

In the domain of theatrical operations, the integration of emerging technologies may encounter challenges due to employees' limited digital skills and competencies. In order to navigate the rapidly evolving digital landscape, it is imperative for theatre professionals to maintain currency with the latest trends.

Interviewee 21 also highlighted the importance of education and the potential learning points from other cultural fields: *"I've seen a few educational and collaborative programmes in the museum field that could also be useful for theatres."* The incorporation of AI education into theatre programmes has been shown to be advantageous, as it synchronises the introduction of novel technological paradigms with the development of human resources. The creation of interactive spaces that facilitate engagement with AI has the potential to foster curiosity, critical thinking, and ethical decision-making in artists and theatre professionals. Such initiatives can promote learning and encourage the responsible and innovative use of AI within artistic and operative fields.

#### 4.4.4. Regulation and policy advocacy

It is imperative to advocate for the implementation of robust regulatory frameworks to ensure the responsible and equitable utilisation of AI within the domain of theatre. By underscoring the importance of respect for human artists and audiences, and by establishing ethical guidelines, we can effectively mitigate potential risks and foster a more equitable and inclusive creative environment. The importance of regulation was also highlighted by Interviewee 24: *"Regulation should be included in the artistic fields... Respect for human artists and in particular respect for human audiences should be too, ensuring that creativity and cultural integrity are preserved."*

The extant research findings indicate a paucity of consensus among theatre professionals and institutions with regard to the adoption of AI-based solutions. Consequently, it is incumbent upon theatre professional organisations and Arts Councils to develop comprehensive guidelines and frameworks in this regard. These initiatives are essential for fostering informed decision-making and facilitating the responsible utilisation of AI technologies within theatrical practices.

## 5. Conclusion

Theatre has historically functioned as a crucible for technological development and experimentation, chiefly through the generation of artistic value. Nonetheless, it can be argued that theatre institutions have exhibited a comparatively protracted response to the rapid transformation of their external environment, particularly within operational and support departments. However, the rapid advancements in artificial intelligence are exerting a substantial influence on diverse industrial sectors, and consequently, on theatres, encompassing operational, support and artistic domains. Consequently, it is imperative for theatre professionals to develop a more profound comprehension of the potential applications, benefits and emerging challenges of AI.

This article explores the potential applications of AI in theatre, addresses challenges and concerns raised by theatre professionals, and provides suggestions for improving the understanding and implementation of AI-based solutions while mitigating risks. To address these questions, semi-structured interviews were conducted with 24 theatre

professionals actively engaged with AI-based solutions. While the majority of preceding studies have concentrated on artistic applications, this research also examines AI's role in the broader digital transformation of theatres, covering operational, support, and artistic domains. The paucity of extant research makes this study one of the first empirical investigations in this field.

The present study did not focus on the in-depth economic and financial implications of AI technology investments in theatres, which could serve as a potential avenue for future research. However, it suggests that cost savings can be achieved in certain areas while highlighting several strategic and human resource-related challenges. The findings reveal that the digital transformation of operational and support areas in theatres may be impeded by factors such as limited human resources, gaps in digital skills, lack of strategy and budget, resistance to change, generational differences, and unclear responsibilities. These insights, which have been overlooked or only superficially addressed in previous research, underscore the distinctive role of AI applications. Specifically, AI is often propelled by bottom-up initiatives, particularly in marketing, sales, and audience management, where it mainly supports data-driven decision-making, content production, and audience engagement. Furthermore, the study identifies ways in which AI can promote sustainability within theatres, notably through the optimization of energy usage, resource management, and the reduction of waste, aligning with the environmental objectives of contemporary theatre production.

In the artistic fields, there is a sense of experimentation in the use of AI, particularly in independent theatres, contemporary plays and younger directors. However, it is important to acknowledge that there is currently no consensus on the use of AI by theatres and creators. The present study indicates that while certain creators, who have historically exhibited a propensity for embracing innovative solutions, are demonstrating a heightened degree of audacity in their experimentation with novel technologies, others are voicing explicit scepticism and displaying resistance. In the domain of artistic applications, which encompasses scriptwriting, dramaturgical support, improvisation, costume, set and visual design, and artistic translation, the potential of AI lies primarily in its capacity to enhance efficiency and enable creators to focus on more creative tasks that demand higher added value. This assertion is in alignment with the European Commission's report [7] and the research conducted by Ren [19], which advocates a supportive approach to AI integration in the arts. It is imperative to acknowledge that the current iteration of these tools is incapable of replacing human creativity. The vast majority of interviewees concurred that human involvement in theatre will persist, as it is challenging to conceptualise a scenario wherein their role is supplanted by artificial intelligence-based solutions. Audiences place significant value on human interaction and artistry, a sentiment that is anticipated to be amplified in the future. This aligns with the conclusions of Anantrasirichai and Bull [1], who emphasized the importance of preserving human-centred creativity, rather than using AI-based tools to replace human creators.

Furthermore, the integration of artificial intelligence in theatres presents a landscape of both promise and apprehension. While some have embraced AI's potential to foster innovation and experimentation, others have expressed concerns about its impact on artistic authenticity, work dynamics, and the joy of creation. In comparison with previous research, this research has more effectively highlighted critical observations about AI, including concerns about the potential transformation of theatrical creation into a digital, commodified product, fears of job loss, and the uncontrolled, deceptive spread of cultural content. These debates underscore the necessity for a nuanced exploration of AI's role within the theatrical milieu, contemplating its ramifications on artistic value, creative processes, and societal dynamics. In order to address the challenges, the study proposes a series of recommendations, including the formulation of appropriate regulations for responsible AI utilisation within theatre, as has been also emphasised by Shumakova et al. [24]. In addition to advocating for regulation, the recommendations emphasise

the promotion of transparency, the fostering of collaboration, the enhancement of educational initiatives, and the critical need for interdisciplinary collaboration and collective action within the theatre community.

A potential limitation of this research is the relatively narrow sample size of interviewees, which may have introduced bias. As AI application in theatre is still developing across operational, support, and artistic fields, the number of professionals with real experience remains moderate. Therefore, expanding the sample size alongside technological development is a potential area for further research. Additionally, more in-depth studies are needed to explore AI's applications, understand its social, economic, and artistic impacts, identify best practices, and address associated risks. Furthermore, there is potential for future research to extend to other domains and stakeholders within the creative and cultural sector, as these areas remain relatively underexplored in academic studies.

### Ethical statement

This study was reviewed and approved by Corvinus University of Budapest, Vice-Rector for Faculty and Research, Research Ethics Committee with the approval number: KRH/61/2025 dated 26.02.2025.

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### CRedit authorship contribution statement

**Dóra Horváth:** Writing – review & editing, Writing – original draft, Validation, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

### Declaration of competing interest

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.

### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.sfr.2025.100747](https://doi.org/10.1016/j.sfr.2025.100747).

### Data availability

The data that has been used is confidential.

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