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Benefits And Challenges of Using AI for Light Design in Theatre Productions, In Theatre Arts Department, University of Uyo

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Abstract- ***This paper identifies the benefits and changes of Artificial Intelligence, and the integration of AI in light design for theatre productions in the Department of Theatre Arts, University of Uyo. The study adopts the mixed methods approach to investigate the benefits and challenges of AI in theatre productions; hence, data was collected through surveys, interviews, and observational studies of lighting design processes. However, the study acknowledges that AI can significantly enhance theatrical productions, but a potential downside of AI integration is its possible stifling of human creativity and displacement of job for creatives. Findings reveal that, there is awareness and understanding of AI, but it further shows that there is significant gap in practical understanding of how it works. The study recommends education and training programs for practitioners to bridge the knowledge gap and improve AI adoption; it also recommends policy development to help govern the ethical use of AI in theater production. Ultimately, the study offers theatre practitioners insights into optimizing AI use in theatre lighting design.***

Index Terms- ***Artificial Intelligence, Challenges, Benefits, Light Design, Semiotics.***

I. INTRODUCTION

Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that usually require human intelligence, such as learning, problem-solving, and decision-making. This technology has been rapidly advancing in recent years, enabling machines to learn from data, adapt to new situations, and improve their performance over time. As a result, AI technology has numerous applications across various fields, including healthcare, finance, transportation, education, and entertainment.

Sindhuja notes that: The field of artificial intelligence gives the ability to the machines to think analytically, using concepts. Tremendous contribution to the various areas has been made by the Artificial Intelligence techniques from the last 2 decades. Artificial Intelligence will continue to play an increasingly important role in the various fields. (5) Sindhuja therefore opines that AI's ability has significantly contributed to different fields and its impact is expected to grow and play increasingly important roles in those fields and likely transform and revolutionize business models to improve efficiency, productivity and decision-making.

The Nigerian theatre industry, a vibrant and diverse sector, has long been a cornerstone of the country's cultural landscape. With a rich history spanning centuries, it has evolved over time, influenced by various social, political, and economic factors. From traditional folk performances to contemporary stage plays, Nigerian theatre has consistently played a significant role in storytelling, entertainment, and social commentary.

However, as with many other industries, the advent of technology has brought about significant changes in the theatre sector. Artificial Intelligence (AI) in particular has transformed various aspects of theatrical productions, from scriptwriting to stage design, acting, and audience engagement, including the aspect of light design. Despite its potential to enhance creativity and efficiency, the adoption of AI in Nigerian theatre has been met with both enthusiasm and skepticism. Some practitioners see AI as a revolutionary tool, while others are hesitant, fearing it may replace human creativity or

compromise the authenticity of live performances. Udengu and Peter in Ojoniyi opine that: There have been concerns around low patronage and sponsorship of the live theatre as most people now, arguably, prefer to sit in the comfort of their homes to watch films, home videos, online skits or digital/cable television theatres. (120-129)

This therefore, shows that the Nigerian live theatre industry is facing challenges with low attendance and sponsorship, as many people prefer the convenience of watching digital content from home, such as films, online skits, or TV shows.

Ojoniyi therefore perceives digitalization (AI) has little negative contribution to the survival of theatre in Nigeria but points to the misunderstanding of digitalization's (AI's) role in theatre making as being a major factor in this menace. His argument suggests that if theatre practitioners properly understand digitalization's historical development and purpose, and also reevaluate the purpose and relevance of theatre within its own historical context, they will see that AI is not a threat, but rather a tool that can be leveraged to enhance theatre, and that the two can coexist and complement each other. Inyang, however, points out the potential risk on inculcating AI in theatre in totality by noting that:

A risk exists that heavy reliance on AI could undermine the development of traditional theatrical skills and individual creativity could lead to challenges regarding originality and the ethical use of AI-generated content, particularly in relation to alleged public domain works. (12)

Inyang thus, suggests that an over-reliance on artificial intelligence (AI) in theatrical productions could have detrimental effects on the development of traditional theatrical skills and individual creativity, and the use of AI-generated content may lead to a homogenization of artistic expression, undermining the originality and uniqueness that human creativity brings to the stage. This effect could be seen from the play "Vices and Virtues" by Christian Tom which was generated from beginning to the end using ChatGPT. The play, "Vices and Virtues", a drama that delves into the complexities of human nature, following the characters as they navigate the temptations and consequences of social vices, including corruption, addiction, and exploitation, could not detail down appropriately to Nigerian culture, specifically, Akwa Ibom state as would a human writer, thereby giving a floating and shallow feeling to the playtext.

With these assertions, the perception of AI in theatre among practitioners is complex, reflecting both the excitement and trepidation that come with embracing new technologies in a centuries-old art form. Hence, the researcher's voyage into the complexity of these perceptions to unravel the dominant perception of AI in theatre by Nigerian Theatre practitioners, using the Department of Theatre Arts, University of Uyo, Uyo, as the primary focus.

The Theatre Arts program at the University of Uyo began in 1993/1994, emerging from the Cultural Studies sub-unit of the Centre for Cultural Studies. Initially, the program aimed to enrich the university's social life and equip students with communication skills in drama and theatre. The department has since expanded to include film production training, offering students courses in television drama production and opportunities to create a variety of films. It officially became the University of Uyo in 1991. The Faculty of Arts, which houses the Theatre Arts department, was among the original faculties established during the UNICROSS era.

Aim and Objectives

The aim is to identify the benefit and challenges of using AI.

The following are the objectives, to:

i. Examine the perceptions of Nigerian theatre practitioners regarding the use of Artificial Intelligence (AI) in light design.
ii. Explore the attitudes and perceptions of Nigerian theatre makers towards the use of AI in theatrical productions.
iii. Assess the perceived benefits and challenges of integrating AI in lighting design into theatrical productions.
iv. Assess the level of adoption and integration of AI-driven lighting technologies in Nigerian theatre productions.

v. Identify the challenges and barriers faced by Nigerian theatre practitioners in adopting AI for light design.

II. CONCEPTUAL REVIEW

This conceptual framework explores the intersection of artificial intelligence, intelligence, and semiotics in the context of theatre production, examining how these concepts converge to shape the creative process, artistic expression, and audience experience. By analyzing the definitions and perspectives of various scholars, this framework aims to provide a comprehensive understanding of the complex relationships between artificial intelligence, intelligence, and semiotics, and how they influence the theatrical landscape.

Artificial Intelligence

Global trends and advancements in AI technology are transforming industries and revolutionizing the way humans live and work. Generative AI is redefining skills and jobs, while AI integration is increasingly present in sectors like education, finance, and healthcare, customized chatbots are being developed to cater to specific needs, and video generation is emerging as the next frontier. Egon et al asserts that: Art and creativity have long been considered uniquely human endeavors, expressions of our emotions, imagination, and cultural identity. However, the advent of Artificial Intelligence (AI) has pushed the boundaries of creativity by introducing new dimensions of collaboration between humans and machine. (10)

Egon et al therefore imply that the traditional understanding of art and creativity as exclusively human domains is being challenged by the emergence of Artificial Intelligence (AI). AI is blurring the lines between human and machine creativity, enabling new forms of collaboration and innovation. This shows how beneficial AI is to arts. However, Duggal notes that:

One application of artificial intelligence is a robot, displacing occupations and increasing unemployment (in a few cases). Therefore, some claim that there is always a chance of unemployment due to chatbots and robots replacing humans. For instance, robots frequently replace human resources in manufacturing businesses in more technologically advanced nations like Japan. (21)

Duggal therefore, opines that the increasing use of artificial intelligence and robotics in various industries poses a threat to job security and may lead to unemployment in certain sectors. As robots and chatbots become more advanced and capable, they can perform tasks that were previously done by humans, making some jobs redundant. This displacement of human workers by robots and chatbots raises concerns about the future of employment and the potential for widespread unemployment.

While AI and robotics may bring about increased efficiency and productivity, they also require significant workforce retraining and upskilling to ensure that workers are not left behind. Furthermore, this trend may exacerbate existing social and economic inequalities, as those with the means to adapt to new technologies may thrive, while others are left vulnerable to job displacement and unemployment.

Aris et al corroborates thus “In the age of AI, the canvas is no longer confined to physical dimensions, nor is the artist bound by flesh and blood. Computers, once mere tools for artists, have now become creators in their own right”. (9)

This implies that the advent of AI has revolutionized the art world, liberating creativity from physical constraints and traditional notions of authorship. With computers now capable of generating art independently, the role of the artist is evolving, and the distinction between human and machine creativity is blurring. Nevertheless, Jeena and Gururaniseem to hold a balanced view by stating that: Artificial intelligence (AI) is awakening fear and enthusiasm in equal measures. Some have likened the advances in AI to “summoning the devil” and there are concerns that AI threatens to end humanity.

AI can scare people, perhaps due to the science fiction notion that machines will take all of our jobs; ‘wake up’ and do unintended things. However, where some see danger, others see opportunity! Artificial

Intelligence and the technology are one side of the life that always interest and surprise us with the new ideas, topics, innovations, products …etc. This technology and its applications will likely have far-reaching effects on human life in the years to come. (3)

This therefore shows that the development of Artificial Intelligence (AI) is eliciting both fear and excitement, with some individuals worried about its potential to harm humanity and others seeing it as an opportunity for growth and innovation. The fear of AI is often fueled by science fiction depictions of machines becoming autonomous and taking over human jobs, leading to unintended consequences.

However, this fear is balanced by the excitement and curiosity about the potential benefits and innovations that AI can bring to various aspects of life. This enthusiasm stems from its potential to transform human life in profound ways, from generating new ideas and products to solving complex problems and improving efficiency.

In theatre, AI is revolutionising the industry as it is being used in stage management and script analysis, while chatbots are enhancing audience engagement and interaction. These innovative applications are transforming the creative process and redefining the audience experience, opening up new possibilities for artistic expression and storytelling in theatre.

This statement by Forbes indicates that AI systems are being used in theatres to optimize operational efficiency, particularly in managing concessions and merchandise inventory, by using algorithms to predict demand trends and reduce waste.

Additionally, AI is being used to address the growing concern of sustainability in cinemas, specifically in managing energy consumption, suggesting that AI can help theatres reduce their environmental impact and improve their overall sustainability. Going further, Davenport states that:
One of the most significant benefits of AI in Broadway is personalised marketing. AI can analyze the preferences and behavior of individual theatregoers and offer tailored recommendations for shows and events. This not only increases ticket sales but also enhances the overall audience experience. (2)

Davenport reveals that AI is revolutionizing Broadway marketing by enabling personalized promotions, where AI algorithms analyze individual theatregoers' preferences and behavior to offer customized show recommendations, leading to increased ticket sales and a more engaging audience experience. By leveraging AI-driven insights, Broadway producers and marketers can now target their audience with precision, boosting box office revenue and fostering a more dynamic connection with theatre enthusiasts.

However, Williams raises concerns by outlining the following points about AI marketing. "Data Privacy Concerns, Lack of Human Touch, Implementation Complexity, and Ethical Considerations" (9). A dive deep into this shows that the use of AI in marketing raises important concerns, including privacy and security issues, the need for transparency, and the potential for biased outcomes.

To address these concerns, marketers must prioritize data protection, comply with regulations, and be open about their data practices. Additionally, while AI enables personalization, it can lack human empathy, highlighting the need for a balance between automation and human interaction. Successful AI integration requires careful planning, significant investment, and ongoing monitoring to ensure fairness, accuracy, and ethical standards. Moreover, AI algorithms are only as effective as the data they are trained on, making it essential to use high-quality, unbiased data to avoid perpetuating harmful practices.

Artificial Intelligence in Light Design in Theatrical Productions
One integral part of theatre-making is stage design which builds worlds onstage for audiences to immerse themselves in the story they are watching, and lighting design is a part of it. David Forsee, a professional theatre designer, conveys the power that AI holds as a creative tool for designers. He states that: Much of theatrical design is iteration. Production processes can be condensed or elongated, creating pressure to iterate quickly, or iterating too

long and leaving artists with a creative block. AI websites such as DALL-E and Midjourney open up endless possibilities for designers to draw inspiration from. (14)

This exposes that the use of AI tools like DALL-E and Midjourney is transforming the iterative process of theatrical design, offering designers a vast array of inspirational sources and endless possibilities for creative exploration, and by leveraging these AI websites, designers can quickly generate and explore new ideas, potentially accelerating the iteration process and overcoming creative blocks, but also risking over-reliance on technology and losing the human touch that is essential to the artistic process.

Nevertheless, Kelvin opines that “A risk exists that heavy reliance on AI could undermine the development of traditional theatrical skills and individual creativity”. (12)

This statement by Kelvin shows that he increasing use of AI in theatre design and production may lead to a decline in the development of traditional theatrical skills and individual creativity, as reliance on technology replaces human innovation and artistic expression.

Okoro notes that “The commercial lighting industry is on the cusp of a revolution, driven by advancements in artificial intelligence (AI)” (5)
Semiotics
Oxford Dictionary states that “Semiotics is the study of signs and symbols, and how they are used to convey meaning in language, culture, and society”. This view connotes that semiotics is a multidisciplinary field that examines the ways in which signs and symbols create and convey meaning across various contexts, including linguistic, cultural, and social realms, highlighting the complex and dynamic nature of meaning-making in human communication.

Peirce supports this by noting that "Semiotics is the doctrine of signs, which deals with the nature and function of signs in all domains of human experience."(7) Even as Greimas corroborates that "Semiotics is the study of the production of meaning through signs and symbols, and how these signs and symbols are used to communicate and create meaning in different contexts". (9)

Peirce and Greimas converge in their understanding of semiotics as a comprehensive framework for examining the role of signs and symbols in creating and conveying meaning across diverse aspects of human experience, encompassing language, culture, and social interaction
Eco, on the other hand, asserts that, “Semiotics is a philosophical approach that views reality as a system of signs, and seeks to understand how these signs shape our perceptions and understanding of the world.” (5) Umberto Eco's perspective on semiotics implies a more profound and philosophical understanding of the field, where reality itself is seen as a complex web of signs that influence human perception, cognition, and comprehension of the world.

II. THEORETICAL FRAMEWORK

This study shall adopt the Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI) as its framework.

Technology Acceptance Model (TAM)
The Technology Acceptance Model (TAM) is a theoretical framework that explains how users form attitudes and intentions to use technology. It suggests that perceived usefulness and perceived ease of use are key factors influencing technology adoption.

Marikyan and Papagiannidis states that:
The technology acceptance model (TAM) explains the acceptance of information systems by individuals. TAM postulates that the acceptance of technology is predicted by the users’ behavioural intention, which is, in turn, determined by the perception of technology usefulness in performing the task and perceived ease of its use. (1)

Marikyan and Papagiannidis thus opine that the Technology Acceptance Model (TAM) suggests that individuals' willingness to adopt and use information systems is driven by their intention to use the technology, which is shaped by two key factors: perceived usefulness (whether the technology helps them perform tasks more effectively) and perceived

ease of use (how user-friendly the technology is). In other words, if users believe that a technology will help them accomplish their goals and is easy to use, they are more likely to accept and use it, whereas if they perceive it as difficult to use or not useful, they will be less likely to adopt it.

Mahajan corroborates thus, defining “perceived ease of use as the degree to which individuals find the innovation difficult to understand and use” (5)
This statement suggests that the concept of "perceived ease of use" in technology adoption is closely related to the idea of "complexity" in innovation diffusion theory, which is a major barrier to the adoption of new innovations. Mahajan defines perceived ease of use as the extent to which individuals find a technology difficult to understand and use.

Hence, quantifying the yardstick rather than depend on qualitative analysis, implying that if a technology is perceived as complex or difficult to use, it will be less likely to be adopted, whereas technologies that are easy to understand and use will have a higher rate of adoption. This postulation highlights the importance of user-centered design and simplicity in technology development to facilitate adoption and diffusion. According to Davis, however:

To TAM, technology acceptance is a three-stage process, whereby external factors (system design features) trigger cognitive responses (perceived ease of use and perceived usefulness), which, in turn, form an effective response (attitude toward using technology/intention), influencing use behaviour. (3)
Here, Davis does not believe in immediate acceptance but rather, acceptance in phases.

The statement above outlines the Technology Acceptance Model (TAM) as a sequential process, where technology acceptance unfolds in three stages. Initially, external factors such as system design features influence users' cognitive responses, specifically their perceptions of ease of use and usefulness.

These cognitive responses then shape users' affective responses, including their attitude towards using the technology and their intention to use it. Ultimately, this intention drives actual use behaviour, highlighting how technology design features can indirectly impact usage behaviours by influencing users' perceptions, attitudes, and intentions. Lin et al corroborate that:

Perceived usefulness and ease of use have considerable impact on attitude of the user. These can be determined as an unfavourableness and favourableness toward the system. Sometimes, other factors known as external variables (user training, system characteristics, user participation in design and the implementation process nature) are considered in TAM model (271-279).

Lin et al indicate that the Technology Acceptance Model (TAM) emphasizes that perceived usefulness and ease of use significantly influence a user's attitude towards a system, shaping their favourability or unfavourability towards it. Additionally, this statement shows that the model acknowledges that external variables, such as user training, system characteristics, user participation in design, and the nature of the implementation process, can also impact user attitude and acceptance. These external factors can either enhance or hinder the effectiveness of perceived usefulness and ease of use, ultimately affecting the user's overall attitude and likelihood of adopting the technology. Nevertheless, Dillon opposes that:

Essentially, there is a reasonable assumption that usability is a prerequisite of acceptance; thus, if a technology is considered highly usable and useful, it will most likely be highly accepted by its targeted users. This is often not the case, as many technologies have been perceived as highly usable and useful but were never accepted by the targeted users. (2)

This assertion by Dillion highlights a crucial nuance in the relationship between usability, usefulness, and acceptance. While it is reasonable to assume that a technology that is both highly usable and useful will be accepted by its intended users, this is not always the case. In reality, many technologies have failed to gain acceptance despite being perceived as user-friendly and valuable, suggesting that other factors beyond usability and usefulness influence

acceptance. This paradox underscores the complexity of technology adoption and the need to consider additional factors that may affect user acceptance, such as social, cultural, or contextual factors that can override the benefits of usability and usefulness

Holden and Rada note that "Such technologies were developed without an adequate understanding of the targeted user population." (2).Taherdoost and Masrom interestingly opine that:

Since TAM ignored the social influence on adoption of technology so it has limitations in being applied beyond the workplace. Besides, some variables as external variables need to be added to TAM to provide more consistent prediction of system use. (19)

This postulation reveals that Technology Acceptance Model (TAM) has limitations in its applicability beyond the workplace setting due to its neglect of social influence on technology adoption. Additionally, the model's reliance on individual perceptions of usefulness and ease of use is insufficient to predict system use, as external variables such as social norms, peer pressure, and organizational culture also play a significant role. To address these limitations, modifications to TAM are necessary, including the incorporation of external variables that can provide a more comprehensive understanding of technology adoption and use, thereby enhancing the model's predictive power and generalizability across different contexts. Taherdoost then adds that:

Since the intrinsic motivations are not addressed in TAM so the ability of TAM to apply in a customer context where the acceptance and use of information technologies is not only to achieve tasks but also to fulfil the emotional needs may be limited. (2)

This further reveals that TAM is limited in its ability to explain technology adoption in customer contexts because it primarily focuses on extrinsic motivations, such as performance and efficiency, while neglecting intrinsic motivations, such as emotional needs and personal satisfaction.

In customer settings, individuals often adopt and use technology not only to accomplish tasks but also to fulfill emotional desires, such as entertainment, social connection, or self-expression. As TAM does not account for these intrinsic motivations, its applicability in customer contexts may be restricted, highlighting the need for extended or modified models that incorporate emotional and social factors to better understand technology adoption and use in these settings. This therefore, brings the need for another theory in order to complement the study's perspective.

Diffusion of Innovations (DOI)
A quick look at the meaning of diffusion by Rogers shows that:
It is the process by which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication, in that the messages are concerned with new ideas. (3)

The process of diffusion of innovations here, refers to the spread of new ideas or technologies within a social system over time. This process enables the dissemination of knowledge and adoption of new ideas, products, or practices among individuals and groups, ultimately leading to social change and innovation diffusion.

Hence, Medlin and Parisot note that "Rogers' diffusion of innovations theory is the most appropriate for investigating the adoption of technology in higher education and educational environments" (20)

However, Greg defines Diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (5).

This definition succinctly captures the essence of diffusion, outlining the key elements involved in the spread of an innovation. The process of diffusion unfolds as an innovation is transmitted through various communication channels, such as media, social networks, or word-of-mouth, over a period of time, reaching and influencing the members of a social system. This process enables the innovation to

permeate the social structure, allowing individuals and groups to become aware of, learn about, and potentially adopt the innovation, ultimately leading to its integration into the social system.

In fact, Orr corroborates that "The most striking feature of diffusion theory is that, for most members of a social system, the innovation-decision depends heavily on the innovation-decisions of the other members of the system"

This goes further to highlight the significant influence of social networks and interpersonal relationships on the adoption of innovations. Nevertheless, revealing that individuals are often swayed by the decisions of others within their social system. As a result, the adoption of an innovation can spread rapidly through a social system, as individuals are more likely to adopt an innovation if they see others doing so, creating a snowball effect that drives the diffusion process.

However, as expressed in Rogers' definition, innovation, communication channels, time, and social system are the four key components of the diffusion of innovations.
According to Sahin, Rogers offered the following description of an innovation: "An innovation is an idea, practice, or project that is perceived as new by an individual or other unit of adoption" (2), adding that "An innovation may have been invented a long time ago, but if individuals perceive it as new, then it may still be an innovation for them". (2) This passage shows Everett Rogers' definition of an innovation, which emphasizes the subjective nature of newness and adoption. The second element of the diffusion of innovations process is communication channels.

Adams note that, for Rogers
Communication is "a process in which participants create and share information with one another in order to reach a mutual understanding". This communication occurs through channels between sources. Rogers states that "a source is an individual or an institution that originates a message. A channel is the means by which a message gets from the source to the receiver". (204)

This portrays communication as a dynamic process where individuals or entities (sources) convey and share information with each other to achieve a shared understanding. The communication process involves the transmission of messages through various channels, which act as the conduit between the source and the receiver. Rogers clarifies that a source can be an individual or institution that initiates the message, while a channel is the medium or pathway through which the message travels to reach the intended recipient. Rogers in Johnson, therefore notes that "diffusion is a specific kind of communication and includes these communication elements: an innovation, two individuals or other units of adoption, and a communication channel". (9)

This notably, points to the fact that diffusion requires two individuals or units of adoption, which refers to the sender and receiver of the message; and a communication channel, which is the medium through which the message is transmitted. By identifying these essential components, Rogers emphasizes that diffusion is a deliberate and structured process of communication that enables the spread of innovations, and that understanding these elements is crucial for facilitating effective diffusion. Thus, interpersonal channels are more powerful to create or change strong attitudes held by an individual.

The social system is the last element in the diffusion process. Sahin reveals that:
Rogers defined the social system as "a set of interrelated units engaged in joint problem solving to accomplish a common goal". Since diffusion of innovations takes place in the social system, it is influenced by the social structure of the social system. For Rogers, structure is "the patterned arrangements of the units in a system". He further claimed that the nature of the social system affects individuals' innovativeness, which is the main criterion for categorizing adopters. (3)
The final element of the diffusion process, the social system, which is a network of interrelated units, working together to achieve a common goal, is shown here.

According to Rogers, the social system's structure, defined as the patterned arrangements of units within

the system, significantly influences the diffusion of innovations, and also that the social system's nature and structure impact individuals' innovativeness, which is a critical factor in categorizing adopters. As technology advances and our communication networks become increasingly interconnected, the pace of diffusion accelerates, allowing ideas and innovations to spread rapidly.

Pertinently, the social system plays a crucial role in the diffusion process, as its structure and nature can either facilitate or hinder the spread of innovations, and understanding these dynamics is essential for effective diffusion and adoption of new ideas, practices, or technologies.

IV. METHODOLOGY

A mixed-method approach is employed in this study to investigate the perceptions and adoption of artificial intelligence in light design by Nigerian theatre practitioners in theatrical production. This approach combines both qualitative and quantitative methods to provide a comprehensive understanding of the research question. The quantitative method involves questionnaires administered to a sample size of Nigerian theatre practitioners, made up of 100 students at the Department of Theatre and Film Studies, University of Uyo, Uyo. Whereas, 150 questionnaires were distributed online and 100 returned.

This will provide data on their awareness, attitudes, and experiences with AI in theatre, which will be analysed statistically to identify trends, frequencies, and correlations, in order to get a broad understanding of the perceptions and adoption of AI among Nigerian theatre practitioners.

The qualitative method involves semi-structured interviews with a smaller sample of 5 expert theatre practitioners. This will gather in-depth insights into their perceptions, challenges, and opportunities of AI adoption in lighting in theatrical production. Content analysis will also be used to analyse play scripts, production designs, and other documents to identify how AI is represented and used in light design in the Nigerian theatre. This will provide rich, contextual insights into the experiences and challenges of theatre practitioners.

V. FINDINGS

The findings of this study, drawn from both quantitative and qualitative data, offer a comprehensive understanding of the perceptions, usage, and adoption of Artificial Intelligence (AI) in theatrical light design among Nigerian theatre practitioners. The following are the findings in alignment with the research objectives:

Awareness and understanding of AI
While there is a growing awareness of AI among Nigerian theatre light designers, the study revealed a significant gap in practical understanding. Some respondents were knowledgeable about AI’s potential in lighting design, whereas others lacked experience or exposure to its applications. The findings also point to a low perceived ease of use, as explained in the Technology Acceptance Model (TAM).

Perceptions of AI Benefits and Usefulness
A substantial 80%of respondents believe that AI can improve the quality of light design, enhance creativity, and reduce production time. This reflects a high perceived usefulness, a key factor in TAM that influences technology adoption.

Current Usage of AI in Light Design
The study revealed that while awareness of AI exists, its actual use in Nigerian theatrical productions remains limited. This reinforces the TAM's view that technology must not only be useful but also accessible and easy to use.

Factors Influencing AI Adoption
Quantitative results showed a 45% increase in willingness to adopt AI when benefits are perceived, and a 30% decrease when drawbacks are perceived.
Perceived Challenges and Ethical Concerns
Although 80% of respondents recognize the benefits of AI, 60% expressed concerns about job displacement, lack of creative control, and potential biases in AI systems.

VI. DISCUSSION

The study found that while a significant number of respondents demonstrated awareness of AI as a concept, many lacked a deep or practical understanding of how it functions in theatrical light design. Some theatre practitioners knew of AI's existence but could not confidently articulate its application or potential in their field.

This gap in understanding is significant, as it directly affects how users perceive the ease of use of AI technologies, a key variable in the Technology Acceptance Model (TAM). If a system is not understood, it is not likely to be embraced. This unfamiliarity with AI not only inhibits innovation but could also exacerbate fears or misconceptions, thereby widening the divide between opportunity and resistance.

Attitudes toward AI in light design were predominantly positive, with 80% of respondents agreeing that AI could improve the quality of theatrical lighting design. Respondents saw AI as a tool for enhancing creativity, increasing precision, and reducing production time.

This perception reflects high perceived usefulness, a crucial determinant of technology adoption in the TAM. Respondents acknowledged the potential for AI to free them from repetitive tasks, allowing more focus on the artistic dimensions of light design. However, these optimistic views were tempered by concerns about losing control over creative decisions.

As Respondent 1 put it, "AI can help us create more complex and interesting lighting designs, but it's not a replacement for human creativity." This illustrates the nuanced view many respondents hold: AI is a welcome enhancement, but not a creative substitute.

Findings indicate that AI is not yet widely implemented in Nigerian theatre productions. While respondents were generally aware of AI's potential, only a few had witnessed or participated in its application within their local productions. In TAM terms, even if AI is seen as useful, its adoption may be hindered by low perceived ease of use due to infrastructural or logistical challenges. Therefore, adoption may remain aspirational without deliberate institutional investments, policy alignment, and cross-sector collaboration to facilitate wider implementation in theatrical settings.

Respondents clearly identified both benefits and challenges of using AI in theatre. Benefits included enhanced design precision, faster execution, and greater creative possibilities acknowledged by 80% of respondents. Challenges, noted by 60%, included fears of job loss, reduced human control, and potential algorithmic bias.

The correlation analysis revealed a 35% negative relationship between perception of AI drawbacks and willingness to adopt, showing that fears and ethical concerns directly suppress adoption potential. As Respondent 5 insightfully remarked, "I'm worried that AI will take our jobs, but at the same time, it can help us focus on more creative aspects of light design." Therefore, while the promise of AI is strong, the concerns are equally valid. A human-centered, ethically guided AI approach must be prioritized.

VII. CONCLUSION

This study has provided valuable insights into the perceptions and adoption of Artificial Intelligence (AI) in light design by Nigerian theatre practitioners. The findings reveal that while a majority of practitioners acknowledge AI's potential to enhance creativity, efficiency, and precision in theatrical lighting, concerns about job displacement, limited awareness, and inadequate infrastructure pose significant challenges to its widespread adoption.

The study's application of the Technology Acceptance Model (TAM) and the Diffusion of Innovations (DOI) framework highlight the importance of perceived usefulness, technological exposure, and industry readiness in shaping AI adoption trends.

Despite optimism about AI's benefits, resistance remains due to fears that automation could replace human roles in light design. Additionally, the study found that education and prior exposure to AI significantly influence willingness to adopt the technology, reinforcing the need for structured training programs, workshops, and curriculum development in theatre arts education.

The study also shows the role of infrastructure and policy in AI adoption. Many Nigerian theatre companies face financial and technological limitations, making AI integration challenging. Addressing these barriers requires investment in digital tools, power supply stability, and access to AI-driven lighting software.

Last but not least, while AI presents immense possibilities for innovation in theatrical light design, its successful integration into Nigerian theatre will depend on a strategic approach that includes education, policy development, and industry support.

VIII. RECOMMENDATIONS

The researcher recommends the following:

i. Education and Training Programs; To bridge the knowledge gap and improve AI adoption, educational institutions should integrate AI-related courses into theatre and performing arts curricula. Additionally, industry-led workshops, mentorship programs, and hands-on training initiatives should be introduced to familiarize theatre practitioners with AI tools and applications in light design. Training should focus on how AI can enhance creativity rather than replace human roles, bringing a balanced approach to technology adoption.

ii. Workforce Reskilling and AI Literacy Campaigns; Given the concerns about job displacement, it is essential to implement workforce reskilling programs that help theatre practitioners adapt to AI-driven innovations. This will help practitioners develop the necessary skills to work alongside AI, ensuring a smooth transition into a technology-enhanced theatre industry.

iii. Investment in Infrastructure and Technological Resources; The government, private sector, and industry stakeholders should collaborate to provide funding, grants, and technological resources that facilitate AI adoption in theatre production. This includes investing in AI-driven lighting software, automated control systems, and stable power supply infrastructure. Without adequate resources, AI adoption will remain theoretical rather than practical. Therefore, financial and technological support is critical to ensuring widespread accessibility and effective utilization of AI in light design.

iv. Policy Development and Ethical Guidelines; Regulatory policies should be developed to govern the ethical use of AI in theatre production. Issues such as algorithmic bias, creative autonomy, and human oversight of AI-generated lighting effects should be addressed to prevent AI from diminishing artistic originality. Clear guidelines should be established to ensure that AI implementation aligns with industry best practices, protecting both practitioners and the integrity of theatrical productions.

v. Encouraging Human-AI Collaboration; Theatre stakeholders should promote a collaborative approach where AI complements rather than replaces human creativity. AI should be positioned as a tool that enhances lighting precision, automates complex effects, and improves efficiency while maintaining the artistic vision of theatre practitioners. By fostering human-AI partnerships, Nigerian theatre can embrace technological advancements without compromising its artistic and cultural essence.

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