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ARTISTIC CREATIVITY, DIGITAL TECHNOLOGIES AND THEATRICAL SUSTAINABILITY: INTEGRATING NEW MEDIA IN THEATRE PRACTICE

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Abstract

Arts and technology have continually been inter-related. Artistic expressions have been facilitated by technological innovations that enable artists either to adapt technologies meant for other purposes, or to invent them as a way to foster the creative process. The evolution of digital technologies in the knowledge era has had a huge impact on the theatre profession, in which digital transformation has influenced the ways theatrical contents are created, presented, distributed and circulated to audiences. This article examines technological advances of the digital era and their impact on the performing arts/the theatre. Relying on the Technology Acceptance Model (TAM), this study argues that new technologies and media enable the creation of new forms of arts that stimulate radical changes in the distribution channels of cultural and creative products (CCPs) based on their digitalisation and dematerialisation. The study finds that digitalisation provides creative artists with new tools and means of artistic expression. Indeed, digitalisation enhances and inspires not only the creation of new art forms but also the presentation of traditional arts by enabling multimedia experiences and interactivity. The paper recommends that, given the reality of globalisation and its concomitant emergence of virtual communities, theatrical performances must adopt new media tools in terms of content creation, exhibition and distribution, to remain functional.

Keywords: Creativity, Digitalisation, Theatre, New media, Cultural and creative products.

Introduction

The command and knowledge of digital technologies has become a necessary skill for success in the 21st century. Technological innovations and tools are rapidly affecting, influencing and changing virtually every facet of human life; constructing new and innovative ways to use technology to improve professional operations. With emerging technological developments and enhancements, the collection and distribution of information can be accomplished at lightning speeds in almost any location, and within a global network; which have altered the ways that many individuals and businesses function. Technology has, undeniably influenced humanity's daily routines and this progress of technology seems endless as long as human exists.

Technology entails the use of principles, obtained through cumulative exploration and application of control over nature, to solve problems. Wahab, Raduann and Osman cite Burgelman et al. as defining technology as "the theoretical and practical knowledge, skills, and artifacts that can be used to develop products and services as well as their production and delivery systems" (70). It connotes the practical and empirical skills, knowledge and procedures for making, using, and doing things useful to human life and environment. Such knowledge, skills and procedures are specialized and pertain to the production of the goods and services in organised economic activity, including the knowledge and skills required to manage a set of interrelated technical processes.

New media can be referred to as the form of media in which information technology tools combine with communication networks with digitised content convergence. Adeniyi and Kafaru put it more articulately as "the form of media which content combine and integrate data, text, sound and images of all kinds, stored in digital formats and are increasingly distributed through networks such as those based on broad band, fibre-optic cables, satellites, and microwave transmission systems" (6). It underscores the convergence of generating and processing data under digitalised computer based systems that are shared through networks.

All fields of study adapt to technology, constructing new and innovative ways to use technology to improve business operations. Theatre is no exception to the reality of technological imperative, its processes and applications. This is because of the way and manner in which theatrical products are created, produced, distributed, marketed, preserved and supported are shifting (in some instances, being transformed) in relation to the apparently digital transition of society. Throughout the history of evolution of theatre practice, it has been enhanced and facilitated by technological innovations that enabled artists either to adapt technologies meant for other purposes, or to invent them as a way to foster the creative processes.

Pasikowska-Schnass claims that: recent developments in digital technology have influenced arts and culture in many ways. Information and communications technologies have provided artists with tools enabling them to access new modes of self-expression and of linking and interacting with their audience. These tools have revolutionised the perception of arts and creation (2). As competition for leisure time increases, it is important to find new approaches for engagement and creativity in theatrical productions to make connections with digitally saturated audiences. Expectations from audience members, designers, directors, artists and administrators have changed due to the progression of digital technology. Court avers that "as technology changes the ways that we function in society, it is imperative that we adapt and integrate new technologies to best serve our respective fields (41). Indeed, the evolution of new technologies and media in the knowledge era has had a huge impact on the field of the arts and culture.

The digital transformation has changed the ways we create, present, distribute and circulate content, including theatrical works. The inventions of new technical devices have continued to boost, enhance and facilitate the artistic process, greatly. Iyamah and Akpughe assert that: theatre practices of different ages have used available

technology to produce visual transformations, interventions and spectacle. As technological advancement and awareness is created, the evolution changes of the technical devices used on stage became necessary, in order to meet up the needs and requirement of the ever growing society (284). For instance, visual design aspect of the theatre which includes: scenery, lighting, sound, costume and make-up, has received much of the benefit that accrue from developing technologies.

The 21st century has offered even the most profound impression, characterised by new technologies with the potential to create equally profound changes in theatre's style, theatre's relationship with its spectators, and the production, distribution and reception practices that determine theatre's influence in the social field. As the production technology landscape shifts, an adaptive and enlightened community of theatre artisans are crafting engaging and innovative productions for a new age by acknowledging shifting patterns through embracing new technology. To engage with modern audiences, the relationship between digital technology and theatre needs to be examined and addressed. It is against this backdrop that this paper examines technological advances of the digital era and their impact on the performing arts, in particular the theatre.

Theoretical Framing

Researchers and authorities in the field of media technology have advanced various theoretical models to evaluate the relevance of incorporating digital technologies in the processes, practices and delivery systems of human undertakings. In this paper, Fred Davis' Technology Acceptance Model (TAM) is adopted to provide the theoretical foundation and justification for technology use in performance parlance. TAM was introduced by Fred Davis in 1986 for his doctorate proposal. Davis specifically tailored the theory for modelling users' acceptance of information systems or technologies, with the goal to explain the general determinants of computer acceptance that lead to explaining users' behaviour across a broad range of end-user computing technologies and user populations. The theory explains how a new technology and the various aspects of it are received and exploited by users. The major assumption of this theory is that; two factors, namely perceived usefulness and perceived ease of use are relevant in technology use behaviours. Perceived usefulness is defined as the potential user's subjective likelihood that the use of a certain system will improve his/her action. Perceived ease of use refers to the degree to which the potential user expects the target system to be effortless. As twentieth-century media theorist McLuhan argues that:

> A new communication technology - be it the printing press, radio, film, television or social media not only carries, but translates and transforms, the sender, the receiver, and the message. To change the medium is to change the message - the signs, the symbols and the meanings they convey, as well as the co-creative relationships between author, actor and audience that contribute to meaning making. (qtd. in Bulut 97-8)

The implication of McLuhan's submission is that the uptake of media technologies will alter the way theatre makers inform, educate, entertain or proselytise on stage as well as change the way spectators perceive and interpret what they see on stage. Hence, the applicability of TAM. Davis developed the theory using the four different types including the individual differences, system characteristics, social influence, and facilitating conditions, which are determinants of perceived usefulness and perceived ease of use. Although other researchers have advanced different theoretical insights on the model, TAM has been used over the years by various researchers to explain the adoption of technology systems to enhance performance processes of different fields including the performing arts.

Evolutionary Trends in Theatre Practice

Since the dawn of human civilization, there has been something essentially desired in humanity's inherent nature; the search for means of recreation and ways of self-expression as a feature of individualities and tempestuous judgments. In the midst of this burning desire, all art forms and born and nourished – to unleash the human spirit and mind. Such artistic creations are interlaced with surges of technological innovations that affect and transform every aspect of life, including the perception of the performing arts (Orisaremi 354). The practice of theatre has a long history that is relative to the different socio-cultural, religious and political formations across the globe. Beginning from the 5th century Dionysian festival in Athens, where the history of what has come to be known formally today as theatre began; it has continued to undergo modifications in terms of performance practice.

The theatre has thrived with emerging technological innovations. Architectural designs such as the proscenium stages introduced in the early 18th century removed the outdoor element of the enclosed theatres with the development of techniques for improved acoustics and sightlines that transformed the performer to be more separated from their audience. Ranging from the introduction of *deus-ex-machina* that enabled the descent of a god to salvage a character on stage, through the pageantry theatre of the medieval era, theatrical performances have continued to be laced with one form of technology or another. All for the purpose of enhancing artistically aesthetic tradition that satisfies the taste of theatre audiences. Reilly notes that: digital performance has a rich history extending back to the *deus-ex-machina* a technique in ancient Greek theatre, towards the end of a performance, a crane-like device was often used to lower an actor playing a god onto the stage to solve an apparently intractable problem in a plot-line (1).

It was a stage device used to bring the gods or heroes of tragedy on stage, as a solution to an apparently insoluble crisis. Translated to mean 'god from the machine' it was an ancient stagecraft, in which an actor playing the deity would be physically lowered by a crane-like (a device that made an actor look like they were flying) mechanism into the stage area. This innovation left a spectacular impact on theatre at the time and has shaped the direction of technology in theatre history. This reminds us that theatre, from distant past, has always been in a synergizing relationship with technology. Although early theatrical productions in Greece and Rome were staged,

evolving new ways to improve performative aesthetics, including lighting and acoustics on the stage (Orisaremi 354); modernization would revolutionize the stage by offering tons of new technology to alter and improve the experience of the theatre for all those involved.

While the theatre has continued to evolve with moving trends, practitioners have always been eager to embrace and incorporate new technologies that can enhance and add value to their products. These include technologies that help them provoke emotion, entertain, educate or enrich the performance environment, as well as those that help them share their arts beyond the immediate physical space. Even in the pre-modern era, when direct communication between actors and a local audience co-present in the same space was the defining feature of the theatrical experience, theatre was already a multimedia art form with image and movement being integral to its aesthetic. The period from the middle ages to the modern, Carr contends that; "new or evolving stage technologies such as squibs, cranes, pulleys, cannons, trap doors, and other apparatuses all contributed to the rise in popularity of...an effect-driven theatre of the senses in early modern England" (1). These technological tools that were to make theatrical affect were not only directed to the enhancement of the visual, but for all the senses. Notable of these innovative tolls were pyrotechnics (which frequently filled the stage with fire, light, smoke, and heat), the rolled bullet and tempestuous drum.

In the modern era, advances in light, sound and imaging technology have led artistes to evolve new modes of content creation, distribution and exhibition, including the structured space (stage), which has become central to public's perception of what theatre is. With the passage of time, technologies like projectors that can fuse new media technologies with the traditional theatre performance or new media technologies with the mainstream media were provided. These were used to facilitate updated production models, including sound systems, advanced lighting systems, that all help to advance audience participation and appreciation of the performance. Saltz reports that: towards the end of the 1980s, digital technology began to make significant inroads into mainstream culture. Computers grew in power and acquired the ability to drive and manipulate visual and sounds media, even as they steadily decreased in size and cost" (421). The innovation of digital technologies had a profound influence on the art of music in the twentieth century as it altered how music is transmitted, preserved, heard, performed, and composed. Digital technology became involved in the reinforcement of concert halls, the recording and broadcast of music, and the design and construction of musical instruments such that it has become rare to hear musical sound that has not at some level been shaped by technology.

Digital technologies have greatly helped to make our lives better by not only saving our important resource as time and money, but also worked well in unifying the world by turning into global village which helped people to easily overcome their cultural, racial and continental barriers. The ease of connecting through technology and communicating online does have impact on culture locally and globally as more and more people choose to share and exchange ideas and information through the cyber space rather than necessarily engaging physically. In Nigeria, the advent of broadcast

media and its development between 1920s and 1930s saw featuring of performances (though predominantly music) on electric media. Adeniyi and Kafaru submit that: it was not until 1959 when the first television station was established in Ibadan the then western state of Nigeria that drama and other forms of entertainment started featuring in another platform other than the stage, but with the evolution of internet and its associated technologies, the performance terrain changed, the media platform did not only increase, it changes (8).

The inception of the internet protocol offered the performing arts many opportunities, particularly making possible all those effects that hitherto have been considered impossible making the performing art industry a bee-hive of activities. With the shifting landscape in performance technology, an adaptive and enlightened community of theatre artisans are crafting engaging and innovative productions for a new age by acknowledging shifting patterns through embracing new technology. In order to engage with modern audiences, the relationship between digital technology and theatre needs to be examined and addressed. Theatre artists have the capacity to unleash the creative potential as well as increased efficiencies provided by new technology. The variety of both legacy and new digital technology that is available for theatrical productions creates a wide spectrum of ability levels in use and implementation.

The 21st century has witnessed intense technological innovations, characterised by the rise of information and communication technologies (ICT), which apart from fuelling the digital economy is accelerating the production, distribution and consumption of goods and services; including consumption in art markets. With this development, the theatre and its practitioners are increasingly embracing new media for the display, promotion and conservation of their artistic collections that provide unique experience for their audiences. For instance, with the prevalence of social media tools artistes have intensified experimenting with new media that give rise to art forms that push the boundaries of performance space, time and audiences. Technology use permeates artistic creativity in content creation and distribution as well as audience engineering and reach. New technologies thus provide ready tools at the disposal of theatre practitioners to expand and enhance performance grandeur and exhibits, grow their audiences, sell tickets and raise funds even online, while allowing theatre audiences to share content and give feedback with ease.

Thomson, Purcell and Rainie explain the influence of media technologies on performance practice, noting that "it has changed audience expectations, put more pressure on the arts groups to participate actively in social media and in some circumstances, undercut organisations' missions and revenue streams" (2). To date, new digital technologies have had their deepest impact on production and dissemination practices in performance processes and practices that allow artists to replace physical content, space and audience with the digital, and to displace distribution over time and between places with instantaneous distribution over networks. Digital media and information technologies are pushing them to their limits with creative experiments, discovering insights in areas such as computer-mediated communication, social interaction and the impact of technology on human life.

Describing this marriage between technology and performance, Kelly Johnson states that "the last twenty years have allowed designers to incorporate technology into storytelling without solely having to rely on performers" (2). Kumar, Chaturvedi and Merhotra aver that:

> The convergence of theatre with new media has led to this social and cultural activity taking place online. The convergence of theatre and new media does not approach internet technologies as a distribution or "transmission" medium; rather, the internet is the site for the performance, & a creative medium. It is not about only making a stage performance accessible to an online audience, it is about discovering new ways of making and presenting theatre, and new artist-audience relationships in these new theatrical-contexts. (2-3)

The position identifies three fundamental ways by which the theatre and new technologies can converge; as performance space, creative artistry and audience reach. The developments in new production technologies within theatre have created new expectations and requirements of facilities. Outlining the compelling needs of modern theatrical performance, Strong contends that: today almost no theatrical work, even poor theatre occurs without some sort of technological enrichment or alteration - a spotlight, say, or a microphone. No matter the size or configuration of the auditorium, the performances, are supported by a considerable array of technology in the form of lighting, scenery handling equipment, and sound systems and acoustics, all of which need to be integrated with the architecture of the auditorium (38). These tools can profoundly transform the design composition of theatre performance in terms of scene, sound, costume and make-up, as well as lights that do not only provide illumination but aesthetic communication.

The integration of theatre with media technologies provides prospects for neoteric viewing encounter and engagement to audiences. This also stimulates the ways that viewers constantly relocate themselves between live spaces and technology spaces in their daily lives – the drift that produces a set of new aesthetic possibilities for theatres that are infused with ideas related to convergence with new media. Like in other facets of human engagements, digital technologies with the potential to create equally profound changes in theatre's style, theatre's relationship with its spectators, and the production, distribution and reception practices that determine theatre's influence in the social field are becoming even more engaging. By adopting digital technologies as new mechanisms of content creation, presentation and reception to audiences that are diverse in many ways, and making the relationship between producers and active citizen consumers more equal, this convergence can assist theatre makers to better engage with new audiences in new ways, and with ease. It can make opportunities to create, view performance content or critique theatre performances available to a wider audience; the opportunities of which can be available to audiences that are historically been marginalised on the basis of class, gender, race or ability. Demonstrably, digital technology can be used as a powerful tool in the creative exhibition and transmission processes of theatrical performance, opening new worlds of possibility.

Synergizing Artistic Creativity with New Media in Theatre Practice

Theatre has the ability to bring people together (either as live, physical or virtual communities through the space-bridging technology of the internet) to share an artistic experience. This makes digital technology an indispensable component to this process of engaging the audience. The synergy of theatre and media technologies can manifest, affect and effect creative artistry in performance parlance in three fundamental ways, namely, performance content creation, performance space and performance transmission. This, in turn, enhances artistic creativity, performance exhibition and accessibility, as a discovery of new ways of making and presenting theatre as well as new ways of cultivating, reaching and sustaining audiences with ease. Although the theatre is a collaborative art that involves the harmonization of human and material resources into a meaningfully aesthetic performance, the interpretative role of this collaborative process lies with the theatre director. This makes the director the creative and interpretative artist in the theatre responsible for interpreting the performance using the performance material (script), actors, space (stage) and other production elements, in harmony with other artistic collaborators. "Wherever is found suitable for locating the drama becomes the space or stage of theatre performance" (Effiong Johnson 54). It could be a live space, recorded, television broadcast, print or paint; each medium has its own technological capabilities that affect the delivery of text, sound, and visual images.

Given the available digital tools at the disposal of artistes, the creativity framework for producing or interpreting artistic content must be consistent with the technological platforms; the hardware, software and service protocols in isolation or combination. Such framework will enable codification of performance content into formatted protocols that allow for exhibition and exchange under user-friendly interfaces. To achieve this objective, the director must work with the elements of the script, actors and the space, consistent to available technology in order to produce visual transformations, interventions and spectacle that meet up the needs and requirement of the ever growing audience.

Theatre practitioners need to integrate the interplay of new technologies for the creation of new scenic effects in their artistic creations, including animation of spectacle to enliven scenic illusion and to create the spectacle of transformation of place. For instance, 3D animated sets can visually mix the real and the imagined places or the stage and the scene, where movement becomes integrated into the visual spectacle in seemingly natural ways or fantasy. There can also be animated sets of light created with the aid of digital technology to realize a luminous expression that will irradiate the colors demanded by the theatrical action with all its emotional power. The major trends surrounding innovation in lighting technology involve LED instruments, new consoles, and wireless tools. Lighting consoles has been truly remarkable, creating both more efficient programming and design process, while also increasing the creative possibilities. The process of patching and programming lights traditionally entailed a complicated and time consuming process, especially for moving lights, which due to digital technology has been exponentially simplified.

In the exhibition and transmission, the wide spread of internet, development of new personal devices and social media emergence are ready technological tools and space for the exhibition and transmission channels of cultural products based on their digitalization and dematerialization. Given the reality of online communities as global communities, virtual communities as real communities; the conceptual reality of the essence of social media sites in terms of socialization, business, politics, evangelism, education, online shopping, interpersonal relationship are proofs that exhibition and transmission of theatrical products is possible. This is because the existence of virtual communities is no longer distant, inaccessible or unrelated to the human organic communities, but as a global phenomenon, has come to stay and with increasing integration into human consciousness; not losing sight of the socio-cultural, socio-political and socio-economic benefits and implications of engaging in the social platforms; and, urging the need for formulating frameworks for proper utilisation of these virtual communities.

For the fact that the audience's capacity for having feelings and generating thoughts is crucially connected with the willingness to suspend disbelief, it becomes necessary to ask whether or not telematic theatre has the capacity to make an audience suspend its disbelief as willingly in the virtual space, as it does in performances where actors and audience share the same physical space. In the theatre industry, many have cast social media as a platform with the capacity to bring about revolutionary changes in the way artists and their audiences come together to make, and make meaning of, plays, performances and events. For advocates, the appeal lies in the fact that social media is driving a shift from the mass media paradigm that dominated in the twentieth century to the more co-creative, collaborative and democratic media paradigm that is becoming dominant in the twenty-first century. Accordingly, social media has the potential to expand the ways in which spectators engage a theatre work, and, equally importantly, the range of spectators engaging a theatre work.

The social media has become a space of engagement between performers and audiences by addressing them in direct, individuated and accessible ways. Given this reality, stage performers and their audiences can easily interact using the social media; the experience of which can take different forms, and places across the aesthetic, critical, marketing and audience development domains of theatre practice. These technological tools and space allow theatre makers to offer their audiences more creative shows, more choice in when, where and how they see these shows, more chance to comment on these shows, and more insight into what is happening behind the scenes of these shows. It is also changing the content of performances as theatre makers start to take the relationships between family, friends, co-workers, companies and politicians playing out on social media as stimulus for the plot, dramaturgy or scenography of their work. The effect of this experimentation goes beyond simply conveying the same messages by means of a new media channel.

Conclusion

As technology is advancing and changing at a fast and seemingly impossible rate, integration is more about balance and strategy than trying to remain current. As

digital technologies have emerged, so have the various opinions about its role in live performance. The new technologies being developed are not necessarily meant to replace legacy technology but to enhance productions. Maintaining a balance of tradition and artistic intention at the heart of the creation process allows for any technology to be used to make ideas reality. Indeed, we are living in a time of change where we have the opportunity to define what theatre means to our era. Digital technical components impact how we make theatre: the creation process, the delivery final product, as well as shape the audience experience. Modern theatre must find a balance that can embrace current possibilities while honouring the traditions of the art form.

The impacts of technology on all facets of human life and its ability to boost, enhance and facilitate development processes is not in doubt. Given the reality of globalization, not only of economy, culture, politics, but also of emergence of virtual communities, theatrical products and services must adopt to the realities of times, to remain functional. Theatre practitioners must integrate new media tools and platforms both in terms of enhancing the audience experience with more aesthetic performances and marketing perspective. Indeed, new media technologies can even be partners to the performing arts makers in their creative processes, rather than just tools for presentation. Theatrical performances can attract wider and resourceful audience as long as they conform to technological tools and platforms that guarantee ease of use and access. This is in view of the fact that technology remains an extension of the outer world and society, and must be implemented into creative processes of theatre.

Works Cited

Adeniyi, Kehinde A. and Babatunde A. Kafaru. "Paradigm Shift in African Theatre and Performance: New Media to the Rescue." *International Journal of Transformations in Business Management (IJTBM)* 6.I (2016):1-10.

Arts Council of Wales, Arts in Wales Survey 2015. 2 August 2022. <www.arts. wales/whatwe-do/research/latestresearch/arts-in-walessurvey-2015>.

Bulut, Miran. Digital Performance: *The Use of New Media Technologies in the Performing Arts*. Thesis, Aristotle University of Thessaloniki, 2018.

Court, P. "New Technology, New Technicians and Ancient Art." *Canadian Theatre Review* Summer (2007): 40-44.

Hadley, Bree. *Theatre, Social Media, and Meaning Making*. Cham: Palgrave Macmillan, 2017.

Iyamah, Chijioke Y. and Akpughe, Oghenemudiaga P. "Technical Theatre Practice in Nigerian University Theatres." *EJOTMAS: Ekpoma Journal of Theatre and Media Arts*.6.1 and 2(2017):281-307. DOI: 10.4314/ejotmas.v6i1-2.16.

Johnson, Effiong. *Play Production Processes*. Lagos: Concept Publications Limited, 2001.

Johnson, Kelly A. Theatrical Productions and Digital Technology: Innovations in and Implications of Digital Production Technology in Regional Theatre. A Master's Dissertation, 2011.

Carr, Matthew K. *A Theatre of the Senses: A Cultural History of Theatrical Effects in Early-Modern England*. Dissertation, Florida State University, 2013.

Kumar, Vinay C. M., Romesh Chaturvedi and Shruti Merhotra. "Art of Theatre on New Media Platform and Audience Viewing Experience." *Global Media Journal-Indian* 4.2(2013):1-20.

Orisaremi, Alphonsus S. "From Classical Athenian Machina to Ibadan Revolve Stage: Theatre Design and Technology in Practice and Theory." *International Journal of Current Research in the Humanities* 22 (2018): 354-371.

Pasikowska-Schnass, Magdalena. "Arts in the Digital Era." *European Parliamentary Research Service*, 2019.

Poole, D. and Le-Phat, H. *Digital Transitions and the Impact of New Technology on the Arts.* Report. Canadian Public Art Funders (CPAF) Network, June 2011.

Reilly, Kara. "Introduction." *Theatre, Performance and Analogue Technology* Ed. Kara Reilly, 2013.1-14.

Saltz, Davis Z. "Media, Technology, and Performance." *Theatre Journal* 65.3(2013):421-432.

Strong, Judith. *Theatre Buildings: A Design Guide*. Abingdon, Oxon: Routledge, 2010.

Thomson, Kristin, Kristin Purcell and Lee Rainie. "Arts Organizations and Digital Technologies." Pew Research Centre. 1 June 2022. <http://pewinternet.org/ Reports/2013/Arts-and-technology.aspx>.

Wahab, Sazali A., Rose C. Raduann and Suzana I. W. Osman. "Defining the Concepts of Technology and Technology Transfer: A Literature Analysis." *International Business Research* 5.1(2012):61-71.http://dx.doi.org/10.5539/ibr.v5n1p61 on 17/06/2022.