

Sustainable Scenography in The Octopus: A Play Design Inspired by E.M. Forster's The Machine Stops

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Abstract

This research examines the cyclical nature of civilizations, which rise, decline, and ultimately collapse due to complex social, economic, political, and cultural factors. In the 21st century, digital technology has made civilization more intricate than ever. It references E.M. Forster's novella "The Machine Stops," a prophetic work from the early 20th century warning about overdependence on technology and emphasizing the importance of human uniqueness. Building on this, the study hypothesizes that the disappearance of modern technology—whether rapid or gradual—could push society toward sustainability and resource recycling.

The research proposes a theatrical performance titled "The Octopus," inspired by Forster's themes, to be performed on a modular mobile stage using recycled materials for scenic elements and giant puppets, promoting sustainable scenography.

The author showcased the proposed designs at the Ahmed Osman Exhibition Hall (Small Hall) at the Faculty of Fine Arts, Alexandria University, Egypt, on April 26, 2025.

Utilizing descriptive, analytical, inductive, and deductive methods, the study concludes that adopting sustainability in arts and theatrical scenography is crucial for preserving humanity and civilization. It emphasizes the need for a balanced relationship with technology and highlights the importance of investing in human potential, asserting that sustainable artistic practices are vital for humanity's future.

Keywords

Sustainable
Scenography; The
Machine Stops;
Recycling.

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1. Introduction:

Among the inevitable divine laws of the universe, nations and civilizations undergo cycles of rise and strength, followed by decline and collapse. Just as nations experience periods of glory, they also face times of weakness and degradation. No entity, regardless of its power or advancement, can escape these laws. Analytical historical studies have revealed the prominent milestones that civilizations have marked throughout history, illustrating the stages of national ascent, prosperity, and eventual decline (Toynbee, Arnold J., 1987). The collapse of these civilizations is not mere coincidence; rather, it results from a complex interplay of internal and external factors, encompassing social, economic, political, and cultural laws.

Philosophers who posited the existence of recurring cycles in civilizations sought to derive general laws from historical events that guide humanity in its journey. These laws assist in delineating interconnected cycles that help identify the truths reflecting a civilization's character and its temporal context (Hussein M. M., 1985). Numerous

historical and analytical studies indicate that the fall of civilizations typically follows two primary trajectories: a gradual decline, as seen in past empires whose cultural fabric eroded incrementally over decades or even centuries (such as the Roman, Abbasid, or Ottoman empires), or a rapid collapse, often precipitated by acute conflicts, wars, or sudden economic downturns (as occurred with Nazi Germany, the Soviet Union, or the Napoleonic Empire).

In the twenty-first century, contemporary digital technological civilization stands at a crossroads that is, if not more complex, strikingly similar to these historical patterns. Amid an absolute reliance on digital systems and artificial intelligence, coupled with the fragility of values and occasional loss of control over the very tools of innovation, both hypotheses of gradual and rapid collapse are highly plausible. The gradual decline may manifest through value erosion, increasing economic and social disparities, and the collapse of profound meanings that preserve human dignity. Conversely, rapid collapse could result from a major digital or environmental catastrophe, loss of control over

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artificial intelligence systems, or a global breakdown of interconnected communication networks and infrastructure.

To confront this latent threat, the shift toward genuine sustainability has become not merely a luxury or elite option, but a vital necessity for preserving human existence and civilization, and for planning a more sustainable and humane future. This entails recycling material and energy resources to ensure a non-wasteful production cycle, investing in human capital as an indispensable asset through value-based education, fostering moral and intellectual awareness, and enhancing the balance between technology, nature, and spirituality to prevent sliding into a destructive civilizational gap. Notably, there is a narrative by British author E.M. Forster titled "The Machine Stops," written in the early twentieth century, which is considered one of the earliest and most powerful literary works predicting the collapse of a technology-dependent digital civilization. This narrative is directly linked to the previously discussed scenarios concerning rapid versus gradual collapse of contemporary technological and digital civilizations. Although the novel was written in 1909 and adapted into a short television film of nine minutes in 2009, it remains a prescient work that forecasts the downfall of a technology-dependent society, resonating with the aforementioned hypotheses regarding the collapse of contemporary technological and digital civilizations.

The narrative envisions a future world where humans live in separate underground chambers, entirely reliant on a massive machine that governs everything: communications, food, travel, and education. Due to their extreme dependence on the machine, humans have lost the ability to think or act independently. Each individual becomes a prisoner of their "cell"/phone/screen, with the machine dominating its human prey like an octopus, symbolizing the pervasive control and penetration the machine exercises over society. In this scenario, individuals become captives of the machine/octopus, unable to break free, and often resist the idea of rebellion. The "machine" infiltrates human thought and psychological behavior to the extent that its victims begin to venerate it, viewing it as infallible. Ultimately, the machine halts unexpectedly, leading to a swift and catastrophic collapse, leaving everyone to realize too late that the true value of sustaining the world lies in investing in humanity.

This research proposes an applied study for designing a theatrical performance titled "The Octopus," inspired by the events of Forster's "The Machine Stops." It includes the creation of drawings and complete designs for the scenes and

characters, proposed to be presented on a modular stage known as a "mobile theater." The design of the scenic elements and large puppets associated with the performance will utilize recycled materials, embodying the concept of sustainable scenography, and will be carried out without reliance on modern technological elements. The author showcased the proposed designs at the Ahmed Osman Exhibition Hall (Small Hall) at the Faculty of Fine Arts, Alexandria University, Egypt, on April 26, 2025.

Research Problem:

The research problem can be summarized through the following questions:

- 1- What if the components of modern technology were to disappear, leading to a loss of electricity and internet connectivity due to infrastructure collapse caused by contemporary issues such as natural disasters, climate change, global conflicts, and economic crises?
- 2- How can theater continue to thrive in the absence of modern technology, considering it is regarded as the "father of all arts" before cinema and television?

Research Hypothesis:

This research is based on the hypothesis of the disappearance of modern technological means and the inevitable transition toward sustainability and resource recycling. It aims to trace the contemporary world's struggles with variables and transformations that may lead to the collapse of the current digital edifice, whether rapidly or gradually.

Importance of Research:

This study proposes an application-focused exploration of how theatrical performances can persist in the absence of modern technology. It examines how the concepts of sustainability and recycling can be utilized in the design and implementation of scenic elements and large puppets within a mobile theater performance, affirming the essence of sustainable transformation.

Research Objectives:

- 1- To investigate the mechanisms of sustainable transformation and how to achieve sustainable scenography in theatrical performances, based on the hypothesis of the absence of modern technology.
- 2- To provide a proposed application study for designing a theatrical performance where the scenic elements and associated large puppets are made from recycled materials, emphasizing the concept of sustainable transformation without reliance on modern technological elements.

Scope of Research:

The current research is limited to the application of sustainable scenography in a theatrical performance characterized by a "modular open stage," designing inspiration from the events of E.M. Forster's narrative "The Machine Stops."

Research Methodology:

The research employs multiple methodologies to achieve comprehensive results, utilizing descriptive-analytical methods to collect and analyze data, inductive reasoning to understand current data, and deductive reasoning to develop future solutions based on those findings.

2- Theoretical Framework

2.1 Sustainability:

Sustainability encompasses both concept and science. As a concept, "sustainability" refers to the body of knowledge that addresses how dynamic systems operate on Earth. As a scientific field, it reflects humanity's rapidly evolving response to the pressing global challenges faced by all people. The term "sustainability" is derived from the Latin verb *sustinere*, meaning "to support, to uphold, to endure." The adjective "sustainable" signifies "capable of continuing without interruption" or "able to endure without failure" (Beer, Tanja, 2021). According to Margaret Robertson, sustainability implies a continuation into the distant future, referencing systems and processes that can operate and persist autonomously over long periods. Since humans are part of interconnected systems with nature, the study of sustainability extends beyond environmental concerns, addressing various interrelated environmental, economic, and social issues (Robertson, Margaret, 2021). In its broadest sense, sustainability refers to the ability to maintain or support a process continuously over time. In business and policy contexts, sustainability aims to prevent the depletion of natural or physical resources, ensuring their availability in the long term (Mollenkamp, Daniel, 2023).

Fundamentally, sustainability is an ecological concept that emphasizes maintaining life continuity based on natural resources. However, it has evolved to encompass the notion of "sustainability for humanity," which refers to the processes undertaken by humans to secure the continuity of generations through the development of growth means and the exploitation of natural resources.

The term "sustainability" was first used in the 1980s and was defined by the United Nations' Environment and Development Commissioners on March 20, 1987, as: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Harvard

Business Review, 2025).

2.2 The Role of the Arts in Promoting Sustainability:

The creative sector plays an increasingly vital role in raising awareness about climate change and promoting sustainable social, economic, and environmental practices worldwide. A growing number of artists, cultural organizations, and leaders in creative industries are utilizing their talents and resources to highlight issues, build will and capacity for change and innovate solutions that drive us toward greater sustainability. These innovators break down the barriers between aesthetics and politics, asserting that culture is a significant and effective factor in sustainability and a fundamental pillar thereof.

This was echoed in the report from the latest Salzburg Global Seminar session in February 2016, titled "Beyond Green: The Arts as a Catalyst for Sustainability," where sixty practitioners and thinkers in the arts committed to promoting social, economic, and environmental sustainability convened at Schloss Leopoldskron. Participants from around the world included artists, designers, architects, creative entrepreneurs, politicians, policymakers, environmental experts, urban planners, educators, scholars, game developers, philanthropists, and business leaders. The attendees represented a broad spectrum of cultural expression and artistic endeavors—including visual and performing arts, literature, cultural heritage, food, fashion, architecture, and design—coming from diverse artistic organizations such as theaters, music organizations, museums, cultural heritage groups, startups, academic institutions, and national and international policy-making bodies.

The objectives of the session were to build on leading initiatives that strengthen the connections between the arts and sustainability globally, encourage bold efforts, and recommend strategic methodologies to scale up innovative grassroots initiatives for greater and longer-lasting impact (Salzburg Global Seminar, 2016). Thus, the cultural sector possesses a unique ability to imagine and experience alternative futures, discuss the status quo, view the world differently, and explore the future with audiences and participants. If the cultural sector does not play its role in assisting current and future societies in transitioning to a more sustainable lifestyle, this fundamental transformation will not occur (Creative Carbon Scotland, 2020).

2.3 The Role of Theater in Achieving Sustainability:

Environmental concerns and efforts to reduce carbon footprints have led to the formation of organizations such as "Creating Carbon Scotland," "Julie's Bicycle," "Sustainability in Production Alliance (SiPA)," "Ecostage," "Albert," and "Broadway Green Alliance." These entities began in May 2021 to develop an online three-volume guide titled "Theatre Green Book," focused on how to make theaters sustainable. The first volume strictly addresses production practices, termed "sustainable productions," while the other two volumes are dedicated to sustainable design and theater operations, labeled "sustainable buildings" and "sustainable practices." Alongside the guide, an online stage has been launched, accessible to all theater makers interested in streamlining their practices and activities to be more environmentally friendly (Albu, Gabriela, 2024).

The climate crisis poses a direct threat to our safety, equity, and prosperity, necessitating urgent action to reduce carbon emissions and mitigate biodiversity loss. This transition must support people, places, and communities while protecting vulnerable groups. While theater alone cannot solve the climate crisis, it can play a critical role in addressing it. Theater can pose questions, challenge norms, provoke thought, entertain, and surprise audiences. It reflects the concerns of generations facing a period of profound and frightening change. However, for theater to fulfill this role, it must also undergo transformation. There is a pressing need for responsible and sustainable production, requiring independent artists, theaters, producers, and companies to adhere to a common standard within the constraints of time, cost, and scale amidst the climate crisis. Yet, producing sustainable performances should not be an end in itself; the goals, scope, creativity, and ambition of theater must remain broad and vibrant as always. The theater's ability to continuously reinvent itself will generate new theatrical thinking within this new reality (Paddy Dillon, Theatre Green Book Coordinator, 2019).

The concern for sustainability is evident in major European and global theater networks, where Europe has initiated the STAGES program—Sustainable Theatre Alliance for Green Change. Recently, this initiative held a meeting for professionals at the Avignon Festival titled "Sustainability and Theatre in Europe," in collaboration with the European Theatre Convention (Helder Jorge, Maia, 2022).

2.3.1 Sustainable Scenography:

The social and environmental issues, particularly climate protection and global justice, have stimulated discussions about sustainability and societal transformation. Naturally, these changes reflect on the cultural sector, especially on the works of artists, exhibition designers, and scenographers. In this context, scenography can be seen as a communicative tool in the process of societal transformation. It needs to gain new significance by enhancing its impact on sustainable development. This applies not only to the external influence on society but also to the design process of scenography and theatrical productions themselves. The shift towards sustainability relies on broad discourse and powerful narratives. Scenography frames this discourse by shaping the space in which this exchange occurs. Furthermore, it tells stories and shapes narratives, thereby playing a crucial role in social change (Christopher J. Garthe, 2023).

Since the latter half of the twentieth century, the concept of "scenography" has rapidly expanded, now representing an advanced field that transcends traditional natural design and realistic representation (Pitches and Popat, 2011). According to McKinlay and Palmer (2016), the origins of Expanded Scenography can be traced back to the reorganization of theatrical scenography in the early twentieth century and to site-specific performance practices that revealed new possibilities for scenography as a cultural form. They note that "expanded scenography does not represent a complete break with theatrical practice but rather a new way of thinking about the spatial, material, and design aspects of performance." According to Gröndahl, scenography can be viewed as a continuous negotiation between spatial possibilities, actions, and unfulfilled goals (Gröndahl, Laura, 2012).

The design process in sustainable scenography is characterized as a "participatory process," involving active collaboration among various stakeholders. Designers collaborate with the target audience, ensuring that the needs and preferences of the audience are central to design decisions. They allow non-professionals or non-specialists to contribute their ideas and perspectives, encouraging diverse viewpoints and fostering innovation. Thus, the final design of the scene embodies the vision of both the designer and the audience, along with the participating stakeholders. Sustainable scenography emphasizes the importance of inclusivity, shared decision-making, and empowering non-designers in shaping sustainable designs, thereby reducing barriers and providing easy, unrestricted access to its content.

Sustainable scenography adopts a systems-thinking approach and utilizes recyclable elements with long lifespans to achieve the right balance and increase reliance on fewer resources and materials, thereby aligning with sustainable transformation. It focuses on societal impact and strengthens the desired effects of transformation within the design process, illustrating the equal integration of sustainable scenography with both the overarching societal impact and the significance of design itself (Christopher J. Garthe, 2023).

2.3.2 Mobile Theater and the Concept of Sustainability:

Scenography acts as a world-maker, with theater serving as a medium to highlight societal issues that are often challenging to confront or understand. It functions as a microcosm, concentrating political, social, and aesthetic energies within a single space. From a scenographic perspective, theater extracts the essence of a moment or place in history and transforms it into a living experience. While theater may not always provide solutions, it excels at revealing visions and suggesting alternative ways of thinking. Its strength lies in showcasing multiple possibilities, allowing complex topics—such as the climate crisis or social change—to be viewed from new angles rather than presenting a singular viewpoint (Hann, Rachel, 2024). This ability enables designers to transform both physical and virtual worlds, creating unique atmospheres that influence how we perceive and interact with our environment. Contemporary designers increasingly navigate multiple disciplines and diverse communities to explore possibilities for political, social, cultural, and environmental revival that extend beyond the confines of theater buildings (Beer, Tanja, 2021).

In today's reality, various institutions worldwide have become increasingly aware of resource limitations and environmental issues. Therefore, establishing and implementing the concept of sustainability is a top priority for all sectors across disciplines. In the arts, design, and architecture sectors, mobile and portable installations represent some of the best sustainable options, as they generate less waste and emissions during construction, provide flexibility for reuse, and promote innovative design thinking in how materials and components can be integrated in practical and appealing ways. They encourage artistic experiments by transforming old materials into new art pieces, thereby enhancing both aesthetic values and sustainable thinking (EcoMod, article, 2023). The mobile theater, as a modular and reconfigurable structure, exemplifies an innovative model that combines art and sustainability for several reasons:

A. Faster Construction and Lower Carbon Emissions

One of the primary advantages of mobile theaters is their ease of pre-assembly, which facilitates on-site installation and enhances efficiency. This, in turn, improves quality control and reduces the overall construction time, minimizing on-site labor. This translates into material savings and a reduced environmental footprint from carbon emissions, making mobile theaters a more sustainable choice.

B. Reduced Waste Production

Since mobile theaters are designed to be disassembled and reassembled in various locations, their components can be crafted from reusable materials, simplifying transportation and decreasing the need for new structures. This not only contributes to waste reduction but also encourages the creation of new and sustainable designs, enhancing the aesthetic value of the artwork while lowering costs and environmental impact.

C. Pre-assembly Reduces Carbon Emissions

The reconfigurable and transportable nature of mobile theaters significantly decreases the need for multiple construction vehicles to travel to and from manufacturing sites. This practice reduces carbon emissions and pollution while also lowering noise and traffic congestion. Such sustainable practices improve the overall efficiency and safety of the structure.

D. Potential for Reuse and Recycling of Components

Disassembling a mobile theater generates minimal waste, allowing for the reuse or repurposing of materials. Additionally, mobile theaters can be easily transported from one site to another, providing a flexible and sustainable solution for theater organizations needing to adapt to changing demands and realities. This approach helps minimize environmental impact and promotes a circular economy by reducing waste and recycling resources.

2.3.3 Giant Puppets and the Concept of Sustainability:

Puppetry is one of the oldest performance arts. Globally, puppet shows have been a popular form of entertainment, with some countries having a rich heritage in this art, while others incorporate it into contemporary theatrical experiences. For centuries, puppets have been used to tell legends and tales, and to present traditional comedies. In the twentieth century, various revival movements emerged, making puppetry an entertainment form for both adults and children through performances in theaters, television programs, state-sponsored puppet shows, and international festivals (Cape Town, 2004).

Due to its long-standing traditions, puppetry is an effective storytelling medium capable of transcending language barriers and cultural divides. From mobile giant puppets to intricate shadow plays, puppetry encompasses a wide range of techniques, each with its unique characteristics. Beyond entertainment, puppetry also inspires positive change, community engagement, educational initiatives, and awareness of environmental issues.

Giant puppets can play a significant role in promoting sustainability by utilizing various recycled materials in their production, from repurposed fabrics to biodegradable components, thus minimizing waste. Contemporary puppet makers are encouraged to reduce environmental impacts without compromising artistic design and creativity.

2.4 Recycling:

Recycling is the process of collecting waste, processing it, and transforming it into new, usable materials. It is an environmentally friendly method of managing solid waste and non-renewable materials, reducing environmental pollution and protecting natural ecosystems. We can recycle paper, textiles, and some plastics ourselves (Helder Jorge, Maia, 2022). Thus, the concept of recycling is closely related to the idea of recovery (Banal Fernández, Marta, 2023), contributing to sustainable development by minimizing the need for valuable natural resources and raw materials. For instance, Enel X recycled 60 tons of plastic waste to create its line of home electric vehicle chargers, embodying a circular economy model that seeks to mitigate our environmental impact from the start of the manufacturing process through recycling and reusing existing products and materials instead of discarding them as waste. This shift from a linear economy to a circular economy helps preserve our planet and its resources for future generations, enabling sustainable development (corporate.enelx, accessed April 20, 2025).

Notably, the works of Japanese architect Shigeru Ban, a Pritzker Prize winner, exemplify the innovative use of materials and techniques, creating both external and internal spaces from recyclable and biodegradable cardboard—termed "paper tube structures." Ban is renowned not only for his innovative material use but also for his compassionate design approach. For over three decades, he has applied his extensive knowledge of recyclable materials, particularly paper and cardboard, to build high-quality, low-cost shelters for disaster victims worldwide—from Rwanda to Haiti, Turkey, Japan, and beyond (ArchDaily

Team, 2020).

2.4.1 Electronic Waste:

According to the European Parliament, "the global economy uses the equivalent of one and a half planets' worth of resources to produce global outputs and absorb waste. Estimates suggest that this figure will rise to the level of two planets' worth of resources by 2030." Despite the adoption of environmental policies and sustainability legislation over the past 60 years, humanity finds itself at a point where the linear economy and demographic growth are the main drivers of impending natural resource consumption, threatening the environment, the planet, and humanity itself. Alongside the implementation of these laws and policies, humanity is also seeking to explore new lands or exploit other planets (Albu, Gabriela, 2024).

Electronic waste (e-waste) is one of the most pressing contemporary environmental challenges. The United Nations has issued warnings about the growing crisis of electronic waste, indicating that the world generated 50 million metric tons of e-waste in 2018. Unfortunately, only 20% of this waste was recycled properly, while the remaining 80% ended up in landfills. Improper disposal of e-waste has severe consequences for both the environment and human health, especially with the loss of valuable resources due to improper disposal. Materials such as copper, gold, and silver, which could have been recovered during recycling, are often lost. Additionally, toxic substances like mercury, lead, cadmium, and palladium can leak into the environment, posing serious health risks (Us News, March 20, 2024).

Therefore, recycling e-waste is an urgent necessity to mitigate the negative environmental and health impacts associated with electronic waste. It is essential to adopt effective policies and practices to build a more sustainable future for upcoming generations. This sustainable approach not only reduces environmental impact but can also be leveraged in creative and artistic fields, contributing to the goals of sustainable scenography by integrating art with modern environmental technologies.

Mobile theaters provide a fertile environment for experimenting with concepts of sustainable creativity, opening new avenues for using recycled materials in designing sets and theatrical elements. This fosters flexibility in design and lightweight structures. In this context, electronic waste, old tires, truck lifts, and other industrial waste can be repurposed as reusable materials in constructing set designs, giant puppets, or modular units that

facilitate easy transport and reconstruction of performances in multiple locations. These practices represent an advanced step in integrating environmental awareness into the artistic field while enriching the visual language of theatrical performances through unconventional materials that reflect a spirit of experimentation and engagement with contemporary issues.

2.4.2 Vehicle Tires:

Used vehicle tires are one of the most significant sources of environmental pollution today, due to the difficulty of disposing of them safely. These tires are often dumped in landfills or burned, releasing harmful substances that adversely affect the environment and the health of living organisms. Thus, there is an urgent need to adopt alternative solutions, with recycling used tires being a leading option (Imam, Hiba, 2024). This has evolved from being merely an environmental trend to an innovative opportunity that can be utilized across various fields, particularly in visual arts and theatrical practices.

Amid the growing demand for sustainable solutions, artists and designers have begun exploring the creative potential of recycled materials, including used tires. These can be employed to construct scenic elements and design modular sets for mobile theater performances, which require flexibility in transport, lightweight materials, and durability in construction. Additionally, these tires can serve as foundational structures for giant puppets, providing strength and flexibility for movement during performances.

These practices merge artistic beauty with environmental considerations, offering a tangible example of how waste can be transformed into creative resources, thus opening new horizons in theatrical design. They also contribute to raising awareness about the importance of recycling within the artistic field, reinforcing the idea that environmental solutions can serve as a launchpad for artistic innovation rather than a barrier.

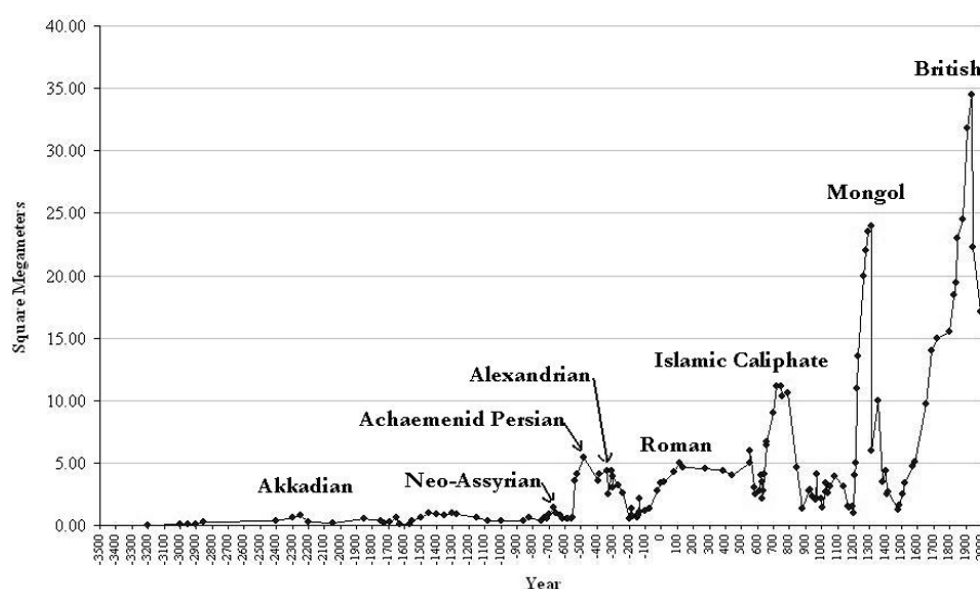
From this perspective, recycling used vehicle tires transcends mere environmental response; it becomes a cultural and artistic act with social and economic dimensions, reshaping the relationship between humans and resources within a new productive framework that marries sustainability with creativity.

2.5 History of the Rise and Fall of Civilizations and Contemporary Necessity for Sustainable Transformation:

The concept of civilization refers to human development through various stages of life. Humanity has undergone phases that have equipped it with experiences, leading to actions and measures to navigate life and protect itself from the harsh environment around it. This evolution has progressed from primitive forms in caves and mountains to towering skyscrapers. Generally, civilization reflects the stages of human development and the achievements—both architectural and non-architectural—that signify a gradual transition to more advanced phases (Al-Humaidan, Abdul Latif, 2017).

Examining the history of the rise and fall of civilizations reveals that most civilizations experience periods of ascent and prosperity, followed by phases of decline and collapse. This follows (Figure 1) a curve represented in a research paper related to an NSF-funded project examining the reasons behind the emergence of large states and empires since the Bronze Age. The curve illustrates the use of quantitative estimates of urban population sizes and the territories of states and empires to identify instances where the size of political systems and settlements increases rapidly, a phenomenon referred to as “upward waves.” It also points to the reasons behind the cyclical rise and fall of civilizations, large entities, and cities, as well as the less frequent occurrences of significantly larger empires and cities. Understanding the long-term evolutionary trend regarding the size of human social organizations requires a detailed study and comparison to interpret how growth processes resemble or differ over extended periods (Chase-Dunn, Christopher, 2006). The waves of rise and fall of civilizations and major entities are influenced by numerous internal and external factors, such as:

- Environmental Conditions: Climate change and natural resources.
- Wars: Internal and external conflicts leading to the collapse of civilizations.
- Economic Changes: Economic prosperity can be followed by collapse due to recession or corruption.
- Social Changes: Shifts in social and political structures can lead to instability.



(Figure 1) illustrates the curve indicating five major political transformations: 1. Akkadian-Egyptian, 2. West Asian-Mediterranean, 3. Islamic, 4. Mongol, and 5. Modern Eastern/Western harmony (Chase-Dunn, Christopher, 2006)

Based on the inevitable divine laws governing the rise and fall of nations throughout history and the studies within Civilization Studies—an academic discipline focusing on the evolution of human civilizations over time, including the factors contributing to their growth, prosperity, and decline—it leads to a plausible hypothesis related to humanity and technology. What would happen if technology were to disappear, and electricity were cut off due to any of the previously mentioned factors, such as climate change, wars, economic recession, or instability? Many narratives and films have explored the dangers of excessive human reliance on technology, resulting in pollution and rendering the Earth uninhabitable, thus emphasizing the importance of balancing simpler and more sustainable aspects. For example, notable films include *Wall-E* (2008) and *Into the Wild* (2007), as well as novels like *The Machine Stops* by E.M. Forster (1909) and *Station Eleven* by Emily St. John Mandel (2014).

Therefore, transitioning to a sustainable lifestyle and relying on human skills and creativity is crucial for resilience and adaptation in crises such as technological disruptions. These proactive steps help build strong, cohesive communities capable of effectively facing challenges. This foundation underlies the research, which selected Forster's *The Machine Stops* as a basis for creating designs and illustrations in a proposed applied study to achieve sustainable scenography in a theatrical performance titled "The Octopus." It is proposed to be presented

on a modular "mobile theater" stage, with the design of scenic elements and giant puppets made from recycled materials, affirming the concept of sustainable transformation without reliance on modern technological elements. The Author showcased these proposed designs in an exhibition at the Ahmed Osman Art Hall (Small Hall) within the Faculty of Fine Arts, University of Alexandria, Egypt, on April 26, 2025.

2.6 The Machine Stops:

The Machine Stops is a science fiction novella (12,300 words) by Edward Morgan Forster (1879-1970), written in 1909. It was first published in the *Oxford and Cambridge Review* in November 1909 and later included in Forster's collection *The Eternal Moment and Other Stories* in 1928. After being recognized as one of the finest short stories until 1965, it was included in that year's anthology of "Modern Short Stories." In 1973, it was also inducted into the Science Fiction Hall of Fame, Volume Two (Burton, S. H., 1970). The story is notable for its prescient depiction of future technologies that did not exist at the time, such as instant messaging and the internet, as well as video conferencing and other aspects of 21st-century reality. Will Gompertz, a writer for the BBC, noted on May 30, 2020, that *The Machine Stops* is not only a prophecy but also a remarkably precise literary description of life in lockdown in 2020 (Gompertz, Will, 2020).

In 2010, Randy Alfred of Wired wrote, "In 1909, E.M. Forster published *The Machine Stops*, a thrilling tale about an information-driven future society that literally comes to a bloody halt. Some aspects of the story no longer seem as distant as they once did" (Alfred, Randy, 2010).

The central theme of the story is the danger humanity faces when it becomes overly reliant on technology for survival (Walsh, Chad, 1972). *The Machine Stops* has proven to be remarkably ahead of its time, containing highly accurate predictions about modern technologies and the excessive dependence on them. Forster's foresight into globalization, the internet, and video conferencing, among other aspects of 21st-century reality, has been highlighted by Will Gompertz, who remarked that the story is not merely a prophetic tale, but an astonishingly accurate literary depiction of the isolation and lockdown experienced during the COVID-19 pandemic in 2020.

The story unfolds in a world where humanity lives underground after most people have lost the ability to survive on the surface. Below ground, each individual is isolated within their "cell," relying entirely on a massive machine to meet their physical and spiritual needs. This dependence has led them to venerate the machine, and those who do not believe in its divinity are considered "non-mechanical" and threatened with "homelessness." Ultimately, the machine collapses catastrophically, leading to the end of their civilization.

Main Characters

- **Vashti:** The mother, who is fully convinced of the machine's capabilities, revering it and relying on it completely.
- **Kono:** The son, who attempts to convey to her that the machine is man-made and vulnerable to failure and collapse.

The narrative implicitly warns against excessive reliance on technology, and after the "machine stops" and collapses, it emphasizes the importance of investing in humanity as a unique being with capabilities and potentials that cannot be replaced by machines alone. This underscores the necessity of balancing technological advancement with human abilities.

The story has been adapted into a short television film of the same name, directed by Adam and

Nathan Freise in 2009 (duration: 9 minutes). Additionally, it was reinterpreted for the stage by playwright Neil Duffy at the Royal York Theatre from May to June 2016, and the play was streamed online as a joint production of the Royal York Theatre and Pilot Theatre from late March to early April 2021 (during the COVID-19 pandemic) (Charles Hutchinson, 2021).

3. Applied Study

3.1 Play: *The Octopus* – An Applied Study by the Author:

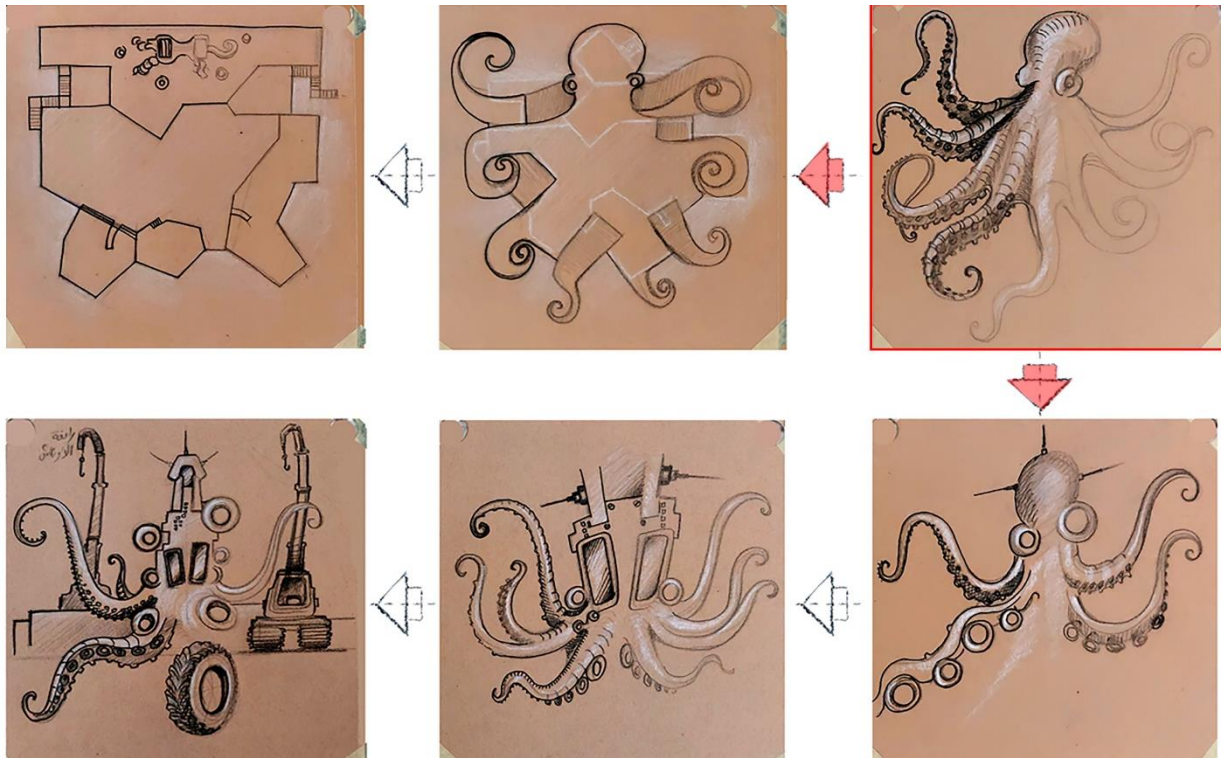
The title "*The Octopus*" was proposed by the Author for the play based on the events of the novel *The Machine Stops*. The choice of the name "octopus" symbolizes the machine in the story, representing technology and its control over humanity due to excessive reliance on it. The octopus, with its numerous arms, can grasp and envelop its prey from multiple angles simultaneously, much like how technology affects various aspects of human life. Additionally, the octopus is an intelligent and adaptable creature, capable of silent movement, camouflage, and squeezing through tiny openings, reflecting how technology infiltrates even the most private details of human life.

3.1.1 Design Process Phases:

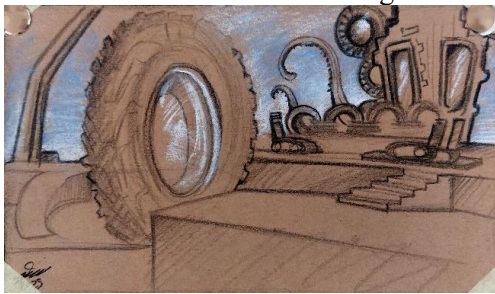
First: Initial Sketches and Design Philosophy:

The design of the stage plan was inspired by the octopus, as well as the vertical scenic elements (Figure 2). The scenes of the play, as described in the novel, include:

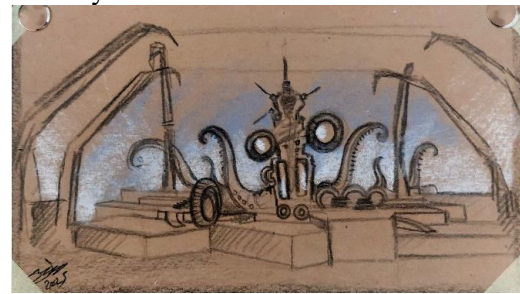
- **General Scene:** An overall shot of the entire stage (Figure 3).
- **Scene One:** In front of the giant screen where Kono speaks with his mother, Vashti. They live in a technologically advanced dystopia "the machine", each holding differing views about their world and grappling with the sudden collapse of their society (Figure 4).
- **Scene Two:** Inside the airship (the mode of travel between cells underground), where Kono requests to meet his mother (Figure 5).
- **Scene Three:** The scene of the machine's stoppage and collapse (Figure 6).



(Figure2) Design philosophy and inspiration drawn from the octopus in the stage top plan and scenic elements.- designed and manually sketched by the Author 2025-



(Figure4) 1st scene - in front of the giant screen-
- designed and manually sketched by the Author
2025-



(Figure3) General view of the entire stage-
- designed and manually sketched by the Author
2025-



(Figure6) 3ed scene - the machine stops and
collapses - designed and manually sketched by the
Author 2025-

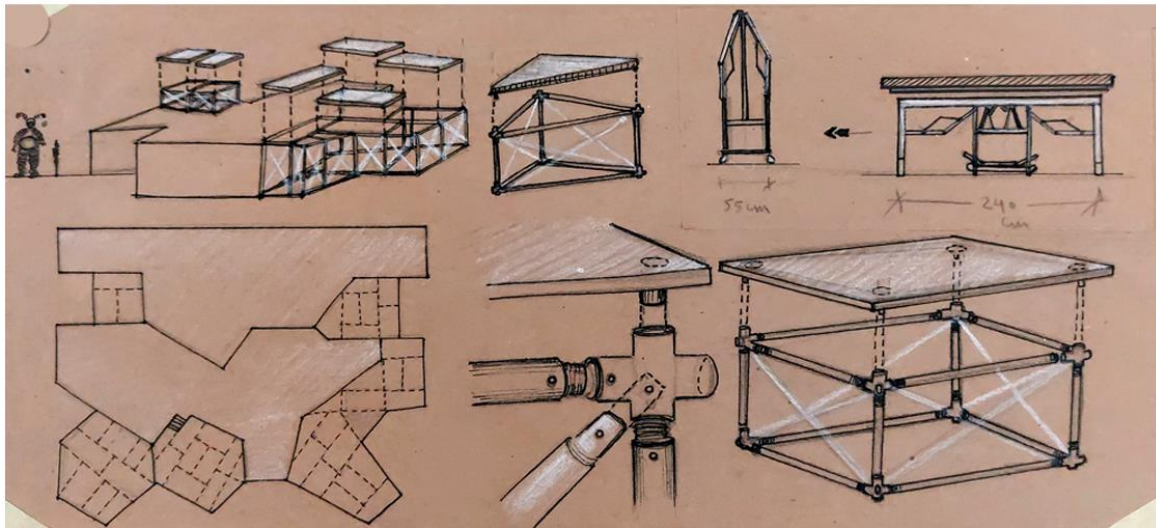


(Figure5) 2ed scene - inside the airship-
- designed and manually sketched by the Author
2025-

Second: Working Details and Approach:

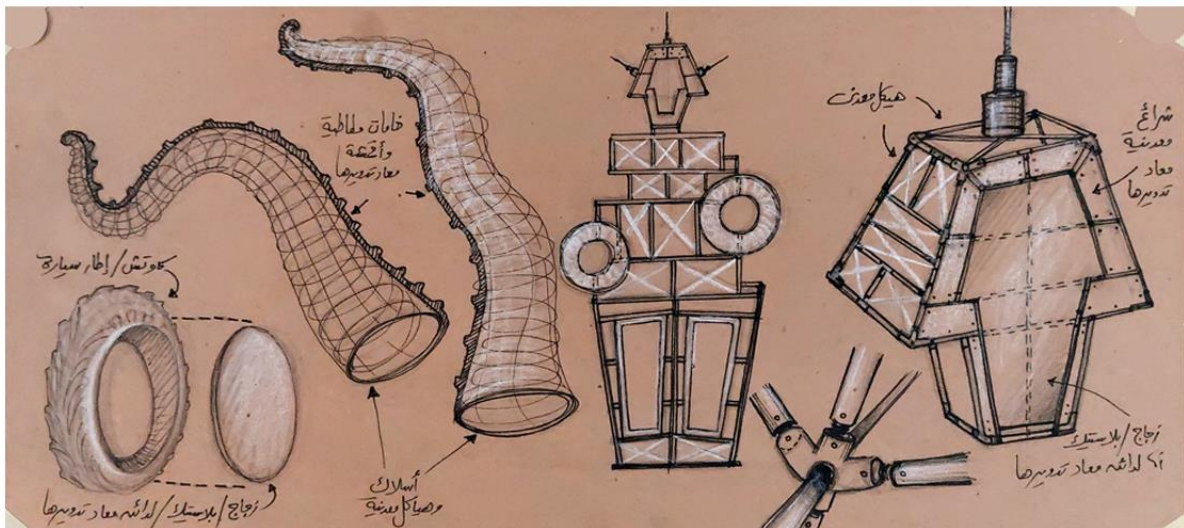
The proposed stage design was created using the principles of portable theater, allowing the stage to be assembled and disassembled for street and square performances. It utilized the concept of sustainability by recycling materials and waste, including metal and plastic scraps, used tires, lifts, smart device waste, screens, solar reflectors, and other recycled resources. This approach emphasizes

the idea of sustainable scenography in theater, which involves designing and producing visual elements in a manner that considers environmental, economic, and social sustainability. This concept focuses on the effective use of natural resources, reducing waste while maintaining the aesthetic quality of the artwork and the audience's experience. (Figures 7, 8, 9).



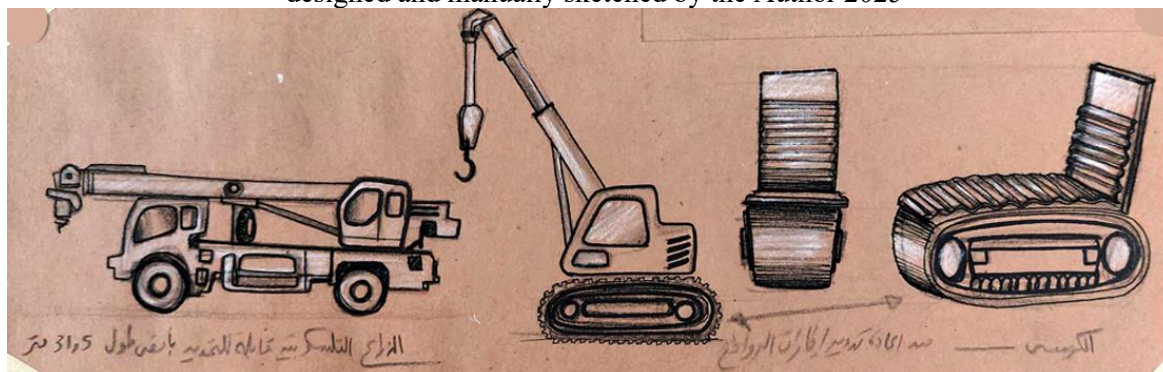
(Figure7) Parts of the assembly that are combined to create the stage, made from recycled materials and metals.

- designed and manually sketched by the Author 2025-



(Figure8) Illustration of the assembly parts that are combined to create the machine design (the main scenic element). This includes metal sheets, metal rods, and arms resembling octopus tentacles made from rubber, fabrics, and recycled metals, as well as the use of car tires, glass, and plastic.

- designed and manually sketched by the Author 2025-

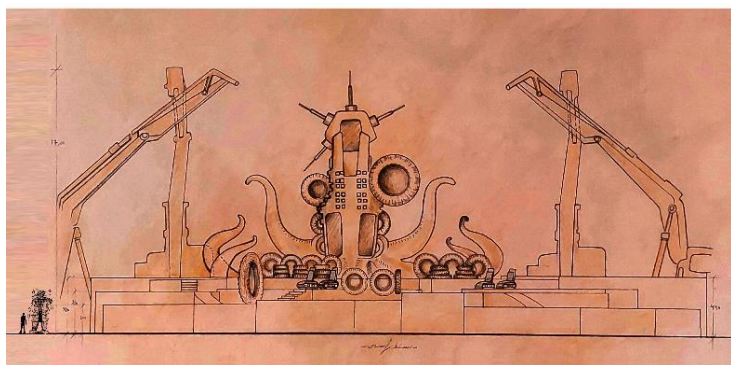


(Figure9) Illustration of the assembly parts that are combined to create the airship seats, made from recycled materials and metals sourced from vehicle tires and cranes. - designed and manually sketched by the Author 2025-

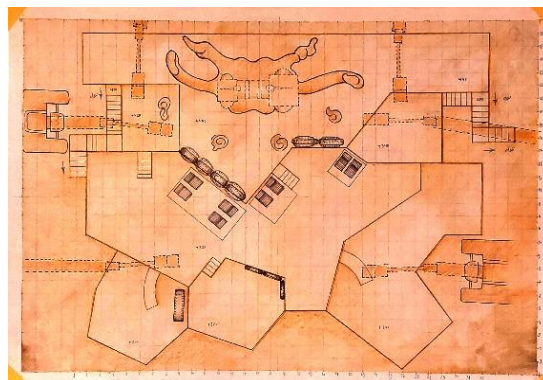
Third: Architectural Drawings:

The dimensions of the stage are 32 meters in width and 26 meters in depth (Figure 10). The maximum height of the vertical scenic elements is 17 meters.

As the proposed design is an "open-air theater", the stage elevation begins at 2 meters and gradually increases in levels, reaching a height of 4.40 meters (Figure 11).



(Figure11) front elevation view of the stage and vertical scenic elements 22 m width x 17 m height
-Manual architectural drawing
by the Author 2025-

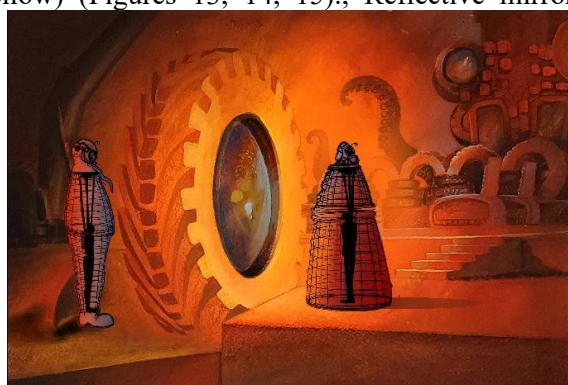


(Figure10) top plan of the stage, 32 m wide x 26 m deep
-Manual architectural drawing
by the Author 2025-

Fourth: The Final Scenes:

Given that the research hypothesis is based on the absence of modern technology and electricity, the proposed theatrical performance is a daytime performance (Figure 12), where natural lighting (sunlight) is utilized. Therefore, the colors of the scenes are dominated by a warm color scheme inspired by sunlight (shades of red, orange, and yellow) (Figures 13, 14, 15)., Reflective mirrors

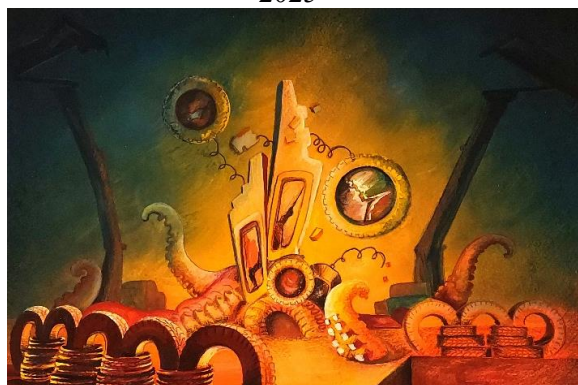
can be used to reflect sunlight onto scenic elements and giant stage performers/puppets. In some shots, fire lighting, torches, candles, and lanterns made from recycled materials can be used. The audience can also be involved in lighting, so the audience can hold small lanterns or candles, creating interaction and increasing the feeling of participation.



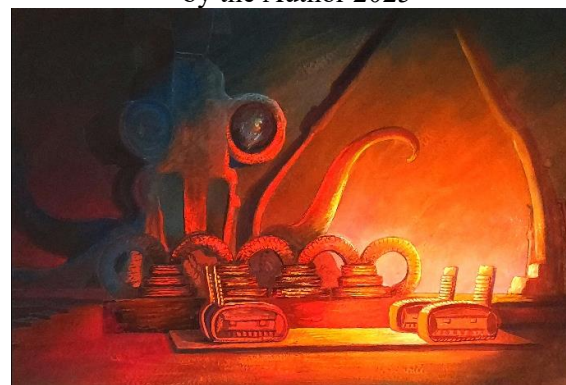
(Figure13) A close-up of the giant screen on which Kono and his mother, Vashti, are speaking personally – sunlight color scheme– designed and manually colored with gouache - by the Author 2025-



(Figure12) general view of the stage design & its setups, including vertical scenic elements – daylighting mood- designed and manually colored with gouache - by the Author 2025-



(Figure15) A close-up of the scene of the machine stopping, collapsing, -the color gradation is like a sunset- designed and manually colored with gouache - by the Author 2025-



(Figure14) A close-up of the scene inside the airship - the means of transportation from cell to cell - the color gradation emphasizes the sunlight- designed and manually colored with gouache - by the Author 2025-

Fifth: The characters:

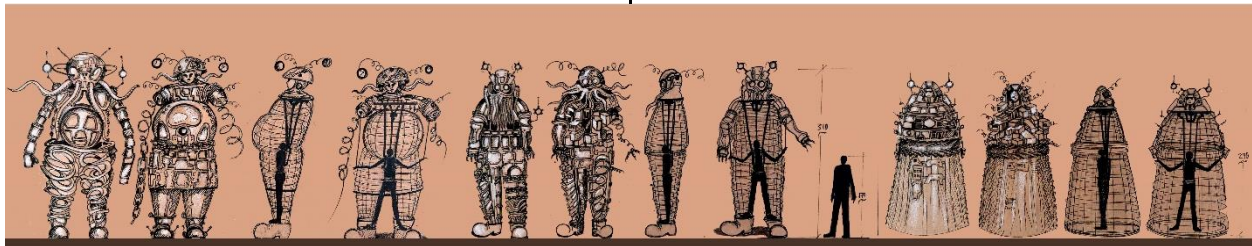
The characters were designed in the style of giant puppets to be clear and visible to the audience. The performer wears the puppet's body and disappears inside it, moving the puppet's arms with sticks (Cattywampus, 2017). The puppets are made from recycled materials to reflect the sustainability approach adopted in the proposed design (Figure 16).

Main Characters:

- Vashti (mother) before and after the machine stopped. (Figures 18, 21)
- Kono (son) before and after the machine stopped. (Figures 19, 22)

Minor Characters:

- One of the passengers on the airship. (Figure 20)
- One of the underground residents after the machine stopped. (Figure 23)



(Figure17) Characters of the theatrical performance consist of giant puppets, with the performer hidden inside the structure, manipulating the arms with sticks. - designed and manually sketched by the Author 2025-



(Figure20) One of the passengers on the airship designed by the Author 2025



(Figure19) Kono- son before the machine stops designed by the Author 2025



(Figure18) Vashti- mother before the machine stops designed by the Author 2025



(Figure23) One of the underground residents after the machine stopped designed by the Author 2025



(Figure22) Kono- son After the machine stopped designed by the Author 2025



(Figure21) Vashti- mother After the machine stopped designed by the Author 2025

Results:

The research Results can be summarized in the following points:

- 1- Transitioning to a sustainable lifestyle that relies on human skills and creativity is essential and represents a proactive step toward resilience and adaptation, particularly in crises such as disruptions to modern technological systems. Such measures foster the development of resilient, cohesive communities capable of effectively confronting challenges and planning for a more sustainable and humane future. This involves recycling physical and energy resources to ensure a non-wasteful production cycle, investing in human capital as an indispensable asset through value-based education, fostering ethical and intellectual awareness, and promoting a balanced relationship between technology, nature, and spirituality to prevent a descent into destructive cultural divides.
- 2- Sustainable scenography in theater refers to the design and production of visual and spatial elements that prioritize environmental, economic, and social sustainability. This approach emphasizes the efficient use of natural and recycled resources, minimizes waste, and fosters eco-friendly practices, all while maintaining the aesthetic integrity and effectiveness of the visual experience for audiences. Integrating sustainability into scenography not only contributes to reducing the ecological footprint of theatrical productions but also promotes awareness and responsibility regarding environmental and social issues within the arts industry.
- 3- Mobile theater represents a fertile environment for experimenting with concepts of sustainable creativity, opening new horizons for using recycled materials in the design of sets and theatrical elements. This approach achieves design flexibility and lightweight structures. Electronic waste, car tires, truck lifts, and other industrial byproducts can be reused to construct scenic structures, create giant puppets, or design modular units that facilitate the easy transport and reconstruction of performances across multiple locations. These practices are an advanced step in integrating environmental awareness into the artistic domain and enrich the visual language of theatrical performances through unconventional materials that reflect the spirit of experimentation and engagement with

contemporary issues.

Conclusion:

- 1- The environmental crisis compels the arts and teaching practices to change. Contemporary scenographers should understand the challenges and opportunities related to environmental and humanitarian issues, as well as global trends, particularly concerning climate change, natural disasters, and crises facing various sectors worldwide. They should encourage sustainable social, economic, and environmental practices globally to prepare for and respond to evolving conditions, building a more livable future despite challenges.
- 2- It is essential to apply the concept of sustainability in theatrical design, as it opens new avenues for communication and collaboration. This approach fosters working together with communities, environments, materials, and spaces, blurring the perceived boundaries between artists, materials, audiences, and the broader ecosystem. It also invites greater ecological responsibility and creative reflection on how art can be practiced and communicated.

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