Eco-Conscious Film Set Design: Reducing Environmental Impact in Temporary Film Sets

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Abstract- Temporary film sets contribute heavily to material waste due to short production cycles, rapid construction demands, and limited reuse practices. With the rise of sustainability concerns in the creative industries, eco-conscious design approaches are becoming increasingly relevant. This research investigates how sustainable materials, modular systems, and waste-reduction strategies can be integrated into film set design without compromising cinematic quality. The study examines material properties, life-cycle impacts, modular construction efficiency, and current industry barriers to sustainable adoption. Methods include literature review, industry surveys, visual analysis, and comparisons between conventional and eco-friendly set practices. Findings suggest that reusable materials, modular components, and early sustainability planning can significantly reduce environmental impact while supporting artistic requirements. The study proposes a practical framework for implementing sustainable strategies in film set design, offering guidelines for designers, art directors, and production teams seeking to reduce waste and improve ecological responsibility.

Index-Terms: Sustainability, Film Set Design, Modular Systems, Waste Reduction, Materials, Interiors, Environmental Impact, Production Design, Reuse, Circular Design.

I.INTRODUCTION

Eco-conscious film set design represents an emerging intersection of creative production, environmental responsibility, and material innovation within the contemporary film industry. Temporary film sets, often constructed rapidly and discarded just as quickly, hold the potential to be transformed through sustainable design approaches that prioritize reduced waste, responsible sourcing, and long-term reusability. By integrating modular systems, natural or low-impact materials, and thoughtful planning, film sets can maintain cinematic quality while significantly

lowering their ecological footprint. As sustainability becomes a global priority, eco-conscious set design offers filmmakers an opportunity to create visually compelling spaces without compromising environmental ethics.

Rooted in collaborative craftsmanship, film set production reflects the collective expertise of designers, art directors, prop fabricators, and technicians. Their creative skill shapes immersive environments, yet these processes frequently generate large amounts of wood, foam, paint, and mixed-material waste. Sustainable alternatives introduce new possibilities: modular frameworks allow repeated use, recycled materials reduce extraction pressure, and biodegradable finishes minimize chemical impact. These approaches not only support environmental goals but also enhance workflow efficiency and reduce long-term production costs.

This study examines how sustainable materials, circular design strategies, and modular construction methods can reshape the future of contemporary film set design. It explores the relationship between visual aesthetics and ecological responsibility, addressing how environmentally conscious choices can enrich production quality rather than limit it. Driven by the need to reduce waste and encourage responsible creativity, this paper aims to demonstrate how the film industry can integrate sustainable practices while preserving artistic expression and supporting greener production methods.

II.MATERIALS AND METHODS

2.1 Materials

The primary materials examined in this study include modular construction components, reusable wall panel systems, and sustainable material substitutes commonly proposed for film set production. These materials were selected based on their potential to reduce waste, shorten construction time, and enhance the reusability of temporary sets. Modular units made from lightweight plywood alternatives, recycled MDF, biocomposite boards, reclaimed timber, and interlocking structural frames form the core of the investigation. Their standardized sizing, flexibility, and ease of assembly make them suitable for repeated use across multiple productions.

Additionally, biodegradable and recyclable materials such as cardboard honeycomb panels, bamboo sheets, and compressed agricultural waste boards were considered as secondary materials. These materials provide structural rigidity, aesthetic versatility, and lower environmental impact compared to traditional one-time-use set materials like thermocol, PVC sheets, and non-recyclable foam boards. Their material properties—including density, porosity, load-bearing capacity, and surface finish—were analyzed to determine suitability for film set use, especially in terms of durability and visual quality.

2.1.1 Modular & Reusable Material Systems

Modular components used in this study include interlocking wall panels, foldable frames, reusable scenic flats, and standardized construction grids. These systems allow sets to be assembled, dismantled, transported, and reconstructed with minimal material damage. The materials often incorporate recycled content, hollow-core structures, and engineered joints that reduce the need for nails, adhesives, and destructive construction methods.

The inherent characteristics of these modules—such as lightweight structure, repeatability, and mechanical strength—make them ideal for sustainable film production. Their behaviour aligns with global sustainable production standards, where modularity significantly reduces material waste, labour cost, and resource consumption. Compared to traditional wooden sets that are discarded after short-term use, modular systems can last for multiple production cycles without losing structural or aesthetic quality.

2.1.2 Backing Materials & Sustainable Substrates

Sustainable substrate materials such as recycled MDF, compressed bamboo boards, jute-composite panels, cardboard honeycomb structures, and reclaimed plywood were selected as backing materials due to their favourable environmental performance. These boards act as the structural surface for applying scenic finishes and set textures, while remaining lightweight and reusable

Fig 1: Section_google images

Studies in sustainable materials indicate that using multi-layered composite systems significantly improves strength, stability, and reusability compared to single-use sheets. These substrates also allow repeated repainting, resurfacing, or texturing, making them suitable for adaptable film set designs. Their performance is influenced by fibre orientation, density, moisture resistance, and structural integrity.

The layering of a reusable decorative surface (e.g., thin bamboo veneer, recycled paper texture, or repositionable scenic skins) over a durable

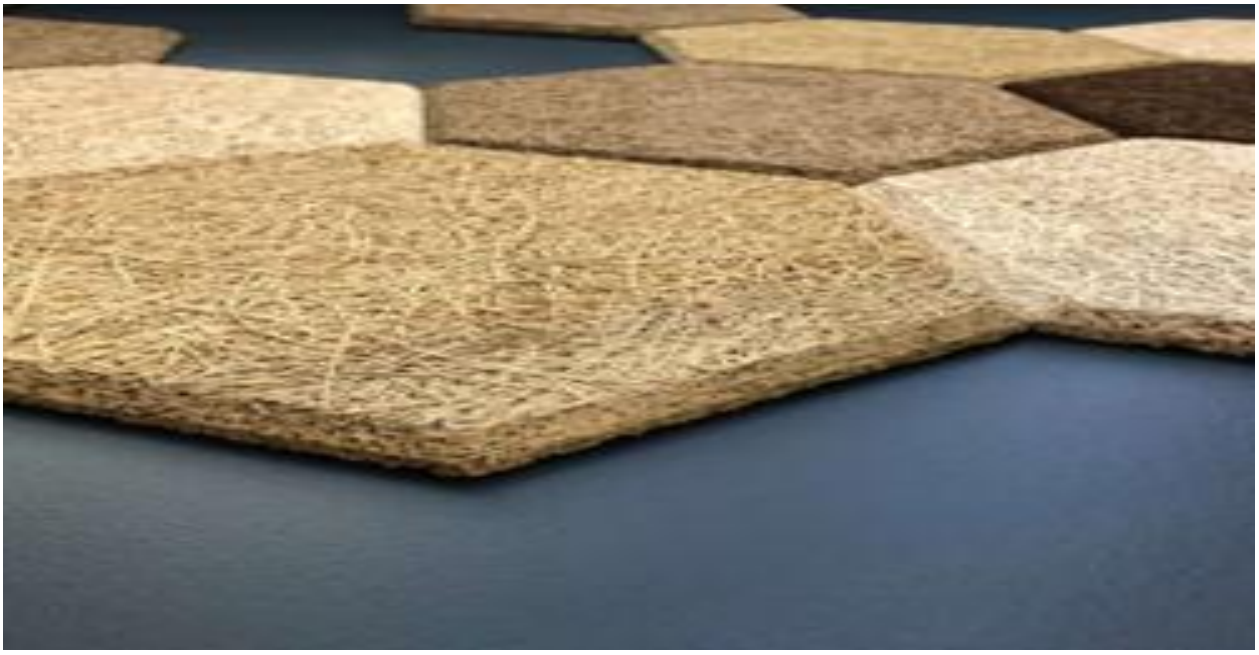


Fig 2: Section_google images

backing enhances both sustainability and cinematic versatility. This combination enables film sets to achieve high-quality visuals while minimizing waste, aligning with the goals of eco-friendly production practices.

2.2 Methods

2.2.1 Literature Review Method

The literature review method involved examining three major studies related to sustainable film set practices and analysing how their findings contribute to understanding material waste, industry behaviour, and environmental performance. The review focused on three main areas: (i) identifying current production methods and waste patterns, (ii) understanding the practical challenges behind adopting sustainable materials, and (iii) evaluating the environmental efficiency of eco-conscious alternatives.

The first study, conducted by the British Film Institute (BFI, 2020), provided extensive documentation on carbon emissions, material usage, and waste volumes generated by film sets. Its findings highlighted that set construction remains one of the highest contributors to production waste, establishing the need for improved material strategies. The second study, published by Julie's Bicycle and BAFTA (2021), investigated how sustainability guidelines influence everyday decision-making in film sets. Through designer surveys and interviews, it revealed barriers such

as cost, limited awareness, and restricted access to eco-friendly materials, all of which significantly shape sustainable adoption. The third study, by Oliver and Vendrell (2022), used life-cycle assessment to measure environmental impacts of temporary sets and demonstrated how reclaimed materials, modular frames, and biodegradable panels can reduce carbon footprint and landfill waste.

Category	Details
Author & Year	British Film Institute (BFI), 2020 albert+2BFI+2
Title	*Screen New Deal: Sustainable Production Review*
Purpose of the Study	To evaluate carbon emissions, material waste, and sustainability gaps in film production — especially focusing on set construction and materials. albert+1
Method Used	Case studies of major film productions, carbon audits, material-use documentation. BFI+1
Key Findings	Set construction is identified as a major waste generator; adopting modular or reusable materials can significantly reduce environmental impact. albert+1
Limitations / Gaps	Analysis focused mostly on large-budget productions; lacks detailed evaluation of specific eco-material performance or small-scale productions.

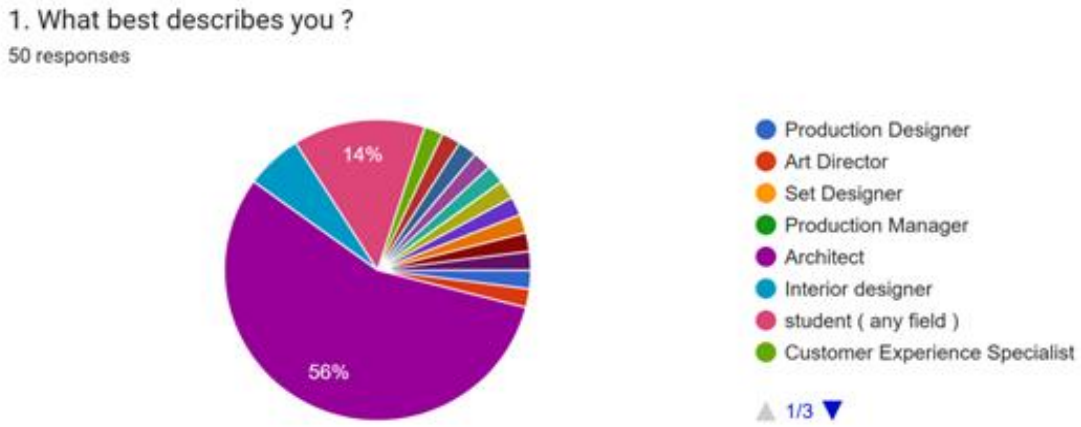
Author & Year	Julie’s Bicycle & BAFTA albert, 2021 Julie's Bicycle+1
Title	*Green Production Guide Implementation in Film Sets*
Purpose of the Study	To assess how existing sustainability guidelines affect material choices and waste generation in film/theatre set design and production. Julie's Bicycle+1
Method Used	Surveys and interviews with designers/production teams; waste-log analysis before and after guideline adoption. Julie's Bicycle
Key Findings	Implementation of guidelines resulted in a 20–30% reduction in material waste; major barriers remain cost, limited availability of eco-materials, and lack of awareness. Julie's Bicycle+1
Limitations / Gaps	Implementation of guidelines resulted in a 20–30% reduction in material waste; major barriers remain cost, limited availability of eco-materials, and lack of awareness. Julie's Bicycle+1

Graphs Interpretation

As part of this research on evaluating sustainable practices in film set design, a survey was conducted to understand industry awareness, perception, and acceptance of eco-friendly materials and modular systems within temporary film sets. The questions explored professional opinions on material waste, sustainability priorities, preferred construction methods, and the feasibility of adopting greener alternatives in production environments. The responses highlight how current set-building practices are perceived in terms of environmental impact, revealing gaps in awareness, challenges in material sourcing, and attitudes toward reusability within the film industry. The findings show a strong interest in adopting sustainable approaches—especially modular structures, recyclable surfaces, and low-waste construction methods—while also identifying key barriers such as budget constraints, time pressure, and limited availability of eco-materials. Overall, the survey results provide insight into both the creative and practical expectations of film professionals, helping to define the market potential, functional benefits, and future opportunities for integrating environmentally responsible solutions into modern film set design. This interpretation supports the development of sustainable set-building frameworks that balance cinematic quality with ecological responsibility

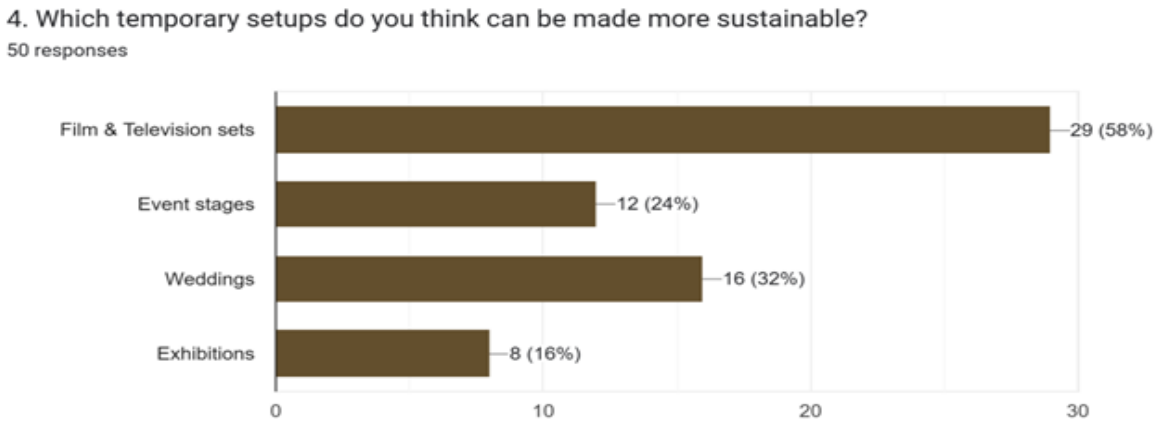
1.What best describes you?

A majority of the survey participants (56%) identify as *architects*, indicating that most inputs come from individuals with strong technical and design backgrounds. This suggests that the findings will be informed by professional knowledge of spatial planning, materials, and sustainable design.

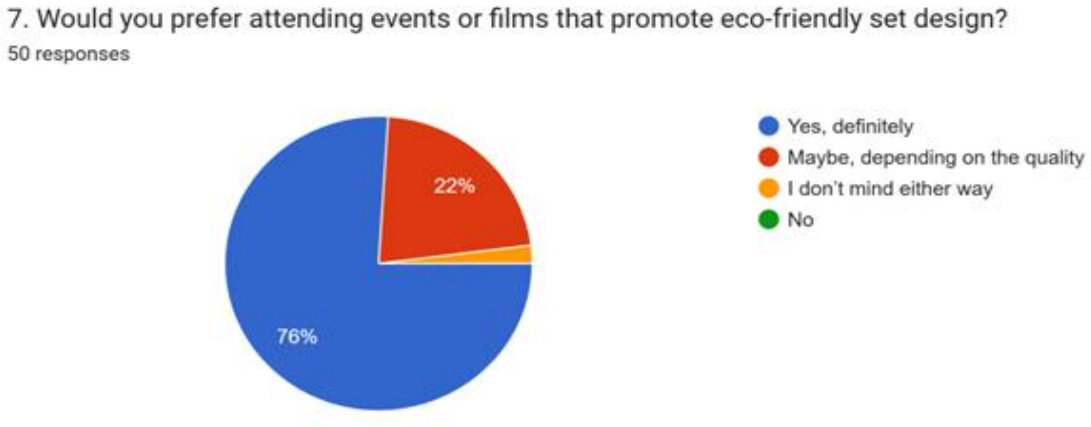


2. Which temporary setups can be made more sustainable?

Respondents clearly perceive film and TV production as generating the most material waste. This supports the relevance of exploring sustainable materials production environments where fast-paced construction and disposal are common.

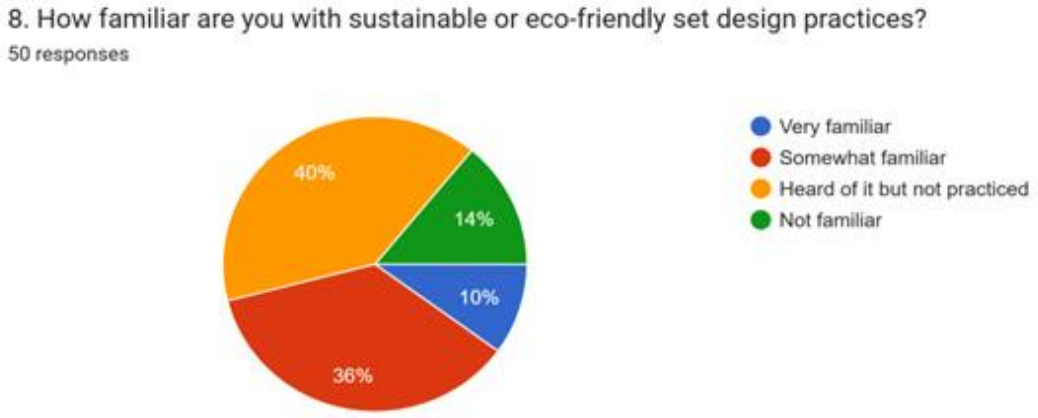


3.Would you prefer attending eco-friendly events or films?
This shows strong audience acceptance of sustainable design. Public preference can encourage designers and production teams to adopt natural materials and eco-conscious practices without fear of compromising viewer experience.

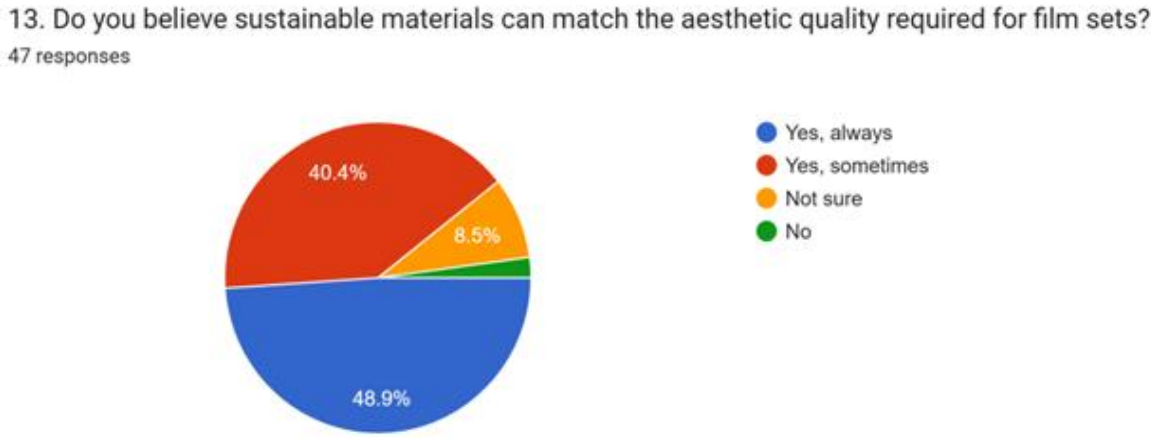


4. Familiarity with sustainable set-design practices?
Most respondents had heard of sustainable design (40%) but had not practiced it. 36% were somewhat familiar, 10% very familiar, and 14% not familiar.

There is moderate awareness but limited hands-on experience. This highlights a knowledge gap in practical applications

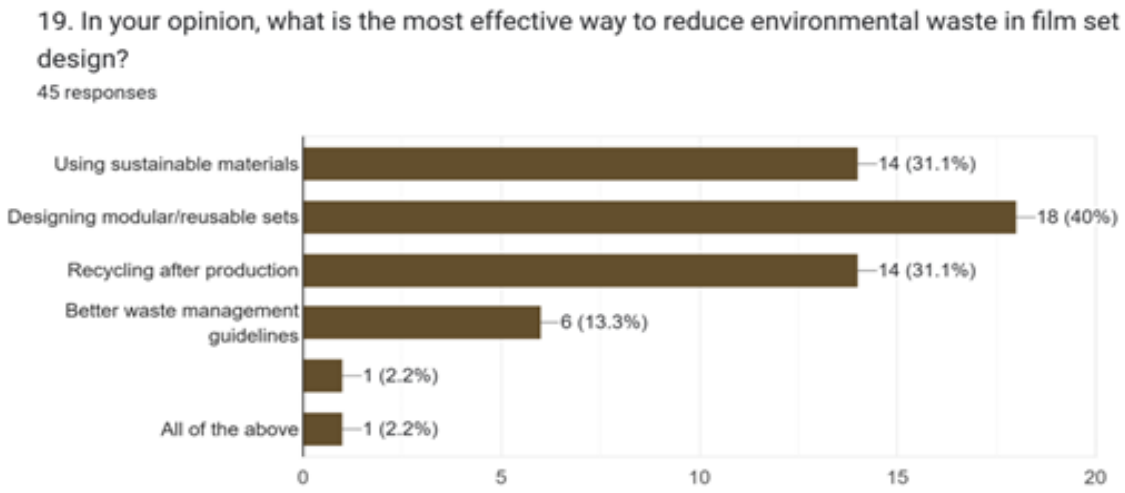


5.Can sustainable materials match aesthetic quality for film sets?
Nearly half (48.9%) believe sustainable materials can always achieve the required aesthetic, and 40.4% believe they can sometimes. Only a small fraction expressed uncertainty or disagreement. Confidence in sustainable materials is high, suggesting that integrating natural craft materials environments like film sets is widely perceived as feasible.



6. Most effective way to reduce environmental waste in film sets?

Designing modular/reusable sets was considered the most effective solution (40%). Using sustainable materials and recycling after production shared equal support (31.1% each). Waste-management guidelines received minimal votes.



III.RESULTS AND DISCUSSION

The results and discussion section presents the key outcomes of the survey, material assessment, and sustainability review conducted for this study on eco-conscious film set design. The findings highlight current material usage patterns, environmental concerns, and the feasibility of adopting sustainable alternatives within production workflows. These insights were compared with existing research on green production practices and sustainable material systems to understand industry readiness and practical challenges. The following subsections summarize the major results derived from the collected data.

3.1 Material Performance and Environmental Impact

Survey results show that plywood, MDF, and thermocol remain the most commonly used materials in set construction, but they are also recognized as high-waste contributors. Participants expressed interest in eco-materials such as bamboo boards, recycled panels, and reclaimed wood if they meet durability and finish requirements. These findings align with earlier studies that identify temporary sets as major waste generators and emphasize the environmental benefits of switching to low-impact materials.

3.2 Modular Design and Reusability

The study highlights strong support for modular systems, with respondents noting that reusable frames and interchangeable panels can reduce both waste and production effort. This is consistent with previous research showing that modularity helps extend the life cycle of set elements and

encourages cleaner construction practices. The findings suggest that modular systems offer a practical, scalable strategy for sustainable set design.

3.3 Industry Adoption and Implementation Challenges

While there is clear interest in sustainable practices, respondents identified challenges such as higher initial costs, limited material availability, and tight timelines. These barriers reflect similar issues noted in the literature, where financial and operational constraints slow the adoption of green alternatives. Despite this, the overall willingness to adopt sustainable methods indicates that the industry is prepared to move forward if supported by better resources, clearer guidelines, and accessible eco-materials.

IV.CONCLUSION

This research shows that eco-conscious film set design can significantly reduce environmental impact through sustainable materials and modular construction methods. The study confirms that traditional set materials generate high waste, while alternatives such as recycled composites, bamboo, and biodegradable panels offer practical, low-impact solutions. Survey responses indicate strong industry interest in adopting greener practices, especially when materials are affordable, reusable, and easy to construct with. Overall, the findings highlight that combining sustainable materials with modular design provides an effective path toward reducing waste, improving resource efficiency, and supporting a more environmentally responsible film production process.

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