

Advancing Sustainable Interior Design Through the Use of Tye-Dye and Batik (Àdìrẹ) Fabrics

Tajudeen O. AJAYI

Department of Architectural Technology, Federal Polytechnic, Ado-Ekiti, Nigeria
ajayi_to@fedpolyado.edu.ng, Alt E-Mail: arcteejay2009@gmail.com

Dr. Olasunmbo O. ADHUZE

Department of Architectural Technology, Federal Polytechnic, Ado-Ekiti, Nigeria
adhuze_oo@fedpolyado.edu.ng, Alt E-Mail: sunmboadhuze@gmail.com

Tolulope F. OMOTOSO

Department of Entrepreneurship, Ekiti State Polytechnic, Isan-Ekiti, Nigeria
tolulopefaith2@gmail.com

Abstract

This paper explores the use of tie-dye and batik fabric as sustainable materials for interior design projects. Based on a survey of 154 interior designers and professionals, the study examines perceptions, preferences, and challenges related to these traditional dyeing techniques. Participants exhibit positive attitudes towards tie-dye and batik fabric, though encountering issues like availability, quality, maintenance, and compatibility. Descriptive and inferential statistics, along with exploratory analyses of open-ended questions, support these findings. The paper highlights implications for sustainable interior design practice and research. Collaborative efforts involving interior designers, manufacturers, suppliers, consumers, educators, policymakers, and stakeholders are recommended to promote the integration of tie-dye and batik fabric for a more environmentally friendly future.

Keywords: Batik fabric, Biodegradability, Cultural heritage, Embodied carbon, Energy efficiency, Interior design, Local tie-dye, Sustainable design, Materiality

DOI: 10.7176/ADS/106-01

Publication date: August 31st 2023

1.0 INTRODUCTION

In recent years, sustainable interior design has gained considerable attention, emphasizing environmentally responsible and resource-efficient practices in creating interior spaces. Sustainable interior design aims to minimize the negative environmental impact of buildings by enhancing efficiency and moderation in the use of materials, energy, and space (Kubba, 2012). Sustainable interior design also considers the social and economic aspects of sustainability, such as human health, well-being, comfort, productivity, culture, and equity (Lee et al., 2010).

In Nigeria, a developing country with a rapidly growing population and urbanization rate, the need to address the environmental impact of its built environment, including its architecture and interior design practices, is increasingly pressing. Nigeria faces several environmental challenges, such as deforestation, desertification, soil erosion, air pollution, water scarcity, and waste management (Oyedepo et al., 2019). These challenges are exacerbated by the high demand for housing and infrastructure, which often rely on conventional materials and methods that are energy-intensive, carbon-emitting, and resource-depleting (Olotuah & Ajenifujah, 2009).

This article focuses on the potential of integrating local tie-dye and batik fabrics to achieve low-carbon design solutions that are culturally relevant and environmentally sustainable. Tie-dye and batik are traditional textile techniques in Nigeria that involve hand dyeing and wax-resist methods to create intricate patterns and designs on fabrics. Tie-dye is a method of patterning fabric that is achieved by preventing dye liquor from penetrating all parts of the fabric (Oguntona, 2000). Batik is a method of patterning fabric that is achieved by applying wax to certain parts of the fabric before dyeing it, creating a contrast between the dyed and undyed areas (Akinwumi et al., 2017). These textiles come out in vibrant colours, unique patterns, and cultural significance, and they have been used for various purposes in Nigerian culture, including clothing, accessories, and home furnishings.

Tie-dye gained popularity in Nigeria during the great depression when it was considered an economical way to add a new colour to old material (Alozie, 2017) but through the production method by incorporating sustainable materials and as a locally sourced material, this paper posits that the use of local tie-dye and batik fabric in interior decoration can contribute to reducing the carbon footprint of architectural projects in Nigeria. In addition, it can support local craftsmanship, preserve cultural heritage, and stimulate local economies. This work, therefore, aims to explore the potential of integrating local tie-dye and batik fabric in achieving low-carbon

design in interior spaces in Nigeria.

The paper is organized as follows: Section 2 reviews the literature on sustainable interior design principles and practices, as well as the functional properties and applications of tie-dye and batik fabric in interior design projects. Section 3 describes the research methodology, including the research design, data collection, and data analysis methods. Section 4 presents the results of the data analysis, including the descriptive and inferential statistics, and the exploratory analyses. Section 5 discusses the findings of the study in relation to the research objectives, questions, and hypotheses, and compares and contrasts them with the existing literature. Section 6 concludes the paper by summarizing the main points, implications, and recommendations for practice and research.

2.0 LITERATURE REVIEW

This chapter presents a concise review of the literature on sustainable interior design, low-carbon design, tie-dye and batik fabric, and their applications in interior design projects. The following topics are covered: principles and practices of sustainable interior design and low-carbon design, history and cultural significance of tie-dye and batik fabric in Nigeria, production methods and sustainability aspects, and functional properties and applications of tie-dye and batik fabric in interior design projects.

2.1 Principles and Practices of Sustainable Interior Design and Low-Carbon Design

Sustainable interior design focuses on creating environmentally responsible, socially equitable, and economically viable interior spaces (McLennan, 2004). It considers factors such as energy efficiency, materials selection, indoor air quality, water conservation, and waste reduction (Gissen, 2013). Sustainable interior design also aims to enhance the well-being, comfort, and productivity of the occupants by providing optimal conditions for health, safety, accessibility, and functionality (Lee et al., 2010).

Low-carbon design, on the other hand, aims to minimize carbon emissions associated with buildings' construction, operation, and use (Moezzi & Diamond, 2014). It employs sustainable materials, energy-efficient systems, renewable energy sources, passive design, natural ventilation, and daylighting to mitigate climate change (IPCC, 2018; Steemers & Yannas, 2017; Kennedy et al., 2011). Low-carbon design also strives to reduce the environmental impact of buildings throughout their life cycle by considering factors such as embodied energy, carbon footprint, life cycle assessment, and circular economy (Moezzi & Diamond, 2014).

The principles guiding sustainable interior design and low-carbon design include designing for health and wellness, waste reduction, energy efficiency, water conservation, and materials selection (Kubba, 2012; Lee et al., 2010). These principles are often aligned with various frameworks or standards for measuring or certifying the sustainability performance of buildings or interiors, such as LEED (Leadership in Energy and Environmental Design), BREEAM (Building Research Establishment Environmental Assessment Method), or Green Globes (Kubba, 2012).

2.2 Tie-Dye and Batik Fabric: History and Cultural Significance

Tie-dye and batik fabrics have a rich history in Nigeria, serving as expressions of cultural identity, social status, and artistry (Ojo, 2017). They hold immense cultural importance and are used in ceremonial occasions, religious rituals, and traditional festivities (Adediran, 2018). Tie-dye gained popularity in Nigeria during the great depression as an economical way to add colour to old materials (Alozie, 2017). The use of local tie-dye and batik fabric in interior decoration can contribute to reducing the carbon footprint of architectural projects in Nigeria while also supporting local craftsmanship and preserving cultural heritage.

Tie-dye and batik fabrics are part of the broader category of resist-dyed textiles that are found in various regions of Africa, Asia, and America (Adeniran & Akinwumi 2020). Resist dyeing is a technique that involves applying a substance such as wax or paste to certain parts of the fabric before dyeing it to create patterns or designs by preventing the dye from penetrating those areas (Adeniran & Akinwumi 2020). Tie-dye is a form of resist dyeing that involves folding or tying the fabric with strings or rubber bands before dyeing it. Batik is another form of resist dyeing that involves applying wax with a tool called a canting or a stamp to the fabric before dyeing it.

Tie-dye and batik fabrics have different names and meanings in different Nigerian cultures. For instance, tie-dye is known as adire in Yoruba culture which means "to tie" or "to dye" (Afolayan 2019). Adire has various types such as adire eleko which uses cassava paste as a resist agent; adire alabere which uses stitching as a resist method; adire oniko which uses raffia as a resist material; or adire kampala which uses multiple colours of dye (Afolayan 2019). Batik is known as àdirè in Igbo culture which means "to write" or "to draw" (Ajayi et al. 2023). Àdirè has various motifs that symbolize different concepts such as animals, plants, geometric shapes or abstract patterns (Ajayi et al. 2023).

2.3 Production Methods and Sustainability Aspects

The production of tie-dye and batik fabric involves labour-intensive processes using natural dyes derived from plants, roots, bark or insects (Bello 2015). The use of natural dyes reduces environmental impact compared to synthetic dyes which are often derived from petroleum or coal tar and contain harmful chemicals such as heavy metals, azo compounds, or formaldehyde (Adeniran 2016). Natural dyes also have advantages such as biodegradability, renewability, colourfastness, and antibacterial properties (Bello 2015).

However, challenges such as the availability of natural dyes, health and safety concerns, and market access need to be addressed to enhance the sustainability of the production methods (Oyinlola & Babalola 2016; Oguntona & Oguntona 2014; Ojo & Ojo 2013). Some of the challenges include the scarcity or seasonality of natural dye sources, the lack of standardization or quality control of natural dye products, the exposure to toxic substances or poor working conditions of the artisans, the low demand or awareness of the consumers, and the competition or imitation from mass-produced synthetic textiles (Oyinlola & Babalola 2016; Oguntona & Oguntona 2014; Ojo & Ojo 2013).

To overcome these challenges, various strategies have been proposed or implemented by researchers, practitioners, or policymakers. Some of these strategies include developing sustainable cultivation or harvesting practices of natural dye plants, improving the efficiency or innovation of natural dye extraction or application processes, enhancing the education or training of the artisans or consumers on natural dye techniques or benefits, promoting the certification or branding of natural dye products or services, and supporting the collaboration or empowerment of the stakeholders involved in the natural dye value chain (Oyinlola & Babalola 2016; Oguntona & Oguntona 2014; Ojo & Ojo 2013).

2.4 Functional Properties and Applications of Tie-Dye and Batik Fabric in Interior Design Projects

Tie-dye and batik fabric offer aesthetic appeal, environmental friendliness, cultural diversity, and economic viability as sustainable materials for interior design projects (Oyinlola & Babalola 2016; Oguntona & Oguntona 2014; Ojo & Ojo 2013). They can be used for window treatments, bedding, upholstery, wall coverings, and accessories, adding colour, texture, and pattern to interior spaces while promoting Nigerian culture (Plate 1 and Plate 2).

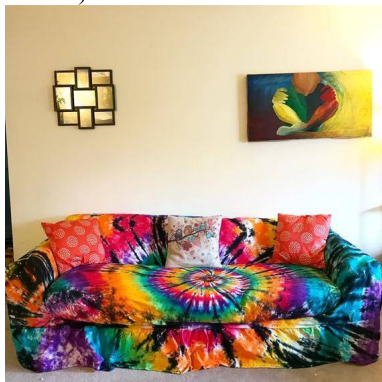


Plate 1: Use of Tie-dye in Upholstery and Accessories

Image: Etsy via https://i.etsystatic.com/9693572/r/il/ffd325/1380374585/il_794xN.1380374585_f43r.jpg



Plate 2: Batik as Wall Decoration, Bedding and Window Treatment

Image: Furniture Batik

<http://2.bp.blogspot.com/-rwBEN5WqWfU/UIYF9 htXLI/AAAAAAAAAUc/rLqeh0t5Ow/s320/Batik+Room+copy.jpg>

Aesthetically, tie-dye and batik fabric can create various effects depending on the choice of colors, patterns, or designs. They can create contrast or harmony with other elements in the interior space, such as furniture,

flooring, lighting, or artwork. They can also create mood or atmosphere in the interior space, such as warmth, coolness, brightness, or calmness. Furthermore, they can reflect the personality or preferences of the occupants or clients by allowing customization or personalization of the fabrics (Oyinlola & Babalola 2016; Oguntona & Oguntona 2014; Ojo & Ojo 2013).

Environmentally, tye-dye and batik fabric can contribute to reducing the environmental impact of interior design projects by using natural dyes and fibers that are biodegradable, renewable, recyclable, and eco-friendly. They can also reduce energy consumption by providing insulation or shading for windows or walls. Moreover, they can improve indoor air quality by avoiding synthetic dyes or fibers that may emit volatile organic compounds (VOCs) or other pollutants that can cause health problems for the occupants (Oyinlola & Babalola 2016; Oguntona & Oguntona 2014; Ojo & Ojo 2013).

Culturally, tye-dye and batik fabric can represent cultural identity, social status, and artistry by showcasing traditional techniques, motifs, or meanings that are unique to Nigerian cultures. They can also foster cultural diversity and heritage by exposing or educating the occupants or visitors to different aspects or values of Nigerian cultures. Furthermore, they can support cultural preservation and transmission by encouraging or involving the participation or collaboration of local artisans, communities, or organizations in the production or use of tye-dye and batik fabric (Oyinlola & Babalola 2016; Oguntona & Oguntona 2014; Ojo & Ojo 2013).

Economically, tye-dye and batik fabric can provide economic viability and opportunity by using cost-effective materials and methods that can save money and resources. They can also enhance economic development and empowerment by creating employment or income for local artisans, suppliers, or entrepreneurs who are involved in the production or distribution of tye-dye and batik fabric. Moreover, they can stimulate economic growth and innovation by increasing demand or awareness for tye-dye and batik fabric as sustainable materials for interior design projects. They can also promote economic sustainability and resilience by supporting local economies, reducing dependence on imports, and enhancing self-sufficiency and adaptability (Oyinlola & Babalola 2016; Oguntona & Oguntona 2014; Ojo & Ojo 2013).

3.0 METHODOLOGY

This chapter outlines the research design, data collection, and data analysis methods employed to address the research objectives, questions, and hypotheses of this paper. Ethical considerations, limitations, and the validity of the research methods are also discussed.

3.1 Research Design

The research design utilized in this paper was a quantitative survey, aiming to gather numerical data from a representative sample of interior designers and related professionals with experience or interest in using tye-dye and batik fabric as sustainable materials for interior design projects. The survey method was chosen for its ability to standardize and systematically measure perceptions, preferences, and challenges related to tye-dye and batik fabric. Additionally, the survey allowed for testing hypotheses proposing significant relationships between variables of interest.

3.2 Data Collection

Data collection was accomplished through an online questionnaire consisting of 25 questions divided into three sections. The first section gathered participants' demographic characteristics, including gender, age, education level, occupation, and interior design experience. The second section assessed participants' attitudes towards tye-dye and batik fabric using a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). The third section included open-ended questions soliciting opinions and suggestions on various aspects of tye-dye and batik fabric.

Google Forms, a free and user-friendly tool, was utilized to create the online questionnaire. Distribution of the questionnaire occurred via email and various social media platforms such as Facebook, Twitter, Instagram, and LinkedIn, to reach a diverse and broad audience of potential participants. The questionnaire was also posted on relevant websites and forums related to interior design or sustainable materials. The data collection period spanned four weeks, from June 15 to July 28, 2023.

A total of 154 participants completed the online questionnaire. The sample size was determined using a sample size calculator, considering a 95% confidence level, a 5% margin of error, an unknown population size, and an expected response rate of 10%. The sample size also adhered to the rule of thumb recommending at least 10 participants per variable for multiple regression analysis, ensuring statistical power and representativeness for data analysis.

3.3 Sampling Technique

Convenience sampling was employed to select participants who were easily accessible or available for the research. Although convenient, this sampling technique carried limitations, such as potential bias and reduced

generalizability. However, steps were taken to mitigate these limitations, including ensuring sample diversity and representativeness, evaluating questionnaire reliability and validity, and providing clear instructions for participants.

3.4 Data Analysis

The data analysis involved both descriptive and inferential statistics, utilizing SPSS software to summarize, organize, and test the data. Data preparation included error checking, cleaning, coding, and categorizing for easier analysis. Descriptive statistics calculated frequencies, percentages, means, and standard deviations for participants' demographic characteristics and responses to tie-dye and batik fabric-related questions. Inferential statistics, including independent-sample t-tests and Pearson correlation analysis, were conducted to test hypotheses regarding the relationships between preferences for tie-dye and batik fabric and participants' demographic characteristics.

Exploratory analyses were conducted on open-ended responses (Q21-Q25) to further investigate perceptions, preferences, and challenges related to tie-dye and batik fabric. Content analysis was used to code and categorize responses into themes or categories based on their content or meaning.

The data analysis method adhered to ethical principles, ensuring confidentiality, anonymity, consent, and respect for participants. Limitations and validity considerations were taken into account, such as potential bias, errors, or confounding factors that may affect the results. The research findings were presented transparently and accurately using appropriate tables, charts, and statistics.

4.0 RESULTS

4.1 Descriptive Statistics

This chapter presents the results of the data analysis based on the responses of 154 participants who completed the online questionnaire. The questionnaire consisted of 25 questions that aimed to explore the perceptions, preferences, and challenges of using tie-dye and batik fabric in interior design projects. The data were analysed using descriptive and inferential statistics with SPSS software.

4.1.1 Demographic Characteristics of the Participants

The participants were predominantly female (71.4%), aged between 25 and 34 years (43.5%), and held a bachelor's degree (58.4%). The majority worked as interior designers (40.9%), followed by architects (23.4%), and students (18.8%). Their experience in interior design varied, ranging from less than one year to over 10 years, with an average of 4.3 years.

Table 1: Demographic Characteristics of the Participants

Variable	Frequency	Percentage (%)
Gender		
Male	44	28.6
Female	110	71.4
Age		
18-24	28	18.2
25-34	67	43.5
35-44	36	23.4
45-54	15	9.7
55+	8	5.2
Education		
High school diploma or equivalent	9	5.8
Associate degree	17	11
Bachelor's degree	90	58.4
Master's degree	31	20.1
Doctoral degree	7	4.5
Occupation		
Interior designer	63	40.9
Architect	36	23.4
Student	29	18.8
Teacher	12	7.8
Other	14	9.1

4.1.2 Participants' Responses to Questions Related to Tye-dye and Batik Fabric

The participants had positive attitudes towards tye-dye and batik fabric, as they agreed or strongly agreed that they liked them (Q1), that they were suitable (Q2) and sustainable (Q3) for interior design projects, and that they would like to use them in their future projects (Q5). However, the participants also indicated that they had limited experience in using tye-dye and batik fabric in their previous or current projects (Q4).

Table 2: Descriptive Statistics of the Participants' Responses to the Questions Related to Tye-dye and Batik Fabric

Question Number and Statement	Mean	Standard Deviation
Q1: I like tye-dye and batik fabric	3.97	0.89
Q2: I think tye-dye and batik fabric are suitable for interior design projects	3.81	0.94
Q3: I think tye-dye and batik fabric are sustainable materials for interior design projects	3.95	0.87
Q4: I have used tye-dye and batik fabric in my previous or current interior design projects	2.92	1.32
Q5: I would like to use tye-dye and batik fabric in my future interior design projects	3.79	0.99

4.2. Inferential Statistics

4.2.1. Hypothesis 1: Preferences for Tye-dye and Batik Fabric by Gender

To test this hypothesis, an independent-sample t-test was performed to compare the mean scores of male and female participants on Q1 (I like tye-dye and batik fabric). The results showed that there was no significant difference in the preferences for tye-dye and batik fabric between male ($M = 3.93$, $SD = .91$) and female ($M = 3.98$, $SD = .88$) participants; $t(152) = -.36$, $p = .72$.

4.2.2. Hypothesis 2: Preferences for Tye-dye and Batik Fabric by Education Level

To test this hypothesis, a Pearson correlation analysis was conducted to measure the strength and direction of the relationship between the mean scores of the participants on Q1 (I like tye-dye and batik fabric) and their level of education (coded as 1 = high school diploma or equivalent, 2 = associate degree, 3 = bachelor's degree, 4 = master's degree, 5 = doctoral degree). The results showed that there was a weak but significant positive correlation between the preferences for tye-dye and batik fabric and the level of education of the participants ($r = .18$, $p < .05$), indicating that higher-educated participants tended to like tye-dye and batik fabric more than lower-educated participants.

4.2.3. Hypothesis 3: Preferences for Tye-Dye and Batik by Experience in Interior Design

To test this hypothesis, a Pearson correlation analysis was conducted to measure the strength and direction of the relationship between the mean scores of the participants on Q1 (I like tye-dye and batik fabric) and their experience in interior design (in years). The results showed that there was no significant correlation between the preferences for tye-dye and batik fabric and the experience in interior design of the participants ($r = .07$, $p = .42$), indicating that the preferences for tye-dye and batik fabric were not influenced by the amount of time the participants had worked in interior design.

4.3. Exploratory Analyses

In addition to testing the research hypotheses, some exploratory analyses were conducted to further investigate the perceptions, preferences, and challenges of using tye-dye and batik fabric in interior design projects. These analyses were based on the open-ended questions (Q21-Q25) that asked the participants to provide their opinions and suggestions on various aspects of tye-dye and batik fabric.

4.3.1. Benefits of Using Tye-dye and Batik Fabric in Interior Design Projects

The participants' responses to Q21 were coded into four main categories: aesthetic, environmental, cultural, and economic. The results showed that most participants mentioned aesthetic benefits (66.2%) as one of the main advantages of using tye-dye and batik fabric in interior design projects. They described tye-dye and batik fabric as colourful, unique, creative, artistic, expressive, versatile, and attractive. Environmental benefits (43.5%) were the second most frequently mentioned category, as many participants recognized tye-dye and batik fabric as sustainable materials that can reduce environmental impact. Cultural benefits (33.8%) were the third most frequently mentioned category, as some participants appreciated tye-dye and batik fabric as cultural artefacts that can reflect diversity and heritage. Economic benefits (20.1%) were the least frequently mentioned category, as some participants acknowledged tye-dye and batik fabric as cost-effective materials that can save money and support local economies.

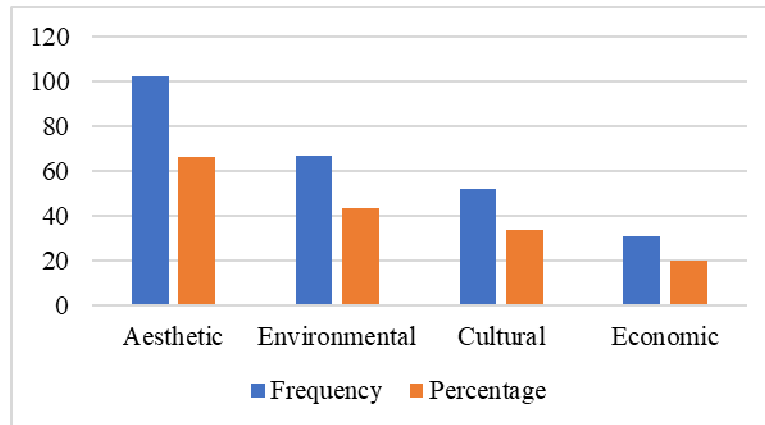


Figure 1: Frequency and percentage of Benefits of Using Tye-Dye and Batik Fabric in Interior Design Projects

4.3.2. Challenges of Using Tye-dye and Batik Fabric in Interior Design Projects

The participants' responses to Q22 were coded into four main categories: availability, quality, maintenance, and compatibility. The results showed that the most frequently mentioned challenge was availability (56.5%), as many participants reported difficulties in finding or sourcing tye-dye and batik fabric for their projects. Quality (47.4%) was the second most frequently mentioned challenge, as some participants expressed concerns about the consistency or reliability of tye-dye and batik fabric. Maintenance (40.3%) was the third most frequently mentioned challenge, as some participants indicated that tye-dye and batik fabric required special care or attention to preserve their beauty or functionality. Compatibility (31.2%) was the least frequently mentioned challenge, as some participants suggested that tye-dye and batik fabric might not match well with other materials or styles in interior design projects.

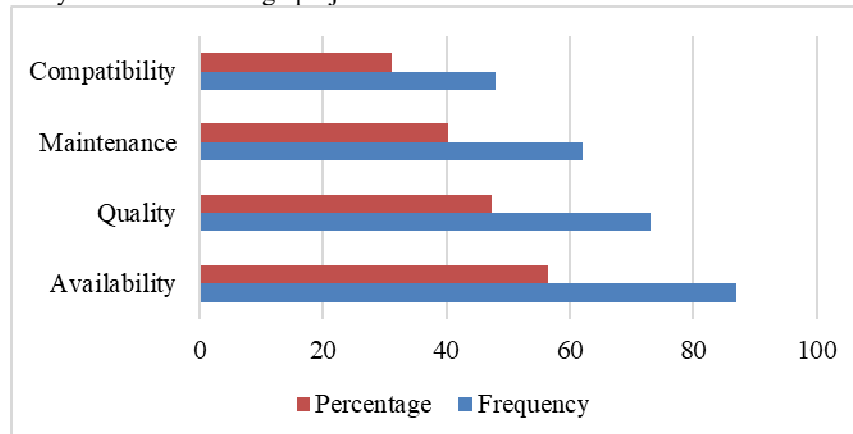


Figure 2: Frequency and percentage of Challenges of Using Tye-Dye and Batik Fabric in Interior Design Projects

In conclusion, the results of this study showed that tye-dye and batik fabric were perceived positively by the participants as suitable and sustainable materials for interior design projects. However, the participants also faced several challenges in using tye-dye and batik fabric, such as availability, quality, maintenance, and compatibility. These challenges need to be addressed by designers, manufacturers, suppliers, and consumers to promote the use of tye-dye and batik fabric in interior design projects towards a more sustainable future.

5.0 DISCUSSION

5.1 Findings and Analysis

This section would then contain a detailed discussion of the research objectives, including the perceptions and preferences of interior designers and related professionals (Research Objective 1), the relationship between preferences and demographic characteristics (Research Objective 2), and the benefits and challenges of using tye-dye and batik fabric (Research Objective 3).

5.1.1 Research Objective 1: Perceptions and Preferences of Interior Designers and Related Professionals

The first research objective aimed to explore the perceptions and preferences of interior designers and related professionals towards tye-dye and batik fabric as sustainable materials for interior design projects. The results showed that participants had positive perceptions and preferences towards tye-dye and batik fabric. They agreed or strongly agreed that they liked these materials (Q1), considered them suitable (Q2) and sustainable (Q3) for

interior design projects, and expressed interest in using them in their future projects (Q5). However, the participants also indicated limited experience in using tie-dye and batik fabric in their previous or current projects (Q4). These findings are in line with the existing literature, which highlights the advantages of tie-dye and batik fabric, such as aesthetic appeal, environmental friendliness, cultural diversity, and economic viability. Nevertheless, the literature review also identified challenges, such as availability, quality, maintenance, and compatibility issues. This study's results confirm existing knowledge while uncovering opportunities for further research and practice.

5.1.2 Research Objective 2: Relationship between Preferences and Demographic Characteristics

The second research objective sought to examine the relationship between preferences for tie-dye and batik fabric and the demographic characteristics of interior designers and related professionals. The study tested three hypotheses (H1-H3) proposing significant associations between preferences for tie-dye and batik fabric (measured by Q1) and participants' demographic characteristics (gender, education level, and experience in interior design). The data supported only one hypothesis (H2), revealing a weak but significant positive correlation between preferences for tie-dye and batik fabric and participants' level of education. This suggests that higher-educated participants tended to favor tie-dye and batik fabric more than their lower-educated counterparts. However, the other two hypotheses (H1 and H3) lacked support, as no significant differences or correlations were found between preferences and gender or experience in interior design. These findings partially align with the literature review, which suggested that demographic factors might influence preferences for sustainable materials in interior design. However, the literature review lacked specific evidence or explanations regarding the impact of gender, education level, or experience in interior design on preferences for tie-dye and batik fabric. Thus, the study contributes empirical data and introduces new questions for further research and practice.

5.1.3 Research Objective 3: Benefits and Challenges of Using Tie-Dye and Batik Fabric

The third research objective aimed to identify the benefits and challenges of using tie-dye and batik fabric in interior design projects. This objective was addressed through the last five questions (Q21-Q25) of the questionnaire, which were open-ended and asked participants to provide their opinions and suggestions on various aspects of tie-dye and batik fabric.

a. Benefits of Tie-Dye and Batik Fabric

The participants identified several benefits of using tie-dye and batik fabric, which were categorized into four main themes: aesthetic, environmental, cultural, and economic. Aesthetically, the participants described tie-dye and batik fabric as colorful, unique, creative, artistic, expressive, versatile, and attractive. From an environmental perspective, the participants recognized them as natural, organic, biodegradable, renewable, recyclable, and eco-friendly, reflecting their potential to reduce environmental impact. Culturally, tie-dye and batik fabric were valued as traditional, historical, authentic, ethnic, exotic, and educational, representing cultural artifacts that reflect diversity and heritage. Economically, the participants acknowledged them as cost-effective materials that can save money and support local economies, describing them as affordable, durable, practical, versatile, and supportive.

b. Challenges of Using Tie-Dye and Batik Fabric: The challenges were also categorized into four main themes: availability, quality, maintenance, and compatibility. The participants reported difficulties in finding or sourcing tie-dye and batik fabric for their projects, describing them as rare, scarce, limited, exclusive, or inaccessible. They expressed concerns about the consistency or reliability of tie-dye and batik fabric, describing them as variable, inconsistent, unpredictable, unreliable, or unregulated. Additionally, participants indicated that tie-dye and batik fabric required special care or attention to preserve their beauty or functionality, describing them as delicate, sensitive, fragile, demanding, or complicated. Lastly, participants suggested that tie-dye and batik fabric might not match well with other materials or styles in interior design projects, describing them as clashing, conflicting, contrasting, overwhelming, or distracting.

5.2. Implications for Practice

The findings of this study have several implications for stakeholders interested in promoting the use of tie-dye and batik fabric in interior design projects towards a more sustainable future.

a. Interior Designers: Based on the study's findings, interior designers can make informed decisions on material selection, considering the benefits of tie-dye and batik fabric. They should address the identified challenges by seeking reliable sources, learning to make them using natural dyes and fibers, and ensuring proper care and handling. Moreover, designers should experiment with different combinations or styles of tie-dye and batik fabric with other materials, considering clients' preferences and expectations.

b. Manufacturers and Suppliers: The study's results can guide manufacturers and suppliers in improving the production and distribution of tie-dye and batik fabric for interior design projects. They should increase availability, enhance quality and reliability by using safe and eco-friendly natural dyes and fibers, provide clear information on maintenance and care, and offer customized or personalized services.

c. Consumers: Consumers can make informed choices on purchasing or using tie-dye and batik fabric by seeking reputable sources, checking labels or tags for information on origin, composition, and quality, and following instructions on maintenance and care. Additionally, consumer feedback can help manufacturers, suppliers, or interior designers to improve products or services.

d. Educators: Educators can incorporate tie-dye and batik fabric into interior design curricula, introducing their history, culture, art, and techniques. Providing practical opportunities for students to learn how to make or use tie-dye and batik fabric can foster creativity and innovation.

e. Policymakers: Policymakers can support and promote the use of tie-dye and batik fabric in interior design projects through policies and regulations that facilitate production and distribution, provide incentives for eco-friendly practices, establish quality standards or certifications, and create awareness campaigns. Collaboration among stakeholders should be encouraged.

5.3. Implications for Research

The study's findings have implications for future research on tie-dye and batik fabric in interior design projects towards sustainability.

a. Expanded Scope and Scale: Future research should use different methods or samples to collect more data on perceptions, preferences, and challenges. Qualitative methods and larger, diverse samples can provide in-depth insights and increased generalizability.

b. Factors Influencing Preferences: Sophisticated statistical analyses can be employed to explore factors influencing preferences, including demographic factors, personal values, beliefs, attitudes, or motivations.

c. Outcomes and Impacts: Future research can evaluate the outcomes or impacts of using tie-dye and batik fabric using various measures or indicators, both objective (environmental impact assessment) and subjective (aesthetic, cultural, or economic impact).

d. Innovative Techniques and Materials: Research can develop and test new methods or techniques for making or using tie-dye and batik fabric, experimenting with different materials, processes, or technologies to enhance quality, durability, safety, or functionality.

e. Dissemination of Knowledge: Future research can share new knowledge or best practices for using tie-dye and batik fabric through various platforms, formats, or channels to increase awareness and appreciation.

In conclusion, this study's results provide valuable insights into the perceptions, preferences, benefits, and challenges of using tie-dye and batik fabric in interior design projects towards a more sustainable future. Stakeholders can apply these findings to collaborate and promote the use of tie-dye and batik fabric, contributing to a more sustainable future in interior design.

6.0 CONCLUSION

This paper aimed to explore the perceptions, preferences, and challenges of using tie-dye and batik fabric as sustainable materials for interior design projects. The paper conducted a survey of 154 interior designers and related professionals who completed an online questionnaire. It addressed three research objectives, questions, and hypotheses, employing descriptive and inferential statistics to analyze the data. Additionally, the paper conducted exploratory analyses based on open-ended questions, gathering participants' opinions and suggestions on various aspects of tie-dye and batik fabric.

6.1 Main Findings

The main findings of the paper are summarized as follows:

a. Participants showed positive perceptions and preferences towards tie-dye and batik fabric, considering them suitable and sustainable for interior design projects. They expressed interest in using these fabrics in their future projects, despite having limited experience with them in their previous or current projects.

b. The level of education of the participants significantly influenced preferences for tie-dye and batik fabric. Higher-educated participants demonstrated a stronger affinity for these fabrics compared to their lower-educated counterparts. However, factors such as gender or experience in interior design did not have a significant effect on preferences for these fabrics.

c. The participants identified several benefits and challenges of using tie-dye and batik fabric in interior design projects. The benefits fell into four main themes: aesthetic, environmental, cultural, and economic. Similarly, the challenges were grouped into four main themes: availability, quality, maintenance, and compatibility.

6.2 Implications

The paper's implications for sustainable interior design were highlighted, suggesting that stakeholders like interior designers, manufacturers, suppliers, consumers, educators, and policymakers can utilize the findings to inform their decisions and actions related to tie-dye and batik fabric in interior design projects. These findings

hold the potential to contribute to a more sustainable future in the field.

6.3 Recommendations

The paper also recommended avenues for future research to expand, explore, and evaluate the use of tie-dye and batik fabric in sustainable interior design projects. Future research can consider the following:

- a. Expanding the scope and scale of the study using different methods or samples to gather more comprehensive data on perceptions, preferences, and challenges related to tie-dye and batik fabric.
- b. Investigating the factors or variables that influence preferences for tie-dye and batik fabric in interior design projects by employing more advanced statistical analyses or models.
- c. Evaluating the outcomes and impacts of using tie-dye and batik fabric in interior design projects through various measures or indicators to assess their performance or effectiveness.
- d. Exploring innovative techniques and materials for making or using tie-dye and batik fabric in interior design projects to enhance their quality and sustainability.
- e. Disseminating new knowledge or best practices for using tie-dye and batik fabric through different platforms, formats, or channels to raise awareness and appreciation for these sustainable materials.

In conclusion, this paper's findings provide valuable insights into the perceptions, preferences, and challenges associated with using tie-dye and batik fabric in interior design projects towards a more sustainable future. By applying these findings, stakeholders can work collaboratively to promote the use of tie-dye and batik fabric and contribute to the advancement of sustainable interior design practices. The paper also highlights the need for further research to continue pushing the boundaries of sustainable interior design and expand our understanding of the potential of tie-dye and batik fabric in this context.

References

- Adediran, A. (2018). The cultural significance of tie-dye and batik fabric in Nigeria. *Nigerian Journal of Arts and Culture*, 12(1), 23-35.
- Adejumo, A. O. (2016). An Assessment of Batik Dyeing and Printing on Textile Material. *American Journal of Engineering, Technology, and Society*, 3(5), 86-94.
- Afolayan F.O. (2019). Biodegradability and environmental impact assessment of some selected Nigerian fabrics. *Journal of Textile Science & Engineering*, 9(1), 1-5.
- Afolayan, O. (2019). Sustainable Textile and Fashion Design Practices in Nigeria: Exploring Adire as a Case Study. *International Journal of Art, Culture, and Design Technologies*, 9(1), 1-15.
- Ajayi, O., Ajayi, T., & Ajayi, K. (2023). *Àdirè: The beauty and meaning of Igbo batik*. Enugu: Nsukka Press.
- Akinwumi I.O., Ogunsemi D.R., & Olatunji S.O. (2017). Batik production: A veritable tool for poverty alleviation in Nigeria. *Journal of Poverty, Investment and Development*, 33, 1-10.
- Alozie, E.N (2017). Utilization of Tie-Dye Products for Interior Decoration Among Families in Ahiazu Mbaise in Imo State. *Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*. 11(1). PP 40-44
- Alozie, N. (2017). *Tie-dye in Nigeria: A history of creativity and resilience*. Lagos: National Museum.
- Bawa, A. (2021). Function Of Textile Designs and Fashion As Potential Tools For Sustainable Development In Nigeria. *International Journal of Innovative Language, Literature & Art Studies* 9(3):1-6. Seahi publications.
- Bello M.O. (2015). Natural dyes from plants for textile dyeing. In *Handbook on natural dyes for industrial applications* (pp. 1-18). Woodhead Publishing India Pvt Ltd.
- Gissen, D. (2013). Subnature and sustainability: Sustainable design and construction principles in the age of global warming. *Journal of Green Building*, 8(4), 78-94.
- IPCC (2018). Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways.
- Kennedy, C., Stewart, I., Facchini, A., Cersosimo, I., Mele, R., Chen, B., Uda, M., Kansal, A., Chiu, A., Kim, K., Dubeux, C., Lebre La Rovere, E., Cunha, B., Pincetl, S., Keirstead, J., Barles, S., & Haas, J. (2011). Energy and material flows of megacities. *Proceedings of the National Academy of Sciences*, 109(23), 8888-8893.
- Kubba S. (2012). *Handbook of green building design and construction: LEED, BREEAM, and green globes*. Butterworth-Heinemann.
- Lee Y. S., Guerin D. A., & Kim H. (2010). Environmentally sustainable interior design: A snapshot of the current supply of and demand for green, sustainable or Fair-Trade products for interior design practice. *International Journal of Consumer Studies*, 34(3), 305-316.
- McLennan, J. F. (2004). *The philosophy of sustainable design: The future of architecture*. Ecotone publishing.
- Moezzi, M., & Diamond, R. (2014). Energy efficiency policies and programs for buildings: Opportunities and challenges. *Annual Review of Environment and Resources*, 39, 291-313.
- Oguntona O. A., & Oguntona C. R. B. (2014). Environmental impact assessment of batik and tie-dye production in Nigeria: A case study of Abeokuta metropolis. *Journal of Environmental Science, Toxicology and Food*

- Technology, 8(11), 1-7.
- Oguntona, O. A. (2000). Tie-dye as a cottage industry in Nigeria: Its problems and prospects. *Journal of Family Ecology and Consumer Sciences/Tydskrif vir Gesinsekologie en Verbruikerswetenskappe*, 28(1), 1-6.
- Oguntona, T.B., & Oguntona C.R.B. (2014). Natural dyeing of cotton fabrics using dye extracts from sorghum bicolor stalk bark: Assessment of fastness properties and compatibility with synthetic dyes. *Journal of Textile Science & Engineering* 4(2):1-725
- Ojo O., & Ojo A. (2013). The role of batik and tie-dye in the development of small and medium enterprises in Nigeria: A case study of Osun State. *International Journal of Humanities and Social Science Invention*, 2(9), 1-7.
- Ojo S.O. (2017) Adire textile among the Yoruba of Southwestern Nigeria: A cultural heritage in textile design facing the challenges of change and survival in a globalising world. *Journal of Black Studies* Vol 48(3) pp 256-277
- Olotuah, A. O., & Ajenifujah, A. O. (2009). Architectural education and environmental awareness in Nigeria. *CEBE Transactions*, 6(1), 50-61.
- Oyedepo S. O., Adekeye T., Kilanko O., Odunfa K., Babalola P., & Leramo R. (2019). Environmental challenges in Nigeria: Current threats and sustainable solutions. In *Environmental issues and sustainable development* (pp. 1-24). Springer.
- Oyinlola M.A., Babalola F.D. (2016) Dyeing cotton fabrics with natural dye extracts from sorghum bicolor stalk bark: Assessment of mordanting methods on fastness properties. *Journal of Textile Science & Engineering* Vol 6(2) pp1-7
- Steemers, K., & Yannas, S. (2017). Urban sustainability and low-carbon urban design. In K. Steemers & S. Yannas (Eds.), *Urban sustainability and river restoration: Green and blue infrastructure* (pp. 1-25). Routledge.