THE ART OF PRINTING: THE SUBSTRATE AS A CREATIVE CANVAS

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Abstract
Printing is usually discussed in terms of technology, aesthetics, and communication (Eisenstein, 1979; Warde, 2009). However, the material surface (the substrate) remains under-examined. This study points out that substrates are not passive carriers but are active canvases that shape meaning, aesthetics, and perception. Through material culture and semiotic lenses, it positions the substrate as a vital component of print design, specifically within Nigeria's hybrid traditional-industrial context. Using a qualitative approach, the study analyses three domains: traditional textiles (e.g., *adire*, *ankara*) that embody cultural narratives; publishing, where paper availability dictates design and access; and emerging uses of substrates in packaging and commercial print production in Lagos, where designers negotiate between imported industrial materials and local improvisations. Findings reveal that Nigerian practitioners treat substrates as central to expression and durability, navigating constraints through innovation. This negotiation fosters a unique design culture where substrates become sites of dialogue between tradition and modernity, scarcity and creativity. By reframing the substrate as a creative agent, this research contributes to design theory and practice, advocating for greater substrate literacy in Nigerian design education and sustainable, local material sourcing.

Keywords*:* Substrate Literacy, Print Design, Material Culture, Nigerian, Adire, Packaging, Arts and Design

Introduction

Printing has long been regarded as a cornerstone of human communication and civilisation, linking the creative imagination of the designer with the material processes of production and function. Historically, scholarship in print design has emphasised technology, aesthetics, innovation, utility, and communication outcomes (Briggs & Burke, 2010; Meggs & Purvis, 2016). However, the surface upon which these designs are realised, the substrate, remains relatively under-theorised. In most accounts, the substrate is framed as a technical requirement rather than an aesthetic or cultural determinant. A technical requirement is mainly about *function*. For instance, if the substrate is paper, the paper must be strong enough to run through a high-speed press without tearing. There is also **an** aesthetic determinant, which is primarily about *perception.* For instance, coated paper (gloss or matte finish) makes printed colours look vibrant and modern, while a cultural determinant is about *meaning*. It suggests that the substrate could carry embedded cultural narratives (e.g., history, stories) or signify identity (e.g., Social Status, Group Membership). This study challenges the assumption that the substrate is framed as just a technical requirement rather than an aesthetic or cultural determinant by positioning the substrate as an active canvas in the art of printing. It argues that substrates shape not only the durability and functionality of a printed artefact, but also its cultural resonance, audience perception, symbolic value and even its functionality.

In Nigeria, especially in Lagos and Aba, the role of substrates offers a rich and vibrant site of inquiry because of the intersection of traditional practices, colonial histories, and modern industrial production. Before the advent of industrial printing, substrates such as handwoven cloth, calabash, bark, and *locally made paper (such as the koda paper used for Arabic manuscripts in the then Hausa-speaking states and Sokoto Caliphate)* served as vehicles of inscription and cultural expression (Bivar, 1968; Picton, 1995). The Yoruba *adire* indigo-dyed cloth, for example, functions as both textile and communicative medium, where the substrate's texture and absorptive quality determine the outcome of resist-dyeing techniques (Akinwumi, 2008). Similarly, carved calabash objects demonstrate how natural substrates were central to ritual, decorative, and everyday communication practices (Picton, 1995). These examples foreground the ways in which substrates were never neutral but carried symbolic, material, and social weight.

The shift to industrial printing substrates began with the establishment of the first missionary presses in the 1840s, most notably with the Church Missionary Society's press in Abeokuta. The founding of *Iwe Irohin* in 1854 and the colonial Government Press in Lagos by 1880 cemented this transition, making imported paper the unchallenged dominant substrate for publishing in Nigeria (Adebanwi, W. (2016)**.** However, this transition also highlighted material constraints: much of Nigeria's publishing industry became dependent on imported paper, the quality of which varied due to economic and infrastructural challenges (Adesanoye, 1995). To this day, the Nigerian print industry remains heavily reliant on imported substrates, from coated and uncoated paper stocks to synthetic substrates used in packaging and outdoor advertising. This dependence underscores the complex relationship between global supply chains and local design practices. Designers and printers often adapt to shortages or fluctuating costs by improvising with recycled substrates or exploring hybrid material applications, reflecting a uniquely Nigerian design ingenuity. (See Fig. 1A, 1B, 1C, 2A & 2B)

Fig.1A: Laminating recycled brown corrugated carton with a new printed sheet

Fig.1B: Repurposing the laminated corrugated carton for packaging

Fig.1C: Repurposing the laminated corrugated carton into gift boxes

Fig.2A: Waste cards in the press

Fig.2B: Waste cards laminated together to increase grammage (thickness)

Fig.2A & 2B: Waste cards can be laminated /gummed together to increase their grammage (thickness) and can be easily repurposed for use in book binding, especially for hardcover bound books.

Theoretically, the reframing of substrates as "active canvases" resonates with Marshall McLuhan's (1964) assertion that "the medium is the message." Substrates, as the material base of printed communication, influence not only the look and feel of the message but also how it is consumed and valued. More recent scholarship in material culture and design studies continues to emphasise that objects, including print substrates, are not inert but actively participate in meaning-making processes (Ingold, 2012; Leander, 2021). For design studies, this perspective invites a deeper appreciation of how the materiality of substrates intersects with creativity, technology, and culture. In Nigeria, where design practices must navigate both scarcity and abundance, the substrate becomes a central site of negotiation between artistic vision and material constraint.

At the professional level, Nigerian designers treat substrate selection as a critical functional decision that directly determines a product's performance, durability, and market success. Beyond aesthetics, substrates are chosen to fulfil essential practical roles. In packaging design, for example, functionality dictates material choice: sachet water packets use thin polyethene film primarily for its sealing and barrier properties, while beverage cartons employ duplex or corrugated board for structural rigidity and protection during transport. This functional imperative intersects directly with affordability and

consumer appeal, as seen in the proliferation of sachet packaging in Nigeria's FMCG sector, where material choice balances cost, product integrity, and brand recognition (Akinola, 2020). Similarly, in publishing, functional requirements drive substrate selection: low-GSM, uncoated paper is chosen for textbooks not only for cost but for reduced weight and durability under frequent handling, whereas glossy coated paper in magazines serves functional needs related to high-resolution image reproduction and visual impact. These decisions reflect a convergence of economic constraints, audience use, and cultural perception. Such examples demonstrate that the substrate operates at the intersection of functionality, design, commerce, and culture, where material performance enables and often dictates creative and commercial outcomes.

Despite this centrality, scholarly engagement with substrates in Nigeria has been sparse. While foundational studies in African print culture have productively focused on content, readership, and historical development (Newell, 2013; Barber, 2018), and textile research on motifs and symbolism (Adediran, 2012), the materiality of the substrate itself has often been overlooked as a primary site of meaning (Bozzoli, 2022). Technical studies in printing and publishing often address substrate properties such as GSM, finish, and durability, but rarely interrogate their cultural implications (Adegbite, 2015). This lacuna provides an opportunity for a hybrid inquiry that combines design practice, material analysis, and cultural theory.

This study seeks to fill this gap by examining the substrate as a creative canvas in Nigerian print practices. It poses three interrelated objectives:

1. To investigate how substrates function as aesthetic and cultural determinants in traditional and contemporary Nigerian design practices.
2. To analyse how material constraints and global supply chains influence Nigerian designers' substrate choices.
3. To argue for the recognition of substrates as central to both scholarly discourse and professional training in print design.

By pursuing these objectives, this study contributes to three domains of knowledge. First, it extends design theory by embedding substrate materiality within discourses of aesthetics and communication. Second, it enriches African cultural studies by showing how material surfaces embody continuity between indigenous and modern practices. Third, it offers practical implications for design education and professional practice in Nigeria, highlighting the need for "substrate literacy" in curricula and encouraging sustainable innovation in material sourcing.

Ultimately, this introduction frames the substrate not as a silent background but as an active agent in the art of printing. Nigeria's hybrid print culture, where *adire* cloth coexists with digital offset packaging, illustrates that substrates are never incidental; they are canvases upon which culture, technology, and creativity converge.

Literature Review

The literature on printing and design has long foregrounded technology, aesthetics, and communication, while treating the material surface of print (the substrate) as a secondary concern. This review organises existing scholarship into three interlinked strands:

(a) conceptual perspectives on the substrate
(b) theoretical frameworks from material culture and semiotics
(c) empirical studies of Nigerian print and design practices.

Together, they highlight both the neglect of substrates in scholarly discourse and the opportunity to reposition them as creative canvases.

Conceptual Review

In technical literature, a substrate is defined as the material base upon which ink, toner, or dye is deposited to produce a printed image (Fleming, 2013). This utilitarian framing reduces substrates to functional supports, ignoring their aesthetic, cultural, and communicative roles. However, from a design standpoint, the substrate is integral to the visual and tactile experience of print. Paper textures, fabric weaves, and even synthetic surfaces condition how colour is absorbed, how durability is achieved, and how audiences interact with printed artefacts (Meggs & Purvis, 2016). Substrates contribute directly to the sensory and communicative qualities of print. In the Nigerian context, this conceptualisation cannot be divorced from indigenous material traditions. For instance, *adire* resist-dyed cloth depends on cotton's fibre structure and porosity, while *aso-oke* weaving relies on sheen and weight to communicate prestige (Akinwumi, 2008). Carved calabashes and inscribed pottery similarly demonstrate that surface material was as significant as motif or inscription (Picton, 1995). These cases illustrate that substrates are not neutral carriers but active participants in meaning-making. The "substrate-as-canvas" paradigm thus expands print discourse beyond technology into cultural and artistic domains.

Theoretical Framework

Two main theoretical perspectives underpin this inquiry: material culture theory and the semiotics of design.

Material Culture Theory

Material culture theory posits that objects mediate social relations and cultural meaning rather than simply serving utilitarian ends (Miller, 2005; Tilley et al., 2013). Substrates, therefore, embody social values, economic realities, and cultural identities. For example, the continued use of Ankara prints in Nigeria illustrates how fabric substrates signify not only fashion but also belonging, authenticity, and symbolic capital (Adediran, 2012). When such motifs are digitally reproduced on synthetic cloth, the change in substrate alters meaning, raising questions of originality and continuity.

Fig.3A: Handwoven Aso Oke

Fig.3B: Digitally reproduced motif on synthetic cloth

Fig.3A & 3B: The substrate defines cultural meaning. Authentic handwoven Aso Oke (Fig.3A) signifies heritage and prestige, while a printed imitation (Fig.3B) signifies affordability and mass production.

Material culture perspectives further underscore how scarcity shapes creativity. In Nigeria, where imported papers are costly and irregular, printers often improvise with recycled boards or hybrid substrates. Such practices demonstrate how material constraints structure design outcomes,

resonating with broader debates on frugal innovation and adaptive design in the Global South (Radjou & Prabhu, 2015).

Fig.4: Adire Book cover, an example of imported paper coexisting with indigenous substrate.

Semiotics of Design

The semiotics of design emphasises that visual communication operates through signs and that material features themselves carry signifying power (Barthes, 1977). In print, the substrate's sheen, weight, or opacity can signal luxury, permanence, or ephemerality. For instance, glossy coated paper used in Nigerian fashion magazines (Fig.5A) signals aspirational modernity, while low-GSM newsprint in mass-circulation newspapers (Fig.5B) suggests affordability and disposability (Adegbite, 2015). Thus, this theoretical engagement allows us to recognise the substrate as both a material object and a signifying system.

Fig.5A: Fashion Magazine

Fig.5B: Newspaper

This symbolic economy also intersects with institutional authority. Government certificates printed on security paper or PVC substrates derive legitimacy from their material resistance to forgery, while photocopied versions on plain paper are dismissed as unofficial. Here, substrates act as signifiers of institutional credibility as much as communicative carriers.

Together, material culture and semiotic theory provide complementary tools for analysing substrates as active canvases in Nigerian print and design culture. They help explain not only how substrates shape practical design outcomes but also how they encode cultural values, status hierarchies, and social trust.

Empirical Review

Empirical work on Nigerian print culture can be organised into three domains:

(a) traditional practices
(b) publishing and paper use
(c) contemporary commercial printing and packaging.

Traditional Practices

Research in Nigerian textile arts has documented the cultural and aesthetic dimensions of *adire* and *ankara*. Akinwumi (2008) shows how the porosity and absorptive qualities of cotton cloth are central to resist-dye techniques, producing designs that are inseparable from the material surface. Adediran (2012) further demonstrates that motifs acquire meaning only through the physical and tactile properties of the cloth. Similarly, carved calabashes reflect the constraints and affordances of curvature, hardness, and durability (Picton, 1995). However, these studies tend to emphasise motifs, symbols, and patterns, often neglecting the substrate as a central variable. Few directly interrogate how the material itself (cotton fibre, calabash skin, raffia texture) shapes the communicative potential of the artefact. This leaves space for inquiries that foreground the substrate as a cultural and aesthetic agent.

Publishing and Paper

Scholarship on Nigerian publishing has historically focused on historical trajectories, readership, and industry economics (Adesanoye, 1995; Igwe, 2016). While these works document the colonial legacy of imported paper, they rarely foreground the substrate as a site of cultural meaning. Instead, paper is treated primarily in technical terms of grammage, opacity, or durability (Adegbite, 2015).

However, evidence shows that substrate quality shapes both aesthetics and perception. Textbooks printed on low-GSM paper deteriorate quickly, diminishing their longevity, usability, and symbolic value (Okebukola, 2018). Conversely, glossy magazine stock conveys modernity and aspirational identity. Newspaper reliance on cheap newsprint encodes disposability into the medium itself, reinforcing its ephemeral status. These dynamics suggest that paper substrates function not only as technical supports but as determinants of cultural practice and reader engagement.

Commercial Printing and Packaging

More recent studies address Nigeria's expanding packaging and advertising industries. Akinola (2020) observes that packaging substrates, whether flexible films for sachet products or carton boards for premium goods, shape consumer perception and market competitiveness. Packaging substrates must balance cost, durability, and print quality while also signaling brand identity. In Lagos's bustling commercial printing hubs, such as Somolu and Ikeja, designers and print operators frequently experiment with recycled carton boards and hybrid substrates due to severe cost constraints. Their ingenious, context-specific innovations include creating hybrid substrates such as:

i. **Laminated Boards:** A recycled cardboard core fused with a new, cheaper sheet of paper to create a clean, printable surface.
ii. **Reinforced Duplex:** Two or more layers of floppy duplex board glued together to achieve the rigidity of cost-prohibitive, white-lined chipboard.

Methodology

This paper adopts a qualitative, interpretive design that combines documentary research, case study analysis, and semi-structured practitioner interviews. The emphasis is on interpreting substrates as both physical media and cultural texts. A qualitative design is appropriate for two reasons:

a) First, substrates are not neutral carriers of ink, but material choices imbued with symbolic, economic, and cultural meaning.
b) Second, Nigerian printing has historically been shaped by resource constraints, indigenous practices, and hybrid material experimentation (Barber, 2006; Adesokan, 2011).

Therefore, the interpretive framework allows us to situate substrates as dynamic mediators of design outcomes rather than as background materials.

Data Sources

Archival and Documentary Sources:

The study consulted archives such as the National Archives in Ibadan and the National Library of Nigeria for records on colonial-era printing, including the use of cheap wood-pulp paper in early missionary presses (Falola, 1999). Print trade documents, such as the Chartered Institute of Professional Printers of Nigeria (CIPPON) reports, provide industry standards and debates around sourcing, cost, and quality. Government reports on publishing subsidies, such as the Universal Basic Education Commission's (UBEC) 2022 Mass Procurement of Textbooks Initiative**,** highlighted how substrate choice is dictated by policies prioritising cost-effective mass production over material quality or durability (UBEC, 2022). Technical manuals from Nigerian print suppliers (e.g., AfriPaper, Lagos; Academy Press PLC) were also reviewed to cross-check contemporary substrate types available locally: carton boards, coated papers, flex films, and specialty substrates such as PVC for ID cards.

Case Studies:

Case studies were purposively selected to illustrate traditional, cultural, and industrial engagements with substrates in Nigeria.

a) ***Indigenous Textile Substrates (Adire, Aso Oke):***
Adire (indigo-dyed cloth from Abeokuta) is a classic example of substrate-as-message. Here, the cloth itself is not just a support but an expressive agent, with resist-dye techniques creating designs that signify cultural identity (Picton, 1995). Similarly, *Aso Oke*, woven with metallic threads, demonstrates how substrate properties (sheen, weight, tactile richness) embody notions of prestige.

a) ***Mass Newspaper Printing (The Punch, Vanguard, Daily Trust):***
These outlets rely on low-cost, low-GSM newsprint. Practitioners interviewed noted that the fragility of the paper shapes both the aesthetics (ink spread, ghosting) and the temporal status of the newspaper (ephemeral, disposable, recyclable).

b) ***Packaging and Commercial Printing (Lagos and Aba hubs):***
Nigeria's packaging industry relies heavily on substrates such as corrugated board, duplex board, and flexible plastic films. Case studies included Lagos-based packaging for products like Indomie Noodles cartons and sachet water branding, where the choice of thin polyethene films enables affordability but contributes to environmental waste (Onyido et al., 2018). Aba's informal printing economy also showcases ingenious substrate improvisation, where operators substitute unavailable or costly materials with salvaged boards and laminated sheets.

Practitioner Interviews

Semi-structured interviews were conducted to gather firsthand insights into the material negotiations of Nigerian print practitioners. A purposive sampling strategy was used to ensure diversity across the print sector.

The interviews were conducted in Yoruba, Pidgin English, and Standard English depending on participant preference.

Analytical Framework

The analysis employed thematic coding (Braun & Clarke, 2013), structured around material culture theory and semiotics of design.

a) **Material Culture Coding:** Categories included availability, cost, durability, and environmental implications of substrates. Example: sachet water films coded under "low-cost accessibility vs. environmental degradation."
b) **Semiotic Coding:** Categories focused on how substrates signify value, temporality, or prestige. Example: *Aso Oke*, as a substrate, was coded under "material signifier of social status."

Triangulation revealed a critical continuity: while printing technology has evolved for the Nigerian printer (from manual presses to digital workflows), the Nigerian substrate market has not, perpetuating a dependency on imported coated stocks that mirrors the colonial-era importation of wood-pulp paper.

Ethical Considerations

"Ethical Considerations" refers to the formal steps taken to ensure this study was conducted in a morally responsible way. It means the active protection of the rights, well-being, and dignity of everyone and everything involved in this research, including:

- Protecting the identity of the participants, ensuring they participated voluntarily without any harm to their persons.
- Ensuring the traditions and crafts of communities (like the *adire* artisans) are not exploited or misrepresented.
- Protecting the confidential business information of companies that is not public knowledge.

This study was conducted in accordance with the core ethical principles of social research: respect for persons, beneficence, and justice. Informed consent was a priority. All participants received a detailed explanation of the research aims, and their consent was obtained. To ensure confidentiality, the names of individuals and most companies have been anonymised. Well-known brands and products that are central to the case studies (e.g., Indomie noodle cartons) are named as they are essential to the public context of the analysis and are not considered confidential information.

Limitations

This methodology acknowledges its limits: the study does not include laboratory testing of substrates' physical properties, and the sample size, while diverse, is small relative to Nigeria's vast printing sector. Nonetheless, the purposive sampling ensures depth and cultural breadth, allowing the study to speak meaningfully to both scholarly theory and design practice.

Justification of Research Method

The chosen hybrid method resonates with Nigerian realities, where substrate choice is often shaped less by ideal design theory than by marketplace realism, cultural tradition, and pragmatic improvisation. As Adegbite (2015) has argued, printing in Nigeria is as much about material negotiation as it is about design vision. By combining archival, case study, and practitioner voices, this methodology demonstrates how Nigerian print designers and artisans continually reimagine "the canvas" under shifting constraints, thereby elevating the substrate to a central object of scholarly and professional inquiry.

Table 1: Case Studies and Practitioner Insights on Substrates in Nigerian Print and Design

Domain	Substrate Examples	Case Study / Context (Source, Date, Location)	Practitioner Insights (Source, Date, Location)	Analytical Significance
Indigenous Textile Printing	Cotton cloth, *Adire*, *Aso-Oke*	*Adire* dyeing pits in Abeokuta (Field notes, May 2024); *Aso-Oke* Weavers in Iseyin (Field notes, April 2024)	"If the cloth is too thin, it cannot carry our stories. The dye will betray you." – Veteran *Adire* Artisan (Interview, Abeokuta, 12 May 2024)	Substrate is not neutral; material properties shape narrative durability and cultural meaning.
Newspaper Printing	Low-GSM newsprint	Production floors of major dailies, e.g., *The Punch* (Lagos) (Industry report, 2023)	"Newsprint teaches us humility—print today, trash tomorrow." – Press Operator (Interview, *The Punch*, Lagos, 22 March 2024)	Fragility of substrate encodes temporality and disposability into design outcomes.
Commercial Packaging	Corrugated board, duplex board, kraft, polyethene films	**Lagos:** Dufil Prima Foods (Indomie carton production) (Company report, 2022). **Aba:** Informal packaging workshops (Field notes, June 2024)	"Designers dream in gold foil, but we dream in what the customs officer clears at the port." – Production Manager (Interview, Ikeja Packaging Plant, Lagos, 5 April 2024)	are dictated by import constraints, affordability, and environmental costs.

Digital Print & Branding	Gloss-coated papers, PVC cards, synthetic substrates	Branding studios in Yaba, Lagos (Field notes, March-June 2024)	"Clients see gloss as premium—even if the design is weak." – Senior Designer (Interview, "Brand Axis" Studio, Yaba, Lagos, 18 March 2024)	Substrate acts as a semiotic cue for value and prestige, sometimes outweighing design quality.

This table works as a methodology bridge:

a) It shows the range of substrates studied.
b) It anchors voices of practitioners alongside cultural/industrial cases.
c) It highlights how analysis (semiotics + material culture) will interpret these insights.

Findings

The analysis of archival data, case studies, and practitioner interviews revealed six central themes regarding the role of substrates in Nigerian print culture.

Substrate Availability as a Structural Constraint

A central finding of this study is that across the Nigerian print ecosystem, the availability of substrates and not just merely creative intent is the primary determinant of design outcomes. This was starkly illustrated in the case of Aba's informal packaging sector, where designers consistently downgraded designs from multi-colour prints (Fig.6A) to simpler, one/or two-colour designs on repurposed brown cartons (Fig.6B) due to material scarcity and cost. The aesthetic and perceived value of the final product was fundamentally dictated by material access, not design vision.

Fig.6

Fig.

Substrate as Semiotic Marker of Value

Interviews in the course of this study confirmed that substrates really function as potent semiotic markers of status. As a Somolu-based branding consultant in Lagos noted, *clients perceive gloss-coated card stock as 'premium' and newsprint or kraft paper as 'ordinary.'* This perception aligns with semiotic theory, framing substrates not as passive surfaces but as active signifiers of prestige and value (Barthes, 1977; Okwuosa, 2019).

Case Example: Within the Nigerian context, the material distinction is stark. University convocation brochures, symbolic artefacts of academic achievement and social mobility, are meticulously produced on imported gloss-coated art paper and hoarded as keepsakes. Conversely, student union flyers on low-GSM bond paper are treated as ephemera and discarded immediately. This hierarchy was observed at the University of Lagos (UNILAG) 2024 Convocation ceremonies**.** The formal brochure, printed on high-gloss, heavyweight paper, was treated as a commemorative object. In contrast, flyers for student events on campus, printed on thin, uncoated bond paper, were routinely discarded. This contrast reveals how substrate choices encode not just functional but symbolic value systems in Nigerian print culture (Field notes, Lagos, January 2024).

The Persistence of Indigenous Substrate Cultures
Despite the dominance of imported papers, traditional substrates (e.g., *Adire* cloth, raffia, leather) remain highly relevant in artistic and ceremonial contexts. During a workshop observation in Abeokuta on 12 May 2024, a veteran adire artisan explained the concept of the cloth as a "living surface" (Yoruba: *aṣọ alààyè*), emphasising that the substrate 'remembers' each stage of the resist-dyeing process, thereby embodying a narrative in its finished pattern. Unlike disposable newsprint, these substrates are valued for their durability and role in the continuity of heritage (Adepoju, 2020). This finding highlights a material duality within Nigeria; while the commercial print economy thrives on disposability, indigenous craft economies emphasise endurance and cultural transmission.

The Paradox of Plastic: Affordability vs. Ecological Cost
This study identifies a central paradox in Nigeria's print ecosystem: the substrates that are most critical for economic accessibility, particularly polyethene sachets and flex banners, are also the most environmentally damaging. The non-biodegradable nature of waste from these materials constitutes a significant portion of urban waste, clogging drains and contributing to flooding (Onyido, Adeleke, & Chukwuma, 2018). Paradoxically, the very properties that make these materials an environmental problem, their low cost, durability, and water resistance, also make them the only viable option for small businesses and advertisers operating in a high-volume, low-margin economy. This creates a vicious cycle: the most affordable and accessible substrates for marketers impose the highest long-term social and ecological costs on the local communities that must manage the waste.

Audience Perception and Material Literacy
Finally, audience reception of the substrate shows a significant gap in material literacy. Surveys conducted in design classes with students at Yaba College of Technology indicated a prevalent tendency to equate "good design" with a "shiny finish" (e.g., gloss lamination, foil stamping), prioritising surface effect over typographic nuance, compositional layout, or cultural resonance. This suggests that a substrate's superficial properties can often eclipse fundamental design craft in shaping audience judgments. This finding aligns with more recent scholarship on critical making and material awareness (Rosner, 2018), which argues that a focus on surface aesthetics without understanding material provenance or impact is a key challenge in contemporary design culture.

Taken together, these findings reveal a layered ecosystem of substrates in Nigerian print culture that indicate the following:

I. Structural factors (import dependence, tariffs, exchange rates) constrain material choice.
II. Semiotic dynamics encode prestige or disposability through substrate.
III. **Indigenous practices demonstrate that materials can be used differently,** prioritising cultural preservation and longevity.
IV. Practitioner negotiations embody adaptive pragmatism.
V. Environmental challenges complicate the ethics of substrate reliance.
VI. Audience literacies shape reception more than designers often assume.

This synthesis positions substrates not merely as technical supports but as cultural actors mediating Nigeria's unique design economy.

Discussion
The findings confirm the central proposition of this study: substrates in Nigerian print culture are not passive supports but **active agents** that shape design outcomes, cultural meanings, and audience perceptions. This section interprets the six themes through the dual theoretical lenses of material culture and semiotics, situating them within broader debates on global dependency, local agency, sustainability, and education.

Substrates as More Than Technical Support
The findings reinforce that substrate cannot be reduced to technical specifications such as grammage or opacity. Instead, they are **constitutive elements of meaning-making**. In Lagos and Aba, the availability of substrates determines whether designs materialise as multicoloured, foil-embellished cartons or downgraded brown-box prints. In Abeokuta, the porosity of cotton cloth enabled resist-dye patterns that embodied cultural narratives. Material culture theory (Miller, 2005) frames these practices as evidence that objects possess "social lives." Substrates, whether gloss-coated art paper or *adire* cloth, carry embedded meanings that influence how print products are valued, consumed, and remembered.

Negotiating Between Global Dependence and Local Agency
Nigeria's heavy reliance on imported substrates situates its print industry within volatile global supply chains. Currency instability, tariffs, and shipping delays directly shape what designers can produce. However, as the findings reveal, local agency emerges through improvisation.

Practices such as the "Aba Special" (laminated duplex boards; see Fig.2A & 2B) or the "Shomolu Save" (reducing colour separations; see Fig.6A & 6B) exemplify what Radjou and Prabhu (2015) describe as frugal innovation**.** These are not merely coping strategies but creative adaptations that generate distinctive Nigerian aesthetics. For instance, varnish and metallic inks used to mimic foil stamping produce visual textures that, over time, may become recognised stylistic markers of Nigerian packaging.

This negotiation between dependence and agency reflects a broader postcolonial dynamic. While the substrate economy remains tethered to global imports, local practitioners reassert creative control by bending available materials to their purposes. The result is a hybrid design culture in which scarcity catalyses innovation rather than suppressing it.

Substrates as Semiotic and Symbolic Media
The semiotic analysis underscores that substrates function as symbols of value, status, and legitimacy**.** In Nigeria, gloss-coated paper does not simply improve print quality; it indexes prestige. Newsprint, by contrast, encodes temporality and disposability.

Examples such as convocation brochures versus student flyers illustrate how substrate choice embodies social hierarchies. The former, printed on imported gloss, is preserved as a commemorative artefact, while the latter, on cheap bond, is discarded within hours. This symbolic economy resonates with Barthes' (1977) argument that surfaces are sign systems that mediate social meaning.

The same logic applies to institutional authority. Government certificates on secure substrates (watermarked paper or PVC) derive credibility not only from textual content but from material resistance to forgery. Here, the substrate itself guarantees legitimacy. Such cases highlight how the semiotics of substrate extend beyond aesthetics into trust, authority, and memory.

Environmental Contradictions of Modern Substrates
Perhaps the most urgent implication of the findings lies in sustainability. The Nigerian print industry's reliance on polyethene sachets, PVC banners, and other non-biodegradable substrates creates significant ecological burdens. Drainage blockages, urban flooding, and mounting landfill waste are the material consequences of affordable substrate choices.

This paradox, where the cheapest and most accessible substrates impose the highest ecological costs, echoes global critiques of unsustainable design economies (Irwin, 2015). However, in Nigeria, the stakes are higher: low-income consumers depend on sachet packaging for affordability, while small-scale printers rely on PVC banners for profitability.

The juxtaposition of *adire*'s enduring cotton cloth with the disposability of sachet plastic illustrates this contradiction vividly. One material transmits heritage across generations; the other persists as waste with no cultural value yet. Addressing this paradox requires investment in sustainable local alternatives, such as:

- Paper pulp from agricultural waste (sugarcane bagasse, rice husks, banana stems).
- Cassava-starch bioplastics for sachet packaging.
- Locally sourced cotton substrates for hybrid print applications.

Such innovations could mitigate environmental damage while embedding print culture within Nigeria's own material resources.

Material Literacy and Audience Perception

The finding that students and consumers equate gloss and shine with design excellence reveals a critical gap in material literacy. This misrecognition not only reinforces the semiotic economy of prestige but also perpetuates unsustainable practices. Rosner (2018) argues that "critical making" requires awareness of material provenance and impact. Applied to Nigerian design education, this suggests curricula must expand beyond software proficiency to include teaching on substrates**.** Future designers should be trained to evaluate substrates in terms of sustainability, cultural resonance, and symbolic meaning, not just surface effect.

Such education could shift consumer perceptions as well. By teaching audiences to value durability, provenance, and ecological responsibility, Nigerian design culture can move beyond the fetishisation of gloss. This, in turn, could stimulate demand for sustainable alternatives and create a feedback loop that reshapes the substrate economy.

Conclusion

This study has examined the role of substrates in Nigerian print and design culture, arguing that they are not neutral carriers but active canvases that shape creative outcomes (design choices), cultural meanings, and social/audience perceptions.

Drawing on material culture theory and semiotics, and supported by archival records, case studies, and practitioner interviews, the research demonstrates that the material surface is central to how design is produced, consumed, and remembered in Nigeria.

The findings revealed a layered material economy where imported papers and plastics coexist with indigenous substrates such as cloth, raffia, and bark. This hybrid nature reflects both Nigeria's dependency on global supply chains and its resilience through local adaptation and improvisation.

Contributions to Knowledge

Theoretically, the research advances material culture and semiotic perspectives by situating substrates within Nigeria's specific socio-economic realities. Substrates here not only bear ink but also actively communicate social hierarchies, cultural values, and institutional legitimacy.
This is demonstrated through several key findings:

I. **Social Hierarchies:** The choice of substrate instantly signals status. For instance, the example in the findings earlier stated that a university convocation brochure printed on imported glossy paper was treasured as a keepsake, symbolising the elite achievement of higher education. In stark contrast, student union flyers on low-grade newsprint were discarded immediately, marking the information and its readers as temporary and ordinary.

II. **Cultural Values:** Indigenous substrates embody core cultural principles. The use of handwoven, durable *adire* cloth for ceremonial attire communicates values of heritage,

patience, status and authenticity. Its materiality stands in direct opposition to the disposability of mass-produced synthetic substrates, representing a cultural value of endurance and memory.

III. **Institutional Legitimacy:** Substrates are used to confer authority and trust. Official government documents or bank certificates printed on secure, high-quality substrates with watermarks or holograms (e.g., PVC for national ID cards) are designed to be hard to replicate. This material complexity grants them institutional legitimacy and public trust, whereas a photocopy on plain paper would be immediately dismissed as unofficial.

Empirically, case studies of Nigerian print practitioners show how material scarcity and consumer preference influence creative decisions (Fig.6A & 6B above), confirming that the substrate is as much a design tool as typography, colour, or layout.

Implications for Education

The findings underscore the urgent need to embed substrate literacy in Nigerian design education. Current curricula prioritise digital software and visual composition, often neglecting the material foundations of print. By incorporating critical pedagogy on substrates, covering provenance, sustainability, functionality and cultural significance, design schools can cultivate practitioners who evaluate materials not only for surface effect, such as costs, but also for ecological and social implications. This shift could foster a generation of designers equipped to innovate responsibly in a rapidly changing material economy.

Implications for Policy and Industry

Policy interventions are vital to address Nigeria's structural dependence on imported substrates and the ecological burdens of plastics. The following priorities are recommended:

a) **Paper from Agricultural Waste (Local Production):** Investment in mills that process agricultural waste (e.g., sugarcane bagasse, rice husks, banana stems) into paper pulp, turning abundant post-harvest waste into a valuable resource and reducing burning practices that contribute to air pollution.
b) **Sustainable Alternatives (Bio-Based Plastics):** Research and scaling of cassava-starch bioplastics to replace polyethene sachets. This could provide a biodegradable alternative to polyethene films, directly tackling the sachet waste problem while supporting cassava farmers.
c) **Regulation:** Gradual restrictions on single-use plastics in packaging and outdoor advertising.
d) **Local Textile Reinforcement:** Empowering the local cotton industry to produce specialised substrates for print and packaging, reducing the need for imported textiles and creating an integrated supply chain from farm to designer.
e) **Incentives:** Tax breaks or subsidies for firms adopting eco-friendly substrates.

Such measures would reduce environmental damage, create green jobs, and strengthen Nigeria's creative economy by stabilising material supply chains. For the industry, embracing sustainable substrates would enhance competitiveness, especially as global markets increasingly demand eco-conscious practices.

Implications for Practice

For practitioners, the study highlights that substrate choices are communicative acts**.** Whether selecting gloss-coated paper for prestige, recycled board for affordability, or indigenous cloth for heritage, designers signal value systems that audiences interpret materially. Recognising substrates as semiotic agents can sharpen professional judgment and encourage innovation.

Moreover, documenting adaptive strategies in Lagos and Aba reveals that improvisation is not a compromise but a creative practice in its own right. By formalising these techniques within professional discourse, Nigerian practitioners can elevate local ingenuity from necessity to recognised expertise.

Forward-Looking

The future of Nigerian print and design culture depends on how substrates are understood, sourced, and taught. If current dependence on imported papers and plastics persists, the sector will remain vulnerable to global volatility and ecological crisis. However, by cultivating substrate literacy, investing in local material innovation, and valuing indigenous practices, Nigeria can transform its material economy into a site of resilience and leadership. To regard the substrate as a canvas is to acknowledge its agency in shaping design futures. Substrates are not merely surfaces upon which ideas are printed; they are cultural and ecological actors whose meanings extend far beyond the pressroom. The challenge and opportunity for Nigerian design is to harness this material agency toward creativity, sustainability, and cultural continuity.

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