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Examination of the Impact of Large-Format Printing on Graphic Design Practice in 21st Century Nigeria

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Abstract. *The emergence of Large-Format Printing (LFP) technology has transformed global visual communication by enabling the production of large-scale, high-quality printed materials, significantly influencing Nigeria's graphic design industry. This study aims to examine the impact of LFP on graphic design practice (GDP) in 21st-century Nigeria and propose strategies for sustainable development while addressing emerging challenges. A mixed-method approach was employed, with a primary qualitative focus through interviews and participant observation, supported by quantitative data collected using a Likert-scale questionnaire to assess designers' perceptions of LFP's influence. The findings reveal a dual impact. On the positive side, LFP has enhanced design scale, print quality, creative flexibility, and production efficiency, effectively overcoming the limitations of earlier methods such as letterpress printing, manual clamp offset printing, and hand-painted signboards. However, several challenges persist, including the oversaturation of practitioners, increased design piracy, and issues of color inconsistency, which undermine quality outcomes. These challenges highlight gaps in professional standards and regulation within the industry. The study concludes that while LFP has driven innovation and growth in Nigeria's graphic design sector, its optimal benefits are constrained by the proliferation of unaccredited freelance designers. Therefore, the study recommends the implementation of targeted training programs and stricter professional accreditation systems through relevant regulatory bodies to ensure sustainable development and maximize the transformative potential of LFP technology.*

Keywords: *21st-Century Nigeria; Digital Printing Technology; Graphic Design Practice; Impact Printing Technology; Large-Format Printing.*

1. INTRODUCTION

The evolution of printing technology can be traced back to Johannes Gutenberg's movable type in the 15th century, an innovation that fundamentally improved the flow of information across Europe (Eisenstein, 2005). However, it was not until the 19th century that a series of innovations, such as the development of the rotary press, enabled true mass communication through unprecedented printing speeds and high-quality production (Standage, 2009, and Mussell, 2013). Building on this foundation, the digital revolution of the late 20th century spurred profound transformations across numerous industries (Castells, 2010), leading to a radical restructuring of the publishing and design sectors. Scholarly research (Meggs and Purvis, 2016) documented this period as a fundamental paradigm shift from mechanical production to digital creation. Emergence of Large Format Printing (LFP) in 21st-century Nigeria is an essential aspect of this modern innovation.

Before the dawn of the 21st century, graphic design and print production in Nigeria were characterized by ingenuity within significant technological constraints. The industry was dominated by letterpress and manual clamp offset printing for small-format designs such as books, magazines, brochures, and posters (Shawon, 2022). For large-scale productions like signboards, shop-front advertisements, and vehicle branding, the industry relied almost

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exclusively on stenciling and hand-painting techniques (Plate 1). *Roadside artists*, practitioners trained through apprenticeship, painstakingly translated small-scale concepts onto vast canvases, such as building walls and lorry bodies (Plate 2). While this process promoted a unique local aesthetic, it was incredibly time-consuming, susceptible to human error (Xing, 2024), and limited in its ability to accurately reproduce complex colour gradients, fine typography, and photographic images.

Globally, the birth of digital large-format printing can be traced back to the early 1990s, when digital fine art photography became a viable capability through machines like the Iris Graphics Model 3047 inkjet printer (Gobin's Inc, 2023). In the 21st century, graphic design practice has undergone a full-scale metamorphosis orchestrated by the relentless pace of digital technological advancement (Armstrong, 2009). As a dynamic and complex field that combines creativity, technology, and strategic thinking to create visual communication (Barnard, 2013), graphic design has expanded significantly through LFP. This technology has fundamentally broadened the designer's canvas, moving from standard small-scale, two-dimensional paper pages to dynamic and enormous print production that encompasses interior graphic information in three-dimensional space (Plate 3).

The introduction of LFP in Nigeria followed the adoption of Direct Imaging (DI) offset printing technology, pioneered by Planet Press Ltd in 2001 (Abiodun, 2016; Afolabi, 2020; Kalilu and Abiodun, 2023). This marked the beginning of widespread accessibility to digital printing, allowing designers to print directly from digital files onto various substrates, including rigid, textile, and flexible materials via inkjet machines (Soyang, n.d; Sharma and Rong, 2014). Flexible substrates, such as flex and various Self-Adhesive Vinyls (SAV) like Cast, Calendered, and Perforated Vinyl (Plates 4 and 5), became the most engaged materials in the country. This technological shift is evident in the proliferation of gigantic highway billboards such as uni-pole displays (Plates 6 and 7), overhead pedestal bridge banners (Plate 8), roadside hang-up and stand-alone banners (Plates 9 and 10) and vinyl vehicle branding (Plate 11), all of which have fundamentally reshaped the visual culture of urban Nigeria by making advertisements more competitive and visually appealing.

Despite the fact that LFP now occupies an enormous portion of graphic design print media production in Nigeria, this transformative shift has attracted little academic scrutiny (Oladumiye, 2014; Fatuyi and Adetoro, 2016). The transition from analogue to digital large-format production has radically altered the basis of graphic design practice, changing what designers create and how they create it, while presenting both unique opportunities and significant challenges. Currently, these impacts have not been systematically gathered,

analyzed, or documented. To bridge this scholarly gap, this study explores the impact of LFP on graphic design practice in 21st-century Nigeria. By examining the perceptions and experiences of graphic designers and LFP press operators, the research aims to unveil the prevailing effects of this technology and propose measures for industry sustainability and the mitigation of its associated challenges.

Figure 1. Hand-Painted Signboard.

The Guardian, 2017, retrieved on July 4, 2025

https://guardian.ng/property/firm-lasura-disagree-over-alleged-unlawful-land-possession

Figure 2. Graphics on lorry body, Lagos-Ibadan expressway, Lagos.

Photograph by Abiodun Akintola, 2025

Figure 3. Interior graphics information.
Screenshot from Digital Reality Prints Limited website, October 12, 2025
https://www.digitalrealityprintlimited.com/services/large-format/portfolio

Figure 4. Rolls of Flexible Printing Substrates, Somolu, Lagos.
Photograph by Abiodun Akintola, 2025

Figure 5. Perforate vinyl (Window graphics), Somolu, Lagos.
Photograph by Abiodun Akintola, 2025

Figure 6. Unipole Portrait Billboard, Berger, Lagos.
Photograph by Abiodun Akintola, 2025

Figure 7. Unipole Landscape Billboard, Berger, Lagos.
Photograph by Abiodun Akintola, 2025

Figure 8. Overhead Pedestal Bridge Billboard, Berger-Ojota Road, Lagos
Photograph by Abiodun Akintola, 2025

Figure 9. Banner for Product Advert. Berger-Ojota road, Lagos.
Photograph by Abiodun Akintola, 2025

Figure 10. Banner for Political Campaign, Oshodi-Mile 2 road, Lagos.
Photograph by Abiodun Akintola, 2025

Figure 11. Vehicle Branding for Product Advert, Somolu, Lagos.
Photograph by Abiodun Akintola, 2025

2. LITERATURE REVIEW

This literature review synthesizes scholarly perspectives on the evolution of Nigeria's printing industry, navigating the transition from traditional mechanical processes to digital innovation. The discourse begins by analyzing the disruptive tension between legacy offset systems and emerging digital formats. It further explores how technology serves as a bridge for cultural preservation and professional revitalization in the Nigerian context. Finally, the review addresses the systemic infrastructural barriers, such as erratic power and high costs of production material, that hinder global competitiveness, while highlighting the expanding role of graphic designers in industrial innovations, particularly for product packaging and promotion.

Ayodele (2025) investigates the strategic intersection of graphic communication and product preservation in Nigeria's agricultural sector. The study emphasises that graphic designers serve a dual purpose: enhancing consumer appeal through vibrant aesthetics and extending shelf life through the integration of intelligent packaging indicators. The author argues that effective typography and colour psychology are essential for communicating *freshness* in the Nigerian graphic industry. However, the research notes that high production costs for specialised materials often limit these innovations to high-end exports. Ayodele concludes that designers must prioritise sustainable, locally sourced packaging materials to bolster Nigeria's food security and local product competitiveness.

Adeyeye *et al.* (2010), in their study on the effects of emerging digital technologies in South West Nigeria, establish that large-format digital output has overtaken the majority of graphic print production. They argue that this shift has unfavorably affected the production growth of traditional offset printing by capturing volumes related to short runs, print-on-demand, and personalisation. The authors contend that large-format printing is a parallel process that may drastically drain the patronage of offset printing in the coming years.

While Adeyeye *et al.* (2010) focus on the economic displacement caused by digital technology, Ibiwoye and Ilesanmi (2020) provide a contrasting view. Their publication on digital printing technology examines how these advancements have influenced screen printing. They identify large-format tools as a prevalent adoption in the 21st-century Nigerian industry that has actually promoted the graphic arts profession by drawing more client patronage and increasing apprenticeship engagement.

Beyond professional revitalization, the integration of new technology also plays a crucial role in cultural continuity. Adam (2022) examines the historical evolution of the printing industry in Kano, arguing that offset lithography enabled the mass reproduction of

manuscripts that retained traditional calligraphic aesthetics. This technology empowered Hausa and Yoruba entrepreneurs to facilitate a unique "do-it-yourself" print culture. Adam concludes that this was not a rejection of tradition, but a strategic adaptation that expanded the reach of Northern Nigerian manuscript culture.

However, the strategic adaptation of technology identified by Adam (2022) is often undermined by broader production factors. Ifeduba (2018) utilizes a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis anchored in technological determinism to evaluate the sustainability of Nigeria's printing sector. While local firms successfully apply digital technology, Ifeduba reveals a troubling reliance on foreign outsourcing. Major infrastructural weaknesses, such as erratic power supply and a lack of e-publishing expertise, hinder global competitiveness and limit participation in international transactions.

Despite the infrastructural barriers noted by Ifeduba (2018), the industry continues to find new functional frontiers. Ayodele (2025) investigates the intersection of graphic communication and agricultural preservation. The study reveals that design elements like colour and typography are fundamental to establishing consumer trust in the fruit packaging industry. Ayodele concludes that establishing design-informed standards is essential for driving agro-industrial innovation, enhancing export readiness, and ensuring food safety in Nigeria's fruit sector.

From the foregoing and a review of the existing academic literature materials, a pronounced and significant gap in the Nigerian context is evident. There is a stark absence of focused academic inquiry into how LFP has specifically impacted graphic design practice in Nigeria. For this reason, this study aims to fill this critical gap by conducting a thorough examination of the prevailing impact of LFP on graphic design practice in 21st-century Nigeria.

3. METHODOLOGY

This study employed a mixed-methods research design to ensure a comprehensive investigation. Data collection involved qualitative approaches of structured oral interviews and participant observation to gather detailed insights into the experiences and perceptions of graphic designers on the subject matter. This qualitative foundation was supported by quantitative components, which provided numerical data on the prevalent impact identified.

The population for this study comprises all professionals who are actively engaged in graphic design and printing production. A purposive sampling technique was employed to ensure the selection of key informants who included graphic designers and LFP press operators, conducted in fifteen (15) typical graphic design and LFP shops in Somolu, Lagos, Nigeria. The

quantitative phase involved distribution of 25 Likert Scale questionnaires across the printing shops, indicating a total number of 375 questionnaires; among which 320 were completed and returned, yielding a high response rate of 85.3%. For the qualitative phase, seventy-five (75) respondents were engaged, five (5) from each shop, representing 20% of the total number of the distributed Likert-scale questionnaires.

Primary data collection was carried out through oral interviews, participant observation, and distribution of a Likert-scale questionnaire to enhance the validity of the research findings. Qualitative data were gathered through structured oral interviews and participant observation during the printing process in the shops. The interviews were recorded and transcribed by content analysis. Participant observation sessions were at the graphic design / LFP shops, providing contextual insights into operational workflows and technical practices in relation to quality print production, creativity, and efficiency. Complementing the qualitative methods, a Likert-scale questionnaire was administered to freelance graphic designers and LFP press operators to quantitatively measure their attitudes towards LFP's impact on graphic design practice. The questionnaire featured statements rated on a five-point scale, allowing for the statistical measurement of the prevalent experiences. Secondary data were obtained from published literature materials such as books, journals, and theses that include hard and electronic copies from the libraries.

Data analysis involves a dual approach to accommodate both types of data collected. The qualitative data derived from interviews and observations were subjected to analysis of quality, creativity, and efficiency. Upon this, ten (10) questionnaire statements were formulated for qualitative data collection. The number of questions was limited to 10 to facilitate in-depth data analysis. Statistical analysis of the quantitative data from the 320 returned questionnaires was performed by SPSS version 22, using descriptive statistics, including frequency distributions, percentages, means, and standard deviations. These statistical measures summarised the overall trends and consensus levels among the respondents' experiences, providing a clear numerical representation of the industry's perspectives on the impact of LFP on graphic design practice in Nigeria.

4. RESULT PRESENTATION AND DISCUSSION OF FINDINGS

The findings from this study present a double-fold account of the impact of Large Format Printing (LFP) on Nigeria's graphic design industry. This discussion interprets the results of the findings, contextualising them within the broader framework of technological adoption in a developing environment and explaining the double nature of LFP as a means of

professional development and a source of significant challenges for graphic design practice in Nigeria (Table 1).

Table 1. Impact of Large Format Printing (LFP) on Graphic Design Practice in Nigeria (n=320)**.**

#	PERCEIVED IMPACT	SD (%)	D (%)	N (%)	A (%)	SA (%)	Net Agree (%)	Mean	Std Dev
1	LFP ability to produce larger-than-life billboards has greatly enhanced the impact of graphics advertising campaigns.	1.3	2.5	7.2	50.3	38.8	89.1	4.23	0.83
2	LFP technology has significantly improved the overall quality of printed graphics.	1.6	3.4	8.4	45.3	41.3	86.6	4.21	0.85
3	LFP allows for a wider and more vibrant range of colours, increasing creative freedom for designers.	1.9	3.4	9.7	45.0	40.0	85.0	4.18	0.89
4	The option to produce low-cost proof prints before a full production run has reduced errors and material waste.	1.6	3.8	10.0	42.8	41.9	84.7	4.19	0.89
5	Vehicle branding by LFP has created a valuable new avenue for graphic advertisement.	1.9	3.8	11.6	37.5	45.3	82.8	4.20	0.92
6	LFP is an impactful instrument of creative and attractive product branding.	3.4	5.9	15.3	31.3	44.1	75.4	4.07	1.03
7	Mastering the technical requirements of LFP has made graphic designers more skilled and valuable in graphic industry.	4.7	7.2	16.9	30.0	41.3	71.3	3.96	1.09
8	Digitalisation of LFP does not lead to oversaturation of graphic practice.	33.4	27.5	15.6	9.7	13.8	23.5	2.43	1.24
9	Managing colour consistency across different LFP substrates (e.g., vinyl, canvas) is not a significant technical challenge.	29.7	26.3	17.2	10.6	16.3	26.9	2.58	1.24
10	Proliferation of LFP shops does not encourage graphic design piracy.	31.3	28.1	16.3	10.3	14.1	24.4	2.48	1.22

Notes: SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree. Net Agree = A+SA. Mean calculated on a 1-5 scale (SD=1, SA=5). n=320 (Total number of Likert Scale questionnaire's respondents)

The first and most significant impact of LFP on GDP from the field investigation is the production of larger-than-life billboards (Plates 6-8). Data analysis indicates a Net Agree of 89.1%, a Mean of 4.23, and a Standard deviation of 0.83. The exceptionally high mean and low standard deviation indicate an impactful, industry-wide consensus. LFP has fundamentally revolutionised the scale of graphic design communication in Nigeria. By enabling the production of flawless, gigantic billboards, the printing process has transitioned outdoor advertising from a manual, hand-crafted effort to a high-impact digital expression. The low

Standard deviation (SD) proves that, regardless of the designer's position, the billboard impact is the most universally recognised benefit of LFP.

An improvement in the overall print quality of graphic design production is another cogent impact of LFP on GDP. The data indicates respondents' Net Agree of 86.6%, a Mean of 4.21, and a Standard deviation of 0.85. The high mean suggests that LFP has effectively standardised excellence in the Nigerian graphic design print production. The quality defined by sharp colour intensity, photographic detail, and durability has become a baseline expectation in the graphic industry. The data suggests that LFP has closed up the gap between international design print standards and local production, allowing Nigerian graphic designers to produce deliverable print media graphics that are competitive on a global level.

Creative freedom through vibrant colour usage is also recognised as a major impact of LFP on GDP in 21st-century Nigeria. It sums up to a Net Agree of 85.0%, a Mean of 4.18, and a Standard deviation of 0.89. Colour is the primary language of the designer. With 85% of respondents in agreement, it is clear that LFP's advanced ink sets and digital distributions have liberated graphic design practitioners from the colour usage limitations of the previous centuries. This helps the designers with the technical freedom to creatively use adequate colour sets without reservation for perfect colour registration during the printing process to match their digital intentions with physical reality.

Availability of low-cost proofing via LFP has greatly impacted GDP by reducing or eliminating avoidable printing errors. This impact recorded a Net Agree of 84.7%, a Mean of 4.19, and a Standard deviation of 0.89. This highlights the economic sustainability LFP brings to graphic design practice. The high mean score indicates that the designers heavily rely on LFP's ability to produce proofs to check for typographical and colour shifts appropriately. This has institutionalised a culture of precision, protecting designers from the high financial loss associated with large-scale print production.

Similarly, vehicle branding and three-dimensional wrapping (Plate 11) is allotted with a Net Agree of 82.8%, a Mean of 4.20, and a Standard deviation of 0.92. This indicates that LFP has literally moved the graphic design exhibition into the open space of the Nigerian streets. The transition from static signboards information dissemination to mobile billboard advertisement via conformable vinyl is recognized and most welcome by a vast majority of the targeted audience. The slightly higher standard deviation (0.92) compared to billboard impact suggests that while this is a new major revenue source for designers, its success is more dependent on the specific technical skill of the creative designers handling the three-dimensional automotive contours, fixing the printed design vinyl on the vehicle.

Large format printing impact of creative product branding earned a Net Agree of 75.4%, a Mean of 4.07, and a Standard deviation of 1.03. This data reflects LFP's role in creating brands for various product items through vinyl graphic design stickers. The Standard deviation crossing the 1.00 threshold indicates that the experiences vary among the designers; while many use LFP for product branding, the level of creativity and attractiveness of the output often depends on the ability of the professionals to manipulate the stickers around various products' shapes and materials, such as glass, metal, can, nylon (Plates).

Skills and value added to graphic designers' technical mastery of digital print production is another major impact on GDP in 21st-century Nigeria. It revealed a Net Agree of 71.3%, a Mean of 3.96, and a standard deviation of 1.09 from the respondents. The data suggests that LFP has professionalised the industry. Over 70% of respondents feel more valuable due to their technical knowledge gained by using the LFP production process. However, the high SD (1.09) shows a divergence in opinion, meaning that some designers see themselves as creative directors regardless of involvement in LFP production, while others recognise that production knowledge is now a vital part of their professionalism.

However, in spite of all the beneficial impacts, there are challenges embedded in LFP, among which is the oversaturation of graphic design practice. This recorded a Net Agree of 23.5%, a Mean of 2.43, and a standard deviation of 1.24. As a reverse-logic impact, the low mean confirms that respondents believe the graphic design practice is heavily oversaturated. The high standard deviation (1.24) indicates a fractured practice experience; the designers in mega cities such as Lagos feel this pressure more severely. This saturation leads to quack-practice and price-cutting in GDP, which devalues professional expertise.

Technical difficulty in colour consistency across various LFP substrates is another major challenge. This earned a Net Agree of 26.9%, a Mean of 2.58, and a Standard deviation of 1.24 from the respondents. This identifies the primary technical challenge. Because only 26.9% agree that consistency is not a challenge, it means 73.1% view it as a major problem. The high standard deviation shows that while a few designers might have mastered colour management through ICC profiles and the use of Pantone colour guide, the majority of the industry struggles to maintain specific brand colours across different materials, leading to inconsistent outputs.

Proliferation of design piracy is the final challenging impact from the data in the table; it achieved a Net Agree of 24.4%, a Mean of 2.48, and a Standard deviation of 1.22. The low mean reveals an ethical crisis. The accessibility of LFP by all and sundry has facilitated a copy-and-paste culture in the Nigerian graphics industry. The majority of the graphic designers'

respondents believe that the rise and unauthorised multiplication of LFP shops encourage piracy in the graphic design industry. This undermines the financial security of original creators of the designs and remains the most significant threat to the long-term professional health of graphic design practice in Nigeria.

5. CONCLUSIONS AND RECOMMENDATIONS

This study critically evaluates the impact of Large Format Printing (LFP) technology on graphic design practice in 21st-century Nigeria. Based on the analysis of the collected data from 320 respondents, the research concludes that LFP's impact is profoundly two-fold, acting as both a major enabler of professional development and a significant challenge to graphic practice dynamics and professional standards.

LFP technology has been overwhelmingly developmental and transformative for the Nigerian graphic design industry on a large scale, superior quality, creativity, and efficiency. It has successfully liberated designers from the limitations of analogue processes, enabling an avenue to express graphic design effectively on a large canvas. By LFP technology, there is a significant improvement in graphic design printing production quality. The technology also encourages freedom of colour usage, increasing the level of designers' creativity. Similarly, low-cost proof prints enabled error-free production efficiency. By the introduction of large format vehicle branding, a new avenue for graphic design expressions was discovered. LFP also created valuable new specialisations such as product branding. Finally, LFP contributes significantly to professional development, making the designers more skilled and technically proficient.

On the contrary, operational challenges evolve despite the capabilities of LFP to promote graphic design practice; the printing technology brought about oversaturation of untrained designers, gave room for graphic design piracy, and devaluation of consistent colour management across diverse substrates built by the professionals in the industry. This indicates that the full potential of LFP is still mediated by the Nigerian influence of the untrained designers. LFP technology has solved fundamental problems but introduced further challenges within the profession.

From the foregoing, it is recommended that the roles of trained and accredited graphic designers, whether by apprenticeship or formal education, should be clearly defined through expertise, and should act beyond competing on the price of printing production. This can be done by building high-value, quality graphic designs and print production skills in strategic branding, environmental graphics, and complex project management beyond what low-

standard designers can easily replicate. Graphic designers who own an LFP press should invest in Technical Mastery of the press. They need to develop deep expertise in colour management, substrate knowledge, and finishing techniques. This technical proficiency will ensure consistent, high-quality output that justifies premium pricing and builds customer trust. In the same vein, there is a need to educate customers by proactively communicating the value of professional designs and the use of quality materials. They need to sensitize their clients about the difference between a cheap print and a strategically effective, high-quality visual communication piece.

A professional organization, such as the Chartered Institute of Professional Printers of Nigeria (CIPPON), should actively take up its duty by properly and extensively regulating printing businesses, determining those who qualify as professional and registered printers. Also, the Advertising Regulatory Council of Nigeria (ARCON) should set and enforce specific standards to control the activities of the unregistered graphic designers in the country. As such, the National Orientation Agency (NOA) should mobilize public support for CIPPON and ARCON policies for the sustainable development of the graphics and printing industry in Nigeria.

Similarly, Government agencies and financial institutions should create targeted support programmes, such as grants or low-interest loans, for legitimate Small and Medium Scale Enterprises (SMEs) in the graphic design and printing industry to acquire and maintain high-quality equipment that can help to improve the standard of production. By adopting these recommendations, the Nigerian graphics and printing industry can navigate the current challenges and build a more sustainable, professional, and high-quality future, fully leveraging the incredible potential that LFP technology offers to graphic design practice in Nigeria.

REFERENCES

Abiodun, D. A. (2016). *Strengths and challenges of direct imaging and computer-to-plate offset printing technologies* [Unpublished M.Tech. thesis]. Ladoke Akintola University of Technology.

Adam, S. Y. (2022). Technology and local tradition: The making of the printing industry in Kano. In S. Reese (Ed.), *Manuscript and print in the Islamic tradition* (pp. 337–364). De Gruyter. https://doi.org/10.1515/9783110776485-011

Adeyeye, N. A., Ogunduyile, S. R., & Oladumiye, E. B. (2020). Effects of emerging digital technologies on the development of offset printing in South West Nigeria. *International Journal of Innovative Science and Research Technology, 5*(10), 735–743. https://doi.org/10.38124/IJISRT20SEP192

Afolabi, A. A. (2024). Digital printing in the Nigerian graphic arts industry: History, trends and prospects. *Fane-Fane International Multidisciplinary Journal, 8*(2).

Armstrong, H. (2009). *Graphic design theory: Readings from the field.* Princeton Architectural Press.

Ayodele, A. A. (2025). Designing for freshness: The role of graphic designers in Nigeria's fruit packaging industry. *Nigerian Journal of Agriculture and Agricultural Technology, 5*(3B), 138–147.

Barnard, M. (2013). *Graphic design as communication.* Routledge. https://doi.org/10.4324/9781315015385

Castells, M. (2010). *The rise of the network society: The information age: Economy, society, and culture.* Wiley-Blackwell.

Eisenstein, E. L. (2005). *The printing revolution in early modern Europe* (2nd ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511819230

Fatuyi, O. A., & Adetoro, S. A. (2016). A comparative study of manual and digital graphic design practices in Nigeria. *Journal of Art and Design Studies.*

Gobin's Inc. (2023). *A brief history of wide format printing.* Retrieved October 26, 2025, from https://gobins.com/post/a-brief-history-of-wide-format-printing

Ibiwoye, T. I., & Ilesanmi, A. B. (2020). Influence of digital technology on printing technology: A survey of screen printing in Akure, Ondo State, Nigeria. *European Journal of Computer Science and Information Technology, 18*(3), 20–30.

Ifeduba, E. (2018). Sustaining Nigeria's printing industry with digital publishing innovations: A SWOT analysis. *Journal of Print and Media Technology Research, 7*(2), 95–106.

Kalilu, R. O. R., & Abiodun, D. A. (2023). An analysis of the strengths and challenges of direct imaging and computer-to-plate offset printing technologies: The Nigerian experience. *Art and Design, 2*(22), 40–52. https://doi.org/10.30857/2617-0272.2023.2.4

Meggs, P. B., & Purvis, A. W. (2016). *Meggs' history of graphic design.* John Wiley & Sons.

Mussell, J. (2013). *The nineteenth-century press in the digital age.* Palgrave Macmillan. https://doi.org/10.1057/9780230365469

Oladumiye, E. B. (2014). Graphic design practice in Nigeria: A historical perspective. *Journal of Arts and Design.*

Sharma, A., & Rong, X. (2014). Establishing standards for color and print quality in large format inkjet printing. *Journal of Imaging Science and Technology, 58*(3), 030504. https://doi.org/10.2352/J.ImagingSci.Technol.2014.58.3.030504

Shawon, M. F. K. (2022). Prospects and challenges of offset printing industry from the viewpoint of graphic designers in Bangladesh. *Graphic Design Journal, 1*(1), 6. https://doi.org/10.63771/GDJ0201.011

Soyang UK. (n.d.). *Large format digital printing materials: A complete guide.* Retrieved October 27, 2025, from https://soyang.co.uk/large-format-digital-printing-materials/

Standage, T. (2009). *The Victorian internet: The remarkable story of the telegraph and the nineteenth century's online pioneers.* Walker & Company.

Xing, X. (2024). Handmade trend: Dual pursuit of personality and emotion. In *Proceedings of the 4th International Conference on Art and Design: Inheritance and Innovation (ADII 2024)* (pp. 30–35). *Innovation Humanities and Social Sciences Research, 18.*