

# **Digital Printing in the Nigerian Graphic Arts Industry: History, Trends and Prospects**

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## **Abstract**

Since the advent of printing, consumer demand has consistently driven printing technological developments. Over time, the industry has transitioned from traditional letterpress methods to advanced digital printing technologies, with these shifts often seen by scholars as disruptive transformations. Digital printing, in particular, is widely recognized as a crucial innovation for repositioning the printing industry to thrive in a multimedia-driven era. However, while the potential of digital printing is well-documented, a notable research gap exists. Specifically, this gap concerns the challenges and strategies required for its adoption and integration within the Nigerian context. This exploratory study addresses this gap by employing document analysis to examine the growth of digital printing in Nigeria and assess its potential to transform and sustain the country's graphic arts sector in the face of multimedia advancements. The findings reveal two key insights: first, digital printing has significantly impacted the Nigerian print industry, offering opportunities for personalized content creation and value-added services. Second, the adoption of digital printing faces persistent barriers, including cultural resistance, limited financial resources, and inadequate technological infrastructure. Lastly, despite efforts such as promotional campaigns and corporate initiatives aimed at fostering adoption by stakeholders, government support remains minimal. The study recommends further research to address these challenges, with a specific focus on exploring government intervention strategies to improve technological infrastructure and enhance the widespread use of digital printing in Nigeria. This research contributes fresh perspectives on the obstacles and strategies surrounding digital printing integration and sets a future agenda for its transformative potential within the nation's graphic arts sector.

**Keywords:** Digital printing; Innovation adoption; Graphic arts industry; Technological developments; Multimedia era

## **Introduction**

Ever since Bi Sheng invented the first movable system in China in 1040 and Johannes Gutenberg achieved its perfection around 1450, the printing industry has been the epicenter of technologically propelled developments. According to Eisenstein (1980), the invention of the printing press in the 1450s by Johannes Gutenberg transformed the world from a rudimentary society to an enlightened one through the introduction of a method of mass communication. Prior to the innovation of Gutenberg, copies of manuscripts were reproduced by hand, a process that was laborious, time-consuming, and prone to error, according to historical records. Gutenberg initiated the construction of his printing press in 1436 by repurposing a wine mill. In 1440, the timber press, which utilized letterpress technology, was finished.

Much has transpired since the inception of printing, with technological advancements being the primary driver of these developments, in line with consumer demands. As acknowledged by McQuail (2005), the advent of the printing press enabled the reproduction of text, which subsequently resulted in the formation of media institutions. The predominant printing process after the letterpress technology that Gutenberg made popular is offset printing technology. Recently digital printing also became a technology to reckon with in the printing industry. Romano (2008) documents that while offset printing still dominates in the printing industry digital printing is not lagging, citing a survey which reveals 81.3% of respondents agree that digital printing is growing faster than offset in terms of acquisition of systems and volume of work. For the printing industry, this is a radical transformation resulting from the inevitable digital transmutation of print. In essence, the adoption of digital technology

has therefore become a strategy for the profitable survival of the printing industry, not only in Nigeria but the world over. Embracing technology will surely put the printing industry on the path to a great future. While this step may be associated with difficulties, it presents limitless opportunities for the sustainable growth of the printing industry.

Digital printing is central to repositioning printers for survival in a multimedia age. It promises to bring about a change of processes and practices about how print is produced and offered for sale. Nonetheless, Webb and Romano (2010) argue that change should be in the manner of doing print business; not just about buying a new piece of equipment. They opine that change is about challenging assumptions, questioning conventional wisdom and comprehending media choices. The print industry, regrettably, is slow to change. The reason, Webb and Romano contend, is because of the huge amount of investment in heavy machinery and the required infrastructure to support them. The transition to digital printing by printers is a cultural change that may not come about seamlessly. For printing firms in Nigeria, the acceptance and diffusion of technological innovations and the associated new practices may prove to be difficult tasks. Despite the acknowledged potential of digital printing technology to revolutionize the printing industry (Rahmat et al., 2022), there is a knowledge gap on the specific challenges and strategies necessary for its adoption and successful integration in the Nigerian context. This knowledge gap hampers the industry's ability to leverage digital printing for growth and sustainable development in the multimedia age.

To fill the identified gap, this study examines the growth of digital printing technology in Nigeria and its potential for transforming and repositioning the nation's graphic arts sector for

sustainable growth and development in a multimedia age. To achieve this goal, the following research questions are posed: (i) What factors have influenced the development and adoption of digital printing technology in the print and graphic arts industry? (ii) What strategies are employed to promote the adoption of digital printing presses within the Nigerian printing industry?(iii) What role does digital printing play in transforming the print and graphic arts sector in Nigeria, and what are the implications of this transformation?

## **Theoretical Framework**

### ***Rogers' Diffusion of Innovation Theory***

Digital printing is an innovation whose adoption depends on how well its features and benefits are diffused among print producers and users. The process involved can be examined through the lens of Roger's Diffusion of Innovation Theory. Rogers(2003) describes diffusion as a special type of communication in which the messages are concerned with a new idea. He asserts that it is this newness of the idea in the message content of information that gives diffusion its special character. The newness means that some degree of uncertainty is involved. In more technical terms, Rogers defines diffusion as the process by which an innovation is communicated through certain channels over time among members of a social system.

Technological innovations are not always diffused and adopted rapidly, even when the innovation has obvious and proven advantages. Rogers highlights the four main elements in the diffusion of innovation to include: innovation, communication channels, time and social system. Innovation, as defined by Rogers, incorporates new ideas, practices, or objects perceived as novel by individuals or adopters, *Digital Printing in the Nigerian Graphic Arts Industry: History, Trends and Prospects*

generating uncertainty. Communication channels serve as conduits for disseminating information about innovations between those knowledgeable about them and those oblivious. While mass media channels effectively reach many, interpersonal channels are more persuasive at the individual level. Time plays a crucial role in diffusion, affecting the innovation-decision process, the timing of adoption, and the rate of adoption within a system. Rogers emphasizes the significance of social systems in diffusion, as they establish boundaries within which innovations spread, fostering joint problem-solving and common objectives among interconnected units.

## **Literature Review**

### ***An Overview of Technological Developments in the Print and Graphic Arts Industry in Nigeria***

The history of the Nigerian printing industry began with missionaries Hope Waddel and Samuel Edgerly establishing the first press in Calabar in 1846. The Hope Waddel Press concentrated on religious publications. In 1854, Rev. Henry Townsend expanded printing to the Western region, beginning a school of printing in Abeokuta and launching Nigeria's first newspaper, *IweIrohin*, five years later. By the late 1800s, Lagos alone possessed several printing presses, based on letterpress printing technology. The search for high-quality printing also drove publishers to invest in modern letterpress equipment, leading to improved services by 1910 (Afolabi,2015).

Colonial influence further influenced the industry, with the establishment of the first Government Printing House in Lagos in 1914. By 1933, the department had grown substantially, necessitating the enactment of a printing regulation law. Private individuals and

organizations also contributed to industry development, with businesses like Tika-Tore Press and CMS Press emerging in the early 1900s. In 1925, the Nigerian Printing and Publishing Company was established, signifying a significant milestone in the industry's history. The entrance of this company (publishers of the popular Daily Times) gave a new lease of life to the print industry with the introduction of mechanical composing machine (intertype) and other industrial printing equipment, such that by 1948, the first rotary printing press was imported into Nigeria (Afolabi, 2015). This marked the beginning of immense technological developments for the nation's print industry.

Letterpress held sway right till the 1970s when the print demands in Nigeria exceeded what letterpress could meet, leading to the introduction of offset lithographic presses. By the late 1990s, not a few printing companies had fully migrated from letterpress-based presses to offset lithographic presses. The introduction of computers in the late 1980s and early 1990s further propelled growth, leading to improved print quality and faster production based on lithographic technology. Using cut-and-paste techniques, graphic artists produced camera-ready artworks used for producing photosensitive lithographic plates for offset printing, thus making production faster and print quality far better than what was obtainable in the previous decades (Afolabi, 2015).

The introduction of desktop publishing cum computer graphics by Task Systems in 1987 paved the way for the digitalization of printing in Nigeria. While colour separation had started based on the analogue system around 1969-1970s, digital colour separation based on computer-to-film technology, was started in the mid-1990s by indigenous companies, followed by the emergence of computer-to-plate imaging technology in the late 1990s and early 2000s. A

more advanced technology which prints directly from the computer to the printing press, known as direct image (DI) press was introduced in 2001 by Planet Press in Lagos (Kalilu&Abiodun,2023). While these printing presses are digital in their operations, in the real technical sense, they are largely still based on the offset lithographic process. As Kipphan (2001) clarifies, digital printing is a distinct process of printing which produces a printed image from an original digital electronic file. In other words, while traditional printing technologies like letterpress/flexography, lithography, gravure, and screen-printing image/printwith a fixed image carrier, digital printing uses a dynamic imaging surface in the sense that an image is digitally generated for each impression of print. Through this variable imaging, it is possible to print each page differently from the other.

### **Methodology**

Using Bowen (2005) as a reference, this exploratory study seeks to provide insights into the emerging digital printing technology diffusion and practice in Nigeria. Notwithstanding the scarcity of research pertaining to the subject matter, this study fills the void by employing document analysis as its principal research approach. A wide range of documents are methodically assessed through document analysis, such as peer-reviewed papers, credible internet sources, books, monographs, and whitepapers (Bowen, 2009; Wimmer and Dominick, 2011; Blaxter, Hughes & Tight, 2010). Analyses of this nature categorize data based on themes, similar to the approach taken in content analysis (Bowen, 2009, citing Labuschagne, 2003). For meaningful interpretation, Ahmed (2010), citing Atkinson and Coffey (1997), stresses the

importance of situating document analysis within a theoretical framework.

## Findings

**RQ 1:** *What factors influenced the historical development and adoption of digital printing technology in the print and graphic arts industry?*

Technically speaking, digital printing is a method of printing from a digital-based image directly to a wide range of substrates or media such as paper, fabric, metal, wood, etc. It is classified as a printing reproduction process like lithography, letterpress, flexography, gravure and screen printing. The basis for the printing systems of digital presses is non-impact printing (NIP) technology. Printing presses that work on the NIP technologies operate without a fixed master. This means that, unlike traditional offset presses that use a permanent image carrier in the form of a printing plate to transfer the image to the substrate, digital printing presses do not have such carriers.

As revealed by Schroeder (2014), the birth of digital printing has been credited to the invention of the dot matrix printer by Robert Howard. This invention was commercialized through Centronics and later Epson. A further development was the introduction of the first non-impact sheet-fed laser printer (called the 9790) by Xerox in 1978, which later transformed into the black-and-white Xerox Docutech. Digital printing presses, as part of the production-level system, emerged in the media landscape in 1993 with less enthusiastic acceptance from printers who were not ready to receive them. Then, the printing industry was still struggling to cope with the disruptive effect of desktop publishing. Digital press manufacturers were however enthusiastic about developing an entirely new type of presses

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which would revolutionize product offerings in the printing industry. The pioneering companies, Xeikon and Indigo, invested enormous amounts to develop technologies to gain market share. By the year 2000, several other digital press manufacturers had emerged. The current list includes Xerox, Heidelberg, Canon, Océ, Konica Minolta, Toshiba, Kodak, Memjet, and others (Schroeder, 2014).

Based on analysis, several factors influenced the development and adoption of digital printing technology in the print and graphic arts industry, including:

*Variable Data Printing (VDP):* Kipphan (2001) highlights that digital printing, by its features of re-generating the image for each impression, makes variable data printing possible. VDP is required for personalization of messages to enhance communication with the target audience in marketing. According to Mejtoft & Nordin (2009), personalization through variable data printing enhances customer engagement and satisfaction.

*Improved Service Delivery:* Hultén et al. (2009) note that digital printing enhances service delivery by reducing delivery time, leading to improved revenue streams through shorter delivery times.

*Speed and Efficiency:* Wei et al. (2021) underscore the importance of speed and efficiency in digital printing, leading to substantial cost savings, faster turnaround times, and increased profitability. Also, Ali et al. (2019) highlight digital printing's flexibility by allowing for short production cycles, and a volume of production that suits customers' needs. This emphasizes the competitive advantage of digital printing in producing superior products under shorter time constraints.

*Print-on-Demand (POD):* Gallagher (2014) mentions the cost

savings and flexibility provided by print-on-demand systems, allowing enterprises to respond quickly to demands and minimize waste.

*Environmental Benefits:* Viluksela et al. (2010) suggest that digital printing methods offer environmental advantages over traditional methods due to reduced waste and emissions.

*Versatility:* Digital printing can image on various substrates, including paper, plastic, fabric, ceramics, and even wood, offering versatility unmatched by traditional printing methods. According to Downey (2022) and Kwon et. al (2020), digital printing finds substantial usage in large-scale industrial manufacturing, where the process is used for imaging on various substrates like glass fronts, banners, electronics parts, and vehicles. The need for a flexible and adaptable printing process for industrial purposes thus played a crucial role in the development and evolution of digital printing.

***RQ 2: What are the barriers to the adoption of digital printing presses within the Nigerian print and graphic arts industry, and what strategies are employed to promote adoption?***

The adoption of digital printing, especially for industrial purposes, has been slow in Nigeria. According to Adekunle (2014), the slow adoption rate can be attributed to cultural, financial, economic and technological barriers. The cultural barrier manifests as a preference for traditional lithographic offset printing, exemplified by the enduring popularity of traditional printing presses such as the Heidelberg press Kord 64. Financial barriers, including limited access to credit for small-sized printing businesses, hinder adoption. Equally, economic barriers arise from uncertainty about recouping investments, which is worsened by the unreliable power supply and unfavourable economic conditions. Additionally, technological

barriers, such as inadequate ICT infrastructure and insufficient technical support, impede adoption. Lastly, Adekunle (2014) revealed that lack of knowledge and skills, particularly in IT, further inhibits the transition to digital printing.

To surmount these barriers and foster widespread adoption, stakeholders, especially marketers of digital printing presses concentrate on undertaking promotional campaigns that emphasize the advantages (such as efficiency and cost-effectiveness) through specialized graphic arts magazines and exhibitions (Printers Marketing Toolkit, 2023). These campaigns are implemented through publicity and placing advertisements in these publications. Besides, instructional videos that function as promotional tools are also made available for online download (Dethlefsen, 2022). By leveraging instructional videos, graphic equipment manufacturers effectively communicate the value of digital printing and encourage its adoption among a wider audience. Studies (Barnes et al., 2023; Singh et al., 2023) have shown that instructional video technologies boost learning motivations and practical skill learning, which is particularly beneficial for technical processes like digital printing.

Digital press marketers also leverage corporate social responsibility programs to generate public awareness about digital printing. A reference point is the campaign to introduce Canon digital presses to the Nigerian market. According to a report by Printers' Digest (2016), the launch of the digital press was well attended by industry practitioners, government functionaries and agencies, media personalities, and traditional rulers. This event raised considerable publicity in the media as a firm committed to improving digital printing practice in Nigeria. Taking the awareness campaign a notch higher, Canon displayed commitment to improving printing education in Nigeria by donating an Imagepress

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750 digital printing press Department of Printing Technology, Yaba College of Technology, coupled with a digital printing training package that staff and students of the department benefited from (Atueyi, 2019; Printers Digest, 2019).

Much as Canon and other graphic equipment manufacturers strive to promote the adoption of digital printing, the onus also falls on other stakeholders to live up to expectations. A major stakeholder is the government, through the National Information Technology Development Agency (NITDA). Given NITDA's director general's stance that "adoption of digital technologies presents more opportunities for Africa to partake as a front seat driver in the 4th Industrial revolution, providing avenue for Africa to diversify and further boost its economy" (NITDA, 2021), the promotion of digital printing in Nigeria's graphic arts sector should be a front burner issue on the agency's priority list. Unfortunately, there is no evidence of any form of government intervention in this respect.

Another key stakeholder that is saddled with lobbying government institutions (such as NITDA) to accord digital printing promotion some reckoning is the Chartered Institute of Printers of Nigeria (CIPPON). As per the CIPPON Act of 2007, the institute is vested with the responsibility of actively promoting the benefits of digital printing technologies to the industry and government, advocating for policies that support technological advancement through adoption. However, the political squabbles and internal frictions that the Institute has been embroiled in the last decade have not helped the situation.

**RQ 3:** *What role does digital printing play in transforming the print and graphic arts sector;*

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*and what are the implications of this transformation in Nigeria?*

Digital printing helps printers to transform and develop. According to Liu et al. (2023), the technology permits variable data printing and personalization, thus enabling the creation of content that is specifically tailored to each recipient, which is especially advantageous for marketing campaigns. Thus, digital printing enables printers to expand their product and service offerings to accommodate changing consumer preferences, which essentially transforms them into marketing service providers. As Liu et al (2024) report, this transformation promotes competitiveness in the era of digitalization and facilitates the exploration of new business opportunities for players in the print and graphic arts industry.

In a similar vein, Afolabi (2015) appraised digital printing as a platform for diversification for printing firms in Nigeria. According to the analyst, digital printing presses print full-colour pages directly from computers with the possibility of varying the information with every revolution of the press cylinder. Afolabi (2015) averred that digital printing makes it possible for printers to offer value-added services to their clients. As explained by Garcia (2012), value-added services (such as content development, print-on-demand publishing, market research, direct marketing, experiential marketing etc.) give printers the opportunity to reposition as communications service providers. As the analyst argues, providing such services in the printing industry has become an imperative that can convince customers to keep doing business with digital printing companies, adding that, "days where printers only focused on ink and paper are long gone...".

Nevertheless, Afolabi (2014) highlighted the implications of transforming printers into marketing solutions providers. In the Nigerian

context, the analyst underscored the urgent need to step up print media education and training to a level that reflects the current trends within the cross-media publishing sector. As he puts it, “There is the need to infuse a large dose of marketing communication courses into the curriculum of training in schools offering printing and print publishing related courses as well as providing professional training to meet the needs of printers in the industry”. Afolabi expressed optimism that this will empower printers with the required competencies that will enable them to function effectively as marketing communications practitioners in Nigeria.

## **Discussion**

### *Analysis of Findings*

With the aim of examining the growth of digital printing technology in Nigeria and its potential for transforming and repositioning the nation’s graphic arts sector for sustainable growth and development in a multimedia age, relevant works were reviewed to find data that provide insights into the study’s three research questions. From the review, it emerged that multifarious factors, including market demands and technological advancements, have impacted the evolution and implementation of digital printing in the printing sector. In Nigeria, barriers like cultural preferences and financial constraints hinder widespread adoption. Government interventions and awareness campaigns are both elements of adoption promotion strategies. While digital printing facilitates customization and broadens the range of services provided, printers must allocate resources towards education and training to effectively respond to evolving market dynamics.

Based on the above findings, one key issue up for discussion is technological evolution and

industry dynamics with respect to digital printing. Explorations in this study affirm that printing technology developments are driven by market demand. This coincides with the submission of Zenkin et al. (2023) that customer demand drives technological advancements in printing, leading to changes in quality standards and computerized production control. The scholars also affirm that innovations enable the creation of personalized, functional, and adaptive products, expanding market opportunities. These disruptive technological changes ensure that printing does not become redundant in the digital age. As argued by Lin et al. (2010), print technology has evolved to become an integral part of an intelligent multimedia ecosystem.

Given the evidenced value of digital printing in the print and graphic arts industry, the barriers to its adoption deserve more than a cursory examination. Like other innovations, the barriers to digital printing adoption are largely cultural and economic. Previous studies on innovation adoption in developing economies gave similar outcomes. For example, a study on barriers to supply chain sustainability innovation in the Nigerian food and agriculture Industry found that the primary barriers affecting supply chain sustainability innovation among Nigerian entrepreneurs include economic and financial barriers. A similar study by Jellason et al. (2021) defines cultural barriers in terms of a lack of familiarity with a practice while economic barriers relate to a lack of capital that hinders the acquisition of innovations.

As a follow-up to adoption barriers, focusing on strategies for promoting adoption is vital. As the current study shows, the bulk of promoting digital printing adoption has been undertaken by manufacturers of digital presses and their marketers, with little input from other stakeholders. This picture contrasts sharply with

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reports from other climes. For example, Liu et al (2024) detail the government incentives and support for the digital printing industry in Beijing, Tianjin, and Hebei. According to the report, the government has made concerted efforts to increase publicity on digital printing because people are demanding more convenience in their lives and prefer electronic-based printing compared to traditional printing. Mention is made in the report of Fujian Xinhua United Printing Group which has been adhering to the concept of developing a digital economy, With the support of the Fujian Provincial Government, the Printing Group is actively promoting innovation by promoting the application of digital printing technology. While studies, such as Atteh (2021) and Liman(2021), detail the crucial support provided by various arms of the Nigerian government on the uptake of agricultural innovations, it appears the print and graphic arts sector is the orphan child that is left to her device. While it is understandable that a premium is placed on agriculture by governments for food security reasons, the print and graphic sector also has its relevance in promoting the dissemination of information which contributes to societal development.

Analyzing the transformative role of digital printing in the print and graphic arts sector, particularly in terms of enabling personalization, expanding service offerings, and facilitating the transition of printers into marketing service providers (as reported in this review) is imperative. Prior studies on the transformative impact of digital printing hold the consensus that digital printing is not mere technology; rather it is a disruptive innovation that impacts how print business is done in the multimedia landscape. Positing that digital printing has become established in the market as a tool for adding value in a rapidly changing environment in print media, Politis et al. (2003) describe the innovation as “an agent of structural change in

organization and management”. In a discourse about innovation in the print and graphic arts industry, Politis (2018) avers that digitalization and innovation are propelling positive development in the sector. As the expert avers, it is crucial for practitioners and researchers to not only observe trends but also to lead the industry's transformation through intensive research. According to Politis, education plays a vital role in this holistic evolution.

To reiterate Politis' advisory, the implications of the transformation brought about by digital printing require focus in this analysis, emphasizing the need for investments in education and training to equip printers with the skills required to thrive in the evolving landscape of marketing communications. Consequently, there emerges an imperative to reposition print and graphic arts education to be more marketing communication-oriented, which involves a strategic shift in how the education is presented and perceived. According to Macro (2023), educational institutions offering print and graphic arts programs (popularly dubbed Graphic Communication) in the United States are redefining their focus to meet industry demands and foster innovation. With the shift towards digitalization, these programs are seizing emerging opportunities.

### ***An Agenda for Future Research***

The current study brought to the fore the use of media like specialized trade magazines and videos as channels for communicating innovations to print and graphic arts practitioners in Nigeria. This is very much in line with the postulation of Roger's diffusion of innovation theory that communication channels serve as conduits for disseminating information about innovations. Previous studies on

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innovation adoption have reported similar themes. A reference point is the study of Atser et al. (2023) on the effect of communication media on the uptake of agricultural innovations in Nigeria which affirmed that video serves as a channel for disseminating messages on the importance of effective weed control in cassava farms. Similarly, Fatunbi et al. (2015) list trade journals as a vital information resource for farmers on agricultural innovations. Moreover, Makhubela and Makhitha (2023) report that SMEs use trade magazines as a channel to provide information about and advertise their products. In addition, Shahzad et al.'s (2011) study reflects that younger farmers with higher levels of education are more open to adopting innovation technology through messages disseminated via agricultural publications, as they perceive these media as more credible and authoritative.

While the vital role of trade magazines as a channel for disseminating marketing messages about digital printing innovations is revealed in this study, there are dimensions unknown about this important subject, necessitating further studies in this regard. Outlined subsequently are aspects of specialized trade publications for further research in the context of promoting the adoption of digital printing in the print and graphic arts sector in Nigeria.

i.) Content Analysis of trade magazines with respect to content relating to digital printing innovations. This could involve reviewing the types of articles, case studies, interviews, and product evaluations published in these journals, as well as the degree of technical detail supplied and the frequency of coverage on different elements of digital printing technology.

ii.) Researching audience engagement, involving investigating how print and graphic arts practitioners in Nigeria engage with

specialized trade magazines as a source of information about digital printing innovations.

iii.) Exploring advertising effect, i.e. the function of advertising in specialized trade journals and their effect on the content connected to digital printing innovations. This could involve studying the prevalence and placement of adverts from equipment manufacturers, suppliers, and service providers, as well as examining any potential biases in the editorial content resulting from advertising ties.

iv.) Examining print and graphic arts practitioners' perspectives of the value received from specialized trade periodicals in terms of staying informed about digital printing innovations, making purchasing decisions, and keeping up to date with industry trends. This could involve surveying practitioners to assess the perceived utility, relevance, and credibility of material gained from these magazines.

In general, by examining these specific aspects of trade magazines, researchers can gain insights into how specialized trade magazines are utilized to promote innovation adoption in the print and graphic arts industry in Nigeria, as well as their respective strengths and limitations as communication channels.

## **Conclusion**

This explorative study is aimed at examining the growth of digital printing technology in Nigeria, as well as finding out its potential for transforming and repositioning the nation's graphic arts sector for sustainable growth and development in a multimedia age. The study traced the development of printing in Nigeria, from 1846 to the present era, revealing market demand as a cardinal drive for the evolution of print technologies. Also, cultural, financial, economic, and technological barriers were

identified as impediments to digital innovation adoption in the country. Although there are several stakeholders in the print and graphic arts sector in the Nigerian economy, only manufacturers of graphic arts equipment and their marketers are identified as being in the frontline of promoting digital printing innovation through strategic campaigns involving publicity and advertising in trade magazines, videos and corporate social marketing. These strategic campaigns are worth the effort because digital printing promises a lease of new life for printing firms in the multimedia era since the process has wider applications beyond what the traditional printing processes offer. Nevertheless, the adoption of digital printing calls for a new approach to doing printing business since print firms are empowered to migrate from print product manufacturers to communications solutions providers. The broader implications of this transformation entail learning new digital and marketing communications skills.

Finally, as an evolving area in the field of digital imaging and media technology, digital printing promises to be a fertile ground for research in the Nigerian media space. Thus, limitless opportunities exist for using digital printing as a platform for transforming and repositioning the printing industry in Nigeria. In essence, embracing digital printing signals a new era of possibilities for Nigeria's print and graphic arts sector, paving the path for sustainable growth and development in an increasingly digitalized world.

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