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**AN ANALYSIS OF THE STRENGTHS AND CHALLENGES OF DIRECT IMAGING AND COMPUTER TO PLATE OFFSET PRINTING TECHNOLOGIES: THE NIGERIAN EXPERIENCE**

**The aim** of this study is to explore Direct Imaging (DI) and Computer to Plate (CtP) printing technologies in Nigeria with a view to determining sustainability of DI printing standard.

**Methodology:** Content analysis through direct field investigation, which included participant observation and key informant interview was engaged. The data collected for the comparative analysis of the strengths and challenges of DI and CtP printings were between May 2014 and June 2021.

**Results:** This study identified high start-up cost and unavailability of spare parts and technicians as the main challenges in the use of the two technologies in Nigeria and consequent upon which there is no longer functional offset DI press in Nigeria. The CtP presses that survived continue to provide the super quality printing standard set up by the DI technology.

**Scientific novelty:** The study discovered CtP print quality as equivalent to DI super print standard, thereby providing basis for sustainable development of DI standard in Nigerian printing industry.

**Practical Significance:** The findings of this research have practical implications on printing industry, delivery of communication design and the Nigerian economy. The identified strength of CtP indicates availability of super print quality this far in the country, as a result create avenue for sustainable development in the affected sectors in Nigeria.

**Keywords:** computer to plate; communication art; direct imaging; offset press; printing technology.

**Introduction.** The origin of printing is traceable to the seals used to sign official documents around 255BC during the Han dynasty in China [1]. By 1232AD, movable fonts of metal were in use in Korea [2]. Around 1400AD, a German named Johannes Gutenberg was said to have reinvented and spread this technique across Europe [2].

In Nigeria, printing started in 1846 in Calabar with the efforts of British missionaries led by Reverend Hope Masterton Waddell and Mr. Samuel Edgerly, his printer friend from the United Presbyterian Church [3]. They both established the Calabar mission press. Calabar is the capital city of the present day Cross River State of Nigeria. During the first ten years of their arrival, and with the joint efforts of Mr. William Anderson and Mr. Hugh Goldie who were also missionaries; Reverend Waddell and Mr. Edgerly achieved some level of advancements in the printing industry [4]. The success in Calabar mission press possibly resulted in the establishment of another mission press by the United Presbyterian Church in

Bonny [4], a town in the present day Rivers State of Nigeria. These two presses restricted their activities to printing of evangelical materials.

Further to this, the Church Mission Society (CMS) which established its mission in Nigeria in 1854 under the leadership of Reverend Henry Townsend established another press, the Henry Townsend Printing Press in Abeokuta in 1859 [5]. Henry Townsend Press went commercial with the production of the first Nigerian Newspaper, *Iwe Iroyin Awon Ara Egba* [6]. According to Okere [4], the CMS established a press in Lagos in 1913 and later in some other cities of Nigeria. In 1914, the Colonial Government of Nigeria established the maiden government printing firm around Broad Street in Lagos [7]. Today, Nigeria has numerous printing presses that use different technologies and techniques but their exact number is yet to be ascertained.

Characteristically, printing is of different types based on the technology employed. It is generically of five basic types: relief printing (letterpress, flexography), intaglio printing (gravure), screen printing (stencil), digital

printing (laser and inkjet technologies) and offset printing (lithography) [8]. Relief printing, as the name implies, shows the image areas raised up and the non-image areas in recess. In this regard, for letterpress, the letters are impressed through movable characters comprising alloy of lead, tin, and antimony. Images like logos, illustrations and diagrams are etched inside a block of zinc or copper for print reproduction. In flexography, the impression surface features rubber in place of metal. As a result of technological development, rubber plates are now being replaced by photopolymer plates; and the technology is mostly engaged in packaging industries [9].

Intaglio Printing is similar to letterpress, except that the potential image is directly transferred from the cylinder on the engaged substrate. It is called intaglio because the image areas are hollow, while non-image areas are expressed in relief [10].

Screen printing, unlike relief and intaglio is one of the simplest printing processes. It is a stencil kind of printing through photographic imaging creation, mostly manually printed. The potential image to be reproduced en masse is initially captured in its primary form on a photographic material and stretched tightly on a frame of fine or open mesh (silk screen). The image is transferred into the mesh through chemical process and printed on a surface by using squeegee that forces ink out of the mesh.

Digital printing is an electrophotographic imaging laser copy machine controlled by computer. When a file is ready and sent for output, a laser beam inside the printing machine applies a static charge to the photosensitive printing drum to allow tonner particles form a predetermined text, image or design which will be heated and fused to the substrate [10]. Inkjet, the other sub-set of digital printing, is a process of spitting droplets of printing inks [11] from Inkjet machines to the surface of a substrate so that it reproduces the intended text, image or design.

Lastly, offset printing, also known as lithographic printing uses aluminium plates as its

image carriers. On this platform, the image and non-image portions are usually generated photo-chemically or electronically. Also, the principle guiding lithographic printing establishes the image portion of the printing plate repulsive to water and receptive to ink while the non image portion is repulsive to ink and receptive to water [12]. Offset printing technology can be Direct Imaging (DI), Computer to Plate (CtP) or Computer to Film (CtF). Therefore, lithographic offset printing is a process used for printing on a flat surface where image is transferred into an offset plate which is chemically treated so that only the image area will absorb ink. Both Direct Imaging and Computer to Plate printing processes involve lithographic offset.

This study is therefore a comparative analysis of the strengths and challenges of Direct Imaging (DI) and Computer to Plate (CtP) offset printing technologies in Nigeria. In carrying out this research, a precise overview of DI and Ctp technologies was done. A comparative analysis of the strengths and challenges of the technologies as experienced in Nigeria was also considered. In scope, the study is limited to digital offset technologies used in Lagos metropolis of Lagos State of Nigeria. It aimed at exploring the state of DI and CtP offset printing technologies in the Nigerian printing industry and checking, if the print standard brought about by DI printing is sustainable by the present CtP technology in the country.

In methods, both direct field investigation and literature materials were employed for data collection for the study. The data collected are of three major categories: bibliographical, oral and visual. The data were obtained through primary and secondary sources. Key informants in printing companies such as graphic artists, pre-press artists, press managers, press operators, quality control personnel, production managers; private print professionals, freelance graphic designers and printers were included in primary sources. On the other hand, relevant literature materials in print and electronic formats were engaged for secondary sources. The primary

data collection spreads across a period of seven years (May 2014 and May 2021) through key informant interview and participant observation (Fig. 1).

All samples for this study were collected in Lagos, Nigeria. Lagos is the commercial, industrial and artistic hub of Nigeria and consequently the hub of printing practices in Nigeria. It is the centre where various types of

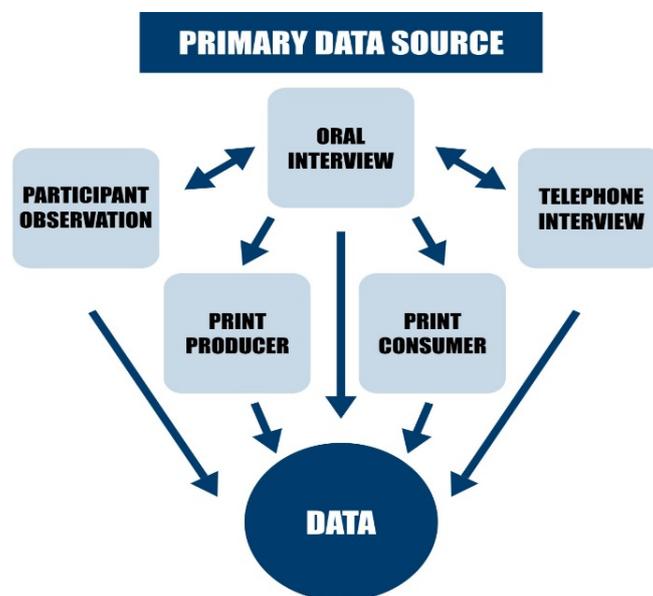
printing technologies are used. Among the numerous offset printing presses in Lagos, 16 corporate companies were purposively selected for the study, among which a total of 10 (63%) corporate companies (Table 1) were finally chosen for data collection. Five out of the ten were involved in both Direct DI and CtP technologies while the remaining five engaged in Computer to Plate (CtP) technology only.

**Table 1**

Distribution of samples by technology used, year of establishment and location

| S/N | Sample Press                     | Technology | Year of establishment | Location               |
|-----|----------------------------------|------------|-----------------------|------------------------|
| 1   | Academy Press Plc.               | CtP        | 1965                  | Ilupeju, Lagos         |
| 2   | Afkar Printing & Publishing Ltd. | CtP        | 2011                  | Ogba, Ikeja-Lagos      |
| 3   | Digital Colours Ltd.             | CtP        | 2008                  | Somolu, Lagos          |
| 4   | Digital Print Reality Ltd.       | CtP        | 2006                  | Sabo, Yaba-Lagos       |
| 5   | Eskade Ltd.                      | DI, CtP    | 1988                  | Ifako-Gbagada, Lagos   |
| 6   | Global Plus Publishing Ltd.      | DI, CtP    | 2006                  | Ogba, Ikeja-Lagos      |
| 7   | Onward Press Ltd.                | DI, CtP    | 1972                  | Oshodi, Lagos          |
| 8   | Odufuwa Modern Design Ltd.       | CtP        | 1987                  | Agidingbi, Ikeja-Lagos |
| 9   | Planet Press Ltd.                | DI, CtP    | 2000                  | Alakija, Lagos         |
| 10  | Printserve Ltd.                  | DI, CtP    | 2002                  | Somolu, Lagos          |

Source: Researchers' Fieldwork.



**Fig. 1.** Summary of data collection techniques in dialectical approach  
Created by: the authors, 2014

This research undoubtedly will help to fill the scholarly vacuum in printing industry generally, and especially in the standard and state of DI and CtP offset printing technologies in Nigeria. The result of this study, hopefully will also serve as a guide for prospective Nigerian

printing investors, directors and printers. In addition, it will improve training in communication design; by broadening the knowledge and scope of communication design professionals as stakeholders in the printing industry. Furthermore, it will be a basis for

further studies on DI offset printing technology, CtP offset printing technology and printing industry as a whole.

**Analysis of Previous Researches.** There is an appreciable number of scholarly studies on offset printing technologies at the global level [13]. The prevailing scholarships on printing in Nigeria were variously on historical background of printing and the development of press and newspaper industries in the country [14]. There are also studies on sustainability of faith-based publishing firms in Nigeria [14] and the remarkable changes brought about by Speedmaster 74 Direct Imaging press in the Nigerian printing industry [6].

Speirs [13] observed that printing industry affects the economy of any nation, that is, the buoyant the printing industry of a nation, the better the economy and vice versa. This ascertains the importance of printing in the globe. Aro [14] traced the historical background and development of the press by Reverend Henry Townsend in order to propagate Christian gospel. This eventually led to the emergence of the foremost Nigerian Newspaper – *Iwe Iroyin awon Egba ati Yoruba*. Thereafter, other Nigerian Newspapers like; Anglo-Africa, The Nigerian Chronicles, The Mirror, The Lagos Standard, African Magazine, The West African Pilot and The Nigerian Tribune sprang up as timely media for vibrant Journalists who used the press to fight colonialism and this eventually resulted in Nigeria's independence which came to reality on 1st October, 1960.

Okere [4] investigated organizational environment of faith-based printing firms in Nigeria. The study stressed the need for sustainability of organizational environment of faith-based printing firms in Nigeria to be realistic if only the vital constituents like gender equity in job employment, good geographical location and resolution to rampant social problems feature in the daily operations of the organizational environment.

Afolabi [15] in a book titled *Graphic Communication in Nigeria* which focused on offset printing technology identified two types of

Direct Imaging in Nigeria: Heidelberg Quick Master 46 and Heidelberg Speedmaster 74 / 75. And it finally established Planet Press Limited as the pioneer of Direct Imaging cutting edge printing technology in Nigeria, launched in 2001.

Enwemeka [6] is a study on the impact of Speedmaster 74 DI in printing industry in Nigeria. The research is a case study of Planet Press Ltd., being the only DI press in Nigeria as at 2000-2001, the stipulated time for the research. The survey discovered that, if the time needed to handle a job with CtP and DI are compared; it is clear that digital workflow of Speedmaster 74 DI offers substantial benefits, and it concluded that digitalization of the printing industry as a key operational parameter in modern day printing should be encouraged.

**Problem Statement.** From the reviewed literature materials, it is evident that there is no significant in-depth study on the impacts and the challenges of DI and CtP printing technologies in the Nigerian experience. Without scholarly interest to identify these problems and proffer solution, such problems may persist and have negative impact on the printing industry in Nigeria; and consequently on the delivery of communication art and the Nigerian economy. There is therefore an urgent need to x-ray the strengths and the challenges of the technologies in order to determine their standards and state in relation to graphic art printing in Nigerian printing industry. This will eventually remove the obscurity in the industry, especially on the conditions of DI and CtP technologies in Nigeria.

**The results of the research and their discussion:** 1. *Direct Imaging (Di) and Computer to Plate (Ctp) Offset Printing Technologies.* Direct Imaging (DI) is the latest offset printing technology in which the plates are imaged directly on the printing machine with the aid of laser exposure components [16]. The laser inside the press is meant to record text, images or design on the surface of the installed plate in line with the command received from the linked computer. With this short and direct production stages, the print quality of DI is excellent.

DI involves digital pre-press systems. With this technology, it is easier to transport digital data of text, image or design directly to the printing press. This automatically eliminates manual steps which involve camera work, film development, and assemblage. The thermal plate used by DI is imaged in accurate registration directly on the press with the aid of the in-built laser devices of the press. The technology also eliminates chemical processes of the plate. As a result of this, time consuming during make-ready is eliminated, the consumption of materials practically and drastically reduces overall production time [17]. All of these strengths are achieved void of losing standard quality mark of lithographic prints. Therefore, once jobs are prepared according to DI guide settings on the computer system and published to PDF (Portable document format), they are as good as finished products [18]. Basically, DI is of two types; Quickmaster (QM) and Speedmaster (SM). These presses can process up to 2400 dot per inch resolution, which is very good for production of perfect offset print jobs quality.

In 1995, the Quickmaster 46 DI was launched, but it was not recognized until Drupa 2000 that the technology became well known globally. Thereafter, the printing industry began to patronize DI technology for her quality printing job delivery. QM 46 DI (fig. 2), is a two-up four colour press of 13x18 inches format. It involves the use of roll of internal imaging media that out rightly prevents plate fixing time consuming. It is a waterless press, as the press design does not accommodate the use of offset printing plates as obtainable in SM DI [19]. Once the press receives data from the computer on what to print, it is supplied to the customized QM printing cylinder which will finally make the printing impression on the substrate; thereby improve make-ready times. The imaging time for a four colour job is between an average of 4.5 and 6 minutes [20]. All the file imaging, fine-tuning of ink coverage and several precise operations of the machine are controlled by an efficient control panel (fig. 3).

Speedmaster DI technology can be configured as four-colour, five-colour, or six-colour machines (figs. 4, 5 and 6), with or without inline coating. SM74 DI is designed to print up to 15,000 sheets of paper or card per hour without any print quality flaw. Speedmaster DI however uses plate (process free thermal plate) contrary the Quickmaster DI. Every SM DI printing unit is installed with Creo-Scitex imaging head (fig. 8). When plates are fixed into each unit, using automatic plate loader, they are simultaneously imaged in register within three minutes [21] at the resolution of 2400dpi.

After automatic mounting of the plates, the press operator with the aid of CP2000 Center touchscreen (fig. 9) launches simultaneous imaging process of the plates in every unit. This in turn produces perfect registration without the common dot gain experience with conventional plate imaging process.

Computer to Plate (CtP) imaging devices are performing excellently well by producing printing plates with high quality printable dots [22]. The use of CtP technology eliminates the intermediate use of film to transfer image on plate for printing process. Therefore, CtP processing employs platesetter to image and process a plate for offset printing [23]. When the platesetter accepts image data from the computer system called Raster Image Processor (RIP), it writes the information on the plate, which is made of aluminium or polyester with silver halide or photopolymer emulsion coating [24]. During the course of plate imaging, the coating on the plate is usually transformed physically or chemically by the laser devices in the platesetter. As a result of this, the platesetter ends up producing high quality offset printing plate. At this stage, the printing press in turn transfers the image from the plate indirectly through offset technology into the substrate. However, two major types of CtP machines are recognised: thermal and violet (fig. 9 and 10). This describes the type of laser technology involved. The technical construction of these systems can be either as external drum, internal drum or flat bed [25].



**Fig. 2.** Side view of Heidelberg Quickmaster (QM) 46 DI (Planet Press brochure, 2008)



**Fig. 3.** Front view of Heidelberg Quickmaster (QM) 46 DI at Onward Press Ltd, Oshodi, Lagos, Nigeria (Abiodun Akintola, 2014)



**Fig. 4.** Heidelberg Quickmaster Control Panel (Planet Press brochure, 2008)



**Fig. 5.** Four-colour, Heidelberg DI offset press, (Onward Press Ltd, Oshodi, Lagos, Nigeria). Photograph by Abiodun Akintola, 2014



**Fig. 6.** Five-colour, Heidelberg DI offset press, (Planet Press brochure, 2008)



**Fig. 7.** Six-colour, Heidelberg DI offset press (The Deutermann Group, Inc, 2014)



**Fig. 8.** Heidelberg Speedmaster 74 DI offset Press with enlarged encased components of the incorporated plate imaging head, at Onward Press Ltd, Oshodi, Lagos, Nigeria. Photograph by Abiodun Akintola, 2014

The adoption of DI press in Nigeria through Planet Press Limited in 2001 [15], [18], [21] exhibited some strengths of the technology. As a result of its super print quality of international standard, the press commanded majority of the topnotch printing jobs usually printed abroad back to Nigeria for printing. The press automation reduced the usual stress of offset printing operation and motivated the operators to put more efforts in their performance in order to produce high quality printing. This encouraged the operators to seek formal education on printing technology on part-time basis. The adoption and performance of DI in Nigeria also encouraged majority of print stakeholders to always crave for best quality print jobs. As a result of this innovation through Planet Press, other printing companies in Nigeria such as Onward Press Plc, Global Plus, Escade Press Ltd, Printserve and Digiprint joined the bandwagon of DI community.

In spite of all the strengths and benefits derived from DI technology, there are some challenges experienced in Nigeria. Lack of spare parts and technical professionals to fix them is the leading challenge. The imaging head is the major part of the press that often got spoilt probably because of its location on the press printing units. The spare parts were not readily available in Nigeria. They must be ordered from abroad alongside with the expatriates who will replace the damaged ones. Another limitation of DI press experienced in Nigeria printing system is the maximum accepted paper size which is 18.5 x 29.5 inches; whereas some other technologies receive up to double of this size. This is a major economic problem in Nigerian situation where most companies run on generating plant for almost twenty-four hours a day. It drastically reduces the turnaround speed. Also, DI press uses special printing plate purposely designed for the press. For this reason, there is no competition which makes the plate very expensive for Nigerian economy. Besides, the plate does not last long and cannot be re-used repeatedly for a long period of time as in the other technology [20], [21], [27], [26].

Imaging the plate on the press creates idle time for press smooth impression running in the Nigerian situation where every client will demand delivery of his job almost immediately. Owing to these challenges which are difficult for press owners to overcome, DI presses were gradually converted to CtP and eventually the press finally collapsed in Nigeria in 2011 and paved way for CtP technology.

Computer to Plate (CtP) printing technology in Nigeria offers a lot of benefits and strengths. One of them is the presence of larger print size with the adoption of SM 102-CD 2000; Mako 8, Mako 800 and Kodak Trendsetter 800iii Quantum feed these presses with imaged plates; the press is A1 format doubling the common A2 print size of offset presses. This is fit for bulk and long run job and drastically reduces production time. It enhances quick job delivery. Computer to Plate technology as a complete system involves the printing machine and the platesetter, being an off-press technology offers the advantage of smooth run time for the press. None of the two interrupts each other and thereby advantageous and beneficial in Nigeria to save the cost of running the company power plant since government generating power is not stable and reliable. Just like it is generally for offset presses all over the globe, the stethoscope still remains in the Nigerian experience that Ctp offset press is one of the most cost effective technologies. The print production output of Thermal imagesetter is supper quality. Both the press and the platesetter making up Ctp are automated and therefore encourage learning and re-training of the stakeholders. This continues to widen the stakeholders understanding on the trade as experienced in developed countries.

In contrary, the by-products of Ctp pollute Nigerian environment as it is evident in offset printing jam-packed environments in Lagos like Mushin and Somolu (fig. 13 and 14). In these areas, most drainages are polluted with waste printing ink and solvent. The waste materials most times are not properly disposed. Ctp, being a digital workflow, posed some difficulties for the operators to initially cope with, because

most of them learned the trade through apprenticeship and did not acquire beyond secondary school certificate. In some situations, they are school dropouts. Start up cost is another challenge facing the expansion of the technology in Nigeria; especially these days that the exchange rate of dollars to naira has drastically gone up. A unit of thermal Ctp that can image up to A1 plate size is between 28 and 30 million naira only for used ones (plate14); while a brand new unit costs not less than 70

million naira only [28]. The difference within Ctp construction techniques is another challenge. There is Thermal and Violet. These two systems do not produce exact equal quality which eventually leads to variation in Ctp print quality. Another challenge on Ctp quality production is about availability of different brands of offset press such as Heidelberg, Komori and KBA in Nigeria. As a result of different brands' configurations, there is always a bit variation in Ctp production quality.



Fig. 9A. Heidelberg SM Control Panel (CP2000) (Planet Press brochure, 2008)



Fig. 9B. Heidelberg SM Control Panel (CP2000) at Onward Press Ltd, Oshodi, Lagos, Nigeria. Photograph by Abiodun Akintola, 2014



Fig. 10. Thermal CtP- Agfar Avalon N4 (Exapro, 2014)



Fig. 11. Violet CtP- Agfa Galileo (WireBids, 2017)

Figure 3. Plate Making Process Steps

|  | IMAGE PLATE | PRE-BAKE | FIX OR PRE-TREAT/WASH | DEVELOP PLATE | WASH WITH WATER | FINISH | POST-BAKE (OPTIONAL FOR LONG-RUN) | FINISH (OPTIONAL FOR LONG-RUN) | PRINT |
|--|-------------|----------|-----------------------|---------------|-----------------|--------|-----------------------------------|--------------------------------|-------|
| Process-free Thermal CTP (one step)                    | ●           |          |                       |               |                 |        |                                   |                                | ●     |
| Chemical-free Thermal CTP (two steps)                  | ●           |          |                       |               | ●               |        |                                   |                                | ●     |
| No-Bake Chemically Processed Thermal CTP (three steps) | ●           |          |                       | ●             |                 | ●      |                                   |                                | ●     |
| Visible Light CTP (four steps)                         | ●           |          | ●                     | ●             |                 | ●      |                                   |                                | ●     |
| Pre-bake Thermal CTP (six steps)                       | ●           | ●        |                       | ●             |                 | ●      | ●                                 | ●                              | ●     |

Fig. 12. CtP Plate Making Process Steps (John Zarwan, 2003)



**Fig. 13.** Speedmaster 102-CD 2000, at Afkar Printing and Publishing Ltd. Photograph by Abiodun Akintola, 2014



**Fig. 13.** CtP by products pollution, at Mushin, Lagos, Nigeria. Photograph by Olaoye Olalekan, 2021



**Fig. 14.** CtP byproducts pollution, at Somolu, Lagos, Nigeria. Photograph by Ajayi Samuel, 2021



**Fig. 15 .** Used Thermal Ctp from Lagos, Nigeria. Photograph by Akin Oduwole, 2021

2. *Comparative Analysis of the Strengths and Challenges of DI and CtP Offset Printing Technologies Experience in Nigeria.* In Nigeria, there are two major types of Direct Imaging (DI) presses; the Quickmaster (QM) and the Speedmaster (SM). QM is usually called QM 46 DI. It is a 2-up format press which accommodates maximum paper size of 13 x 18 inches (A3 extra). SM, on the other hand, categorised as SM 74 (4-colour press) and SM 75 (5-colour press). Both of them are 4 up format press and they accept up to 18.5 x 29.5 inches (A2 extra) paper size. All the DI presses available in Nigeria are Heidelberg products. For CtP, the presses vary from Heidelberg and Komori to Koenig and Bauer AG (KBA). They are either 4 up or 8 up as in the case of speedmaster 102-CD 2000 (fig. 11). Their colour compartment is from 2 to 6. Each of these has its plates imaged from a number of plate platesetters; among which are Agfa Galileo, Agfa Palladio, Agfa Avalon N4, Azura TS and Trendsetter 800iii.

We want to compare the strengths and the challenges of DI and Ctp technologies from the point of similarities and disparities. For the strength, both technologies produce super print quality as generally experienced in developed world. This is possible because the stakeholders in Nigeria over a period of time have gone beyond learning curve. They have become professionals in their respective areas of specialization, beginning from the Graphic artist who does the preparation of files for quality plate imaging, to the prepress technician who in most cases in Nigeria is a graphic artist and to the press operator who will bring out the final required print quality of Ctp. The two technologies in Nigeria maintain digital workflow, except in some abnormal situations when the digital network breaks down and pending the availability of the professionals who will repair the network; the ready files to be imaged on the plate are copied inside a flash drive and manually transferred from a system into another bypassing digital workflow

temporarily. DI and Ctp save time, most importantly for long run jobs; they help to reduce the cost of running generating plant as well as meeting up with the urgent delivery demand of the hasty clients who are not holistic about their job delivery. The technologies also have these strengths in diversity. DI images plate directly on the press which drastically reduces make ready time and encourages perfect registration of the plates; for Ctp press, which has a separate platesetter allows for smooth uninterrupted job run-there is no need for the press to wait to image plates before running its impressions.

However, the two technologies have the following challenges. DI creates down time for the press during plate imaging; while Ctp poses the same challenge during plate fixing and make ready. In the aspect of the plates used by the technologies, DI plates are weak; they cannot be re-used over a period of time for good quality printing. For Ctp, the plates can still give good quality printing when re-used for a period of long time, but the variation in Ctp types like Thermal and Violet lead to variation in print quality the same way over use of DI plate will react. For both technologies, any error discovered on the plate after imaging is equivalent to total condemnation of the entire plate and re-image of new ones, there is no room for patching. Repairs and maintenance of DI are strictly for expatriates which makes it very expensive. For Ctp, the same problem can be handled by the indigenous professionals, but in a situation where they are unable to get it right at once, they need to repeat process which will also result in spending too much money on Ctp repairs and maintenance.

**Conclusion.** It is evident that printing practice in Nigeria was introduced through missionary activities of Reverend Hope Masterton Waddell and Mr Samuel Edgerly in 1846 in Calabar and Abeokuta before spreading gradually to Lagos and other parts of the country. Interestingly, printing has moved from direct contact printing of Letterpress to offset which includes Computer to film (CtF), Computer

to plate (CtP) and Direct Imaging (DI). However, the concerns of this study are (CtP) and (DI).

DI printing technology as experienced in Nigeria produced digital quality of offset printing like never before. This experience along with speedy job delivery due to automated operation of the press was outstanding in the Nigerian printing industry. However, high cost of maintenance as a result of non-availability of spare parts and lack of the professional DI press engineers in Nigeria at the adoption of the technology eventually collapsed the availability and the operation of the press in Nigeria today. There is no evident of functional DI offset printing machine in Nigeria again. On the contrary, CtP offset printing technology continues to blossom in Nigeria due to low cost of maintenance and the improvement on the technology which leads to super print quality and rapid delivery space for job production.

The study concludes that there is no trace of DI printing volume in Nigeria today as a result of non-availability of any functional DI press. CtP technology has taken over the entire ground of offset printing productions in Nigeria, and the technology is meeting up to the super quality printing standard set up by DI technology in 2021. It is evident that the super print quality of DI technology is sustainable by CtP technology in Nigeria today.

This research recommends the involvement of Nigerian government both at the Federal and State levels in printing industry in order to join forces in sustaining the improved quality of printing by way of policies to make spare parts and printing materials available and affordable. Strengthening the printing sector will eventually provide more job opportunities for graphic design, marketing, printing technology and communication related specialists.

From the field work, it was discovered that majority of the offset press operators learned the trade through apprenticeship, and the few among them who had formal printing technology training are from one Polytechnic or the other, since there is no such programme in any of the Nigerian universities. The printing

industry requires beyond this; therefore, this study also recommends that the Nigerian universities; particularly universities of technology should be involved in training and re-training of printing technology candidates by including the programme in their area of specialization. This is imperative for producing high quality manpower for printing industry particularly at the middle and upper managerial/executive levels; which in turn will

prepare a good ground for sustaining super print quality of graphic art production initiated by offset DI in Nigeria.

Moreover, Chartered Institute of Professional Printers of Nigeria (CIPPON) should always either once or twice a year organise mandatory technical workshop for the printing staff particularly the production staff in order to achieve highest possible employee participant in Nigerian quality printing production.

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### АНАЛІЗ ПЕРЕВАГ І НЕДОЛІКІВ ТЕХНОЛОГІЙ ДРУКУ DIRECT IMAGING ТА COMPUTER TO PLATE: ДОСВІД НІГЕРІЇ

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**Метою статті** є вивчення технологій друку Direct Imaging (DI) і Computer to Plate (CtP) у Нігерії та визначення сталості стандарту DI друку.

**Методологія:** використано метод польового дослідження, що включає спостереження та інтерв'ю із спеціалістами. Дані для порівняльного аналізу переваг і недоліків технологій друку DI та CtP були зібрані в період з травня 2014 року по червень 2021 року.

**Результати:** визначено, що висока вартість технічного обслуговування, відсутність запасних частин і технічного персоналу є головними проблемами у використанні технологій друку DI та CtP у Нігерії, і, як наслідок, у країні більше не функціонує офсетна друкована машина DI. Машина CtP, які збереглися, продовжують забезпечувати стандарт друку високої якості, встановлений технологією DI.

**Наукова новизна:** виявлено, що якість друку CtP є еквівалентною стандарту DI super print та забезпечує основу для сталого розвитку стандарту DI в поліграфічній промисловості Нігерії.

**Практичне значення:** результати дослідження мають практичні наслідки для поліграфічної промисловості, комунікаційного дизайну та економіки Нігерії. Визначено переваги використання технології CtP, що сприяє високоякісному друку в країні та створює шлях для сталого розвитку в постраждалих секторах Нігерії.

**Ключові слова:** друкарська форма; комунікаційний дизайн; Direct Imaging; офсетний друк; технологія друку.

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