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Cutting Corners with Unwashed Lithographic Machines: Impacts on the Quality of Print Jobs in Nigerian Print Houses

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ABSTRACT
One of the notable commercial printing methods is the offset lithographic process, which prints using plates with images photo-transferred on to their surfaces. In offset, the image is first printed on a rubber blanket, which offsets or transfers it to the actual surface like paper. Owing to the blanket's flexibility, offset can print on various surfaces ranging from flat paper to cylindrical forms like packaging. The lithographic four colour process is called CMYK using four plates to print four colours – cyan, magenta, yellow and black in precise, successive layers to create full colour images on the paper. Since the colours have to be printed by the same machine, operators are required to wash the colours off of the machine after each impression. However, many operators in print houses in Nigeria tend to shunt the right processes, and even avoid washing the machine after each impression. Using personal interviews, observation in several small presses, including the comparison of printing processes in the University of Benin Printing Press and Clear Impressions Limited, Kano, this paper sought to examine the professionalism and attention to detail in offset printing processes in Nigeria. Results show that most machine operators in Nigerian print houses tend to avoid washing inks off of the printing machine, before printing the next colour, to save on chemicals and time for washing, which unwittingly produces bad quality prints.

KEYWORDS: Lithographic printing, Colour separation, machine washing, bad quality prints.

Introduction

As an art form, printing is a process for reproducing texts, images and other illustrations using a master form or template from one medium to another (Dennis and Jenkins 1990). The earliest known form of printing as applied to paper and fabric was the woodblock practiced in China around 220AD. Later innovations in printing technology as noted by Philip (2012) included the movable type, invented by Bi Sheng at about 1040 AD. The printing press was invented by the German, Johannes Gutenberg at about 1450, which played a pivotal role in the development of the Renaissance and spread printing to other parts of the world. While all printers and clients desire to see cutting-edge finishes on printed material, this desire however does not just come by chance. It takes dedicated, creative application of certain principles to achieve good finishing in print jobs.

One of the notable commercial printing methods is the offset lithographic process, which prints using plates with images photo-transferred on to their surfaces. Lithography is a planographic printing process that uses designs drawn and fixed onto prepared zinc or aluminium metal plate, by chemical means (Parrott-Sheffer 2024). In offset, the image is first printed on a rubber blanket, which offsets or transfers it to the actual surface like paper. Owing to the blanket's flexibility, offset can print on various surfaces ranging from flat paper to cylindrical forms like packaging. Using a process of water resist, the image parts of the plate pick the oil-based ink, while the none-image parts resist the ink. In this manner, the exact image transferred to the plate is reproduced on the paper surface. Offset lithographic printing can be four, six or eight plates. The four colour process is called CMYK using four plates to print four colours – cyan, magenta, yellow and black in

precise, successive layers to create full colour images on the paper. The CMYK process is probably the most widely used method for printing full colour images (Sturken and Cartwright 2001), particularly in third world economies like Nigeria, where newer processes have not yet become usual. There is also the six colour printing process, which uses the cyan, magenta, yellow, black, orange and green inks in successive layers to reproduce full colour images. With this wider pallet, a graphic artist or printer can reproduce far more vibrant images than using the four-colour process. Another is the eight-colour printing process, which uses cyan, magenta, yellow, black, orange, green, diluted yellow and diluted black to achieve photo realism, smoother and less grainy images (*BBR Graphics* 2024). However, in Nigeria, the most commonly used lithography process is the CMYK, as can be seen in the many printing enterprises in major cities and towns like Lagos, Benin, Kano, etc. Irrespective of how many plates were used, the offset process is able to achieve the desired optical illusion of full colour print job. As Peter and Michael (2001) notes, it is an optical illusion because the colours are printed over each other, and the viewer sees what appears to be a continuous tone colour print whereas what is actually seen are several layers of colour (Meggs and Purvis 2010). Figure 1 illustrates how a combination of certain colours can produce other colours. In the CMYK process, for example, magenta, cyan and yellow are used to produce prints, while black is combined with these three colours to add depth to the printed image.

While it is entirely possible to print both in grey scale (shades of grey using just one black plate) and spot colour (specific colours that don't mix on the print), process colour printing is much more complicated because it requires more equipment, materials and processes (Hyatt-Major 2012). In terms of colour processing, the most critical difference between using process colour and grey scale is colour separation (Adams and Dolin 2001), which is the technique of separating and producing different films and plates for each of the lithographic colours. Even for spot colour printing, the colours have to be separated to make the printing plates. From the earlier darkroom and photographic methods of separating colours, colour separation evolved to be done digitally on film, and now direct-to-plate or Computer to Plate (CTP) technologies are available to digitally transfer the image to the plate. While most Nigerian presses use the darkroom lithographic platemaking process, an increasing number are now using the CTP machines. However, the colour separation equipment is not found in Nigerian art schools and small-scale graphics and printing establishments, because they are very expensive. Along with the Nigerian Naira's devaluation, this leads most print houses to cut corners in the printing process, and trade-off quality in prints for a bit of cost-saving. Using personal interviews, observation/descriptive methods, comparisons between printing processes in the University of Benin Printing Press, Clear Impressions Limited, Kano, and smaller print houses in Benin City, this paper sought to examine how cutting corners in the printing process affects the quality of printed matter.

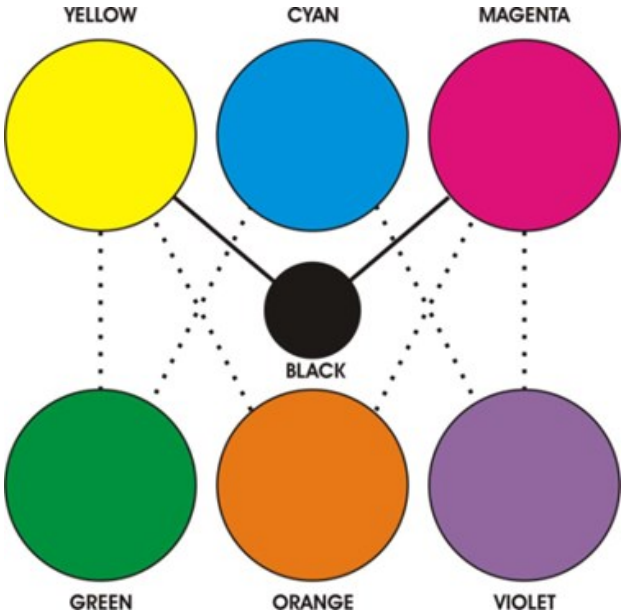

Fig. 1: The CMYK reproduction of other colours from four colours. Diagram: Felix Osaigbovo 2024

Clear Impressions Limited, Kano

Clear Impressions Limited, Kano, is a typical Nigerian print house. This company was set up with the objective of satisfying the printing needs of people, in the north of Nigeria. The pre-press staff consists of graphic artists and designers, typesetters, computer operators and lithographers. Some of the equipment at the pre-press are Apple Macintosh computers, high resolution Cezanne Dainnipon Screen flatbed scanner, the ECRM (Electronic Character Recognition Machine), Mako 56 and 36 Image Setters, the raster image processor and the film processor.

A typical print job at Clear Impressions starts with the graphic artist either making designs or scanning printed matter or photographs. The graphic artist does some colour correction and enhancement when needed, using one of the colour editing software especially the Adobe Photoshop. After being satisfied with the design, the graphic artist sends it from his own computer via the Local Area Network (LAN) to the image setter via the RIP (Raster Image Processor) machine.

Besides direct observations, this researcher had personal interviews with several machine minders like Taiwo Owolabi (b. 1958), who provided detailed information about their printing processes. Whereas the four-colour lithographic process is called CMYK, at Clear Impressions Limited the researcher observed that

they print "K" (the black plate) first. After a careful observation of his style and process, the researcher asked what informed this sequence of colour print. Taiwo Owolabi's simple answer was that printing "black" first gives a ready registration guide to follow when printing the remaining colours, which are not as strong. Also, he explained that in the event of inadvertent misregistration, the mistakes might not prove as obvious and vivid, when black is printed first.

The University of Benin Press

The University of Benin Press is in Benin City, Edo State. The press serves the academic community and also people with printing needs from outside the university. The CMYK colour process is also what is done in the University of Benin Press. Dr. Imafidon (b.1962) is the Manager of the University of Benin Press. In his idea of printing, light colours need to come first. Also, since "black" is the strongest colour, when it is printed last it covers wrong registrations that might have occurred in previous colours.

Imafidon (2021) also reiterated that, in most cases, his machine minders start from the lightest colour, which is yellow, and progress toward the darkest, which is black. In this case, cyan and magenta come before black, meaning that their formula is YCMK. Although the normal scientifically established sequence is the CMYK, the researcher found out that there is a major difference in how both presses print the CMYK plates. While Clear Impressions Limited print the black plate first in a KMCY sequence, the Uniben Press does YCMK. However, and theoretically, Johnson (2007) argues that the three colours cyan, magenta and yellow should be able to reproduce the same image as the copy. However, the inks used in printing may inaccurately make grey and black areas to appear brownish. This is why the fourth colour "black" is used, to achieve images with the right densities that precisely approximate the copy. The colour image in Fig. 2, for example, is a composite of the cyan, magenta, yellow and black versions.

Comparative Visual Analysis of Prints from Clear Impressions Limited and the University of Benin Press

For this study, five print samples each were collected from Clear Impressions Limited, Kano and the University of Benin Press, and analysed from the visual rather than thematic perspectives, since we are concerned with the effects each press achieves in its sequence of applying the CMYK plates. For ease of purpose, the samples from Clear Impressions Limited were labelled CIL 1-5, while those from the University of Benin Press were labelled Uniben 1 -5.

Analysis One: CIL 1 and Uniben 1

From the pair of print samples (Figs. 3 and 4), CIL 1 is definitely brighter and more vivid in colour than Uniben 1. CIL 1 was digitally colour-separated, filmed on lithographic plate and printed with a 2-colour Heidelberg MOZ printing machine. Also, at the Clear Impression Limited, the impression sequence is KCMY (black, cyan, magenta and yellow). On the other hand, the Uniben 1 was not digitally colour-separated. Rather, separation was done manually and printed on Kord-64 printing machine, which made it dull. In digital colour separation, blank spaces are created for the black image and, if well registered, the black ink falls directly on the blank spaces created. If there is no digital colour separation, the black ink will fall on previous colours created by a mixture of cyan, magenta and yellow, making the resulting "black" to be as dull as it is in Fig. 4. It is important to note that black- cyan-magenta-yellow is the impression sequence adopted by Clear Impressions Limited for most of its jobs. On its part, Uniben Press does not adhere to a particular colour sequencing. Rather, according to Imafidon, the Manager, sequencing is dependent on the exigency of the job

Fig. 2: Progressive separation of colours. Photograph: Felix Osaigbovo 2024.

Fig 3: CIL 1 (a Calendar).

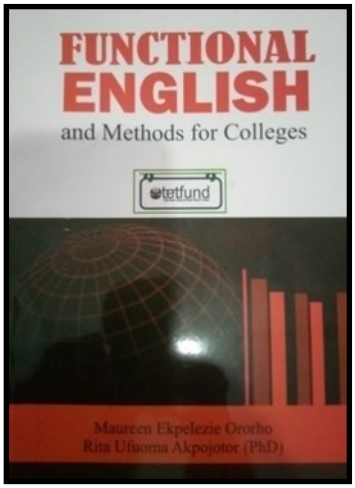

Fig 4: Uniben 1 (book cover)

at hand. Thus, in most cases, to save cost, they adopt the YCMK, where printing is done from lightest and weaker colour to strongest. In so doing, they do not have to clean the machine after each impression. However, from the visuals above, it can be clearly seen that CIL 1 is sharper and its colours more vivid than Uniben 1. However, this difference did not come about because of the sequence of impressions, but by the lack of digital colour separation in Fig. 4, and also because of the technical flaw in the method of not washing each colour out of the machine before the next impression is made. These two problems tend to "muddle-up" colours and make them look dull.

Analysis Two: CIL 2 and Uniben 2

In the next pair of prints (Figs. 5 & 6), CIL 2 was done with a Computer to Plate (CTP) machine, in which the process of printing colour separation film is by-passed. The computer transfers the images directly on the printing plate, according to their colour tonal value. CIL 2 (Fig. 5) was printed on Kord-64 machine, using the KCMY sequence, while Uniben 2 (Fig. 6) was manually colour-separated and also printed on Kord-64 machine. Whereas these two samples were printed using the same type of machine, CIL 2 colours still appear sharper than Uniben 2. The most obvious reason is the poorer pre-press process and the fact that the Uniben Press does not wash its machine after each colour, in its YCMK impression sequence.

Analysis Three: CIL 3 and Uniben 3

The two visuals, CIL 3 and Uniben 3 (Figs. 7 & 8) compete favourably with each other. They are both calendars and their colours are equally rich and brilliant. While both prints were digitally colour-separated, CIL 3 was printed with the Heidelberg Speedmaster machine using the KCMY process, and Uniben 3 was printed with Kord-64 machine using the YCMK. The use of different printing machines has evidently not affected the visual quality of both prints, meaning that the ma-

Fig 5: CIL 2 (event poster).

Fig. 6: Uniben 2 (event poster)

Fig 8: CIL 3 (a Calendar).

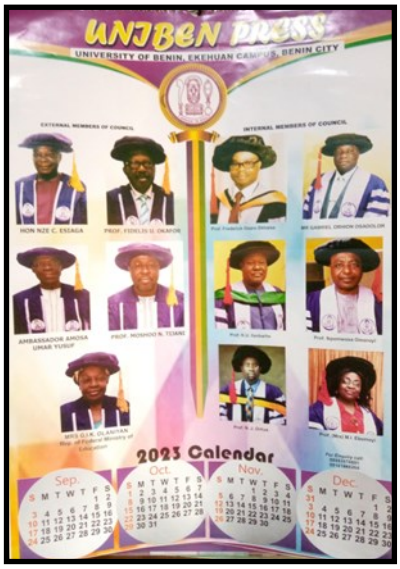

Fig 9: Uniben 3 (a Calendar)

chine minders were equally good at handling the printing processes, including the achievement of brilliant colours by cleaning the machine after each impression.

Analysis Four: CIL 4 and Uniben 4

CIL 4 (Fig. 10) is the back cover of a pamphlet, while Uniben 4 (Fig. 11) is an invitation card. CIL 4 looks more like spot colour print except that the Nigerian coat of arms is in full colour. CIL 4 was digitally colour-separated and printed with MOZ machine using the KCMY hence the sharp nature of the output. Uniben 4 was also digitally colour-separated but printed with Kord-64 machine, with the sequence of YCMK. The colour output of the photograph is very rich. Comparing the two prints, the black impression in Uniben 4 appears deeper than CIL 4, since it was printed last in the YCMK process. Printing black ink first, in the KCMY process in CIL 4 can have the effect of other colours printing over and dulling the black. Indeed, the quality of black ink has a way of making a print job stand out.

Analysis Five: CIL 5 and Uniben 5

CIL 5 (Fig. 11) is the back cover of a convocation booklet and Uniben 5 (Fig. 12) is also a back cover, but of a laboratory manual. CIL 5 was digitally colour-separated and printed with MOZ machine using the KCMY sequence, while Uniben 5 was manually colour-separated and printed on Kord-64 machine with the sequence of YCMK. From the visual quality, it is obvious that CIL 5 is brighter, neater and more professional-looking than Uniben 5. The Uniben 5 print looks blurred, obviously because of the colour separation technique, which does not translate into as sharp contrasts as can be achieved with digitally separated prints. Print jobs done with digital colour separation tend to come out better because the computer seamlessly separates colours to the tiniest dot-per-inch (dpi), giving the print much high fidelity to colours than can be achieved with manual separations.

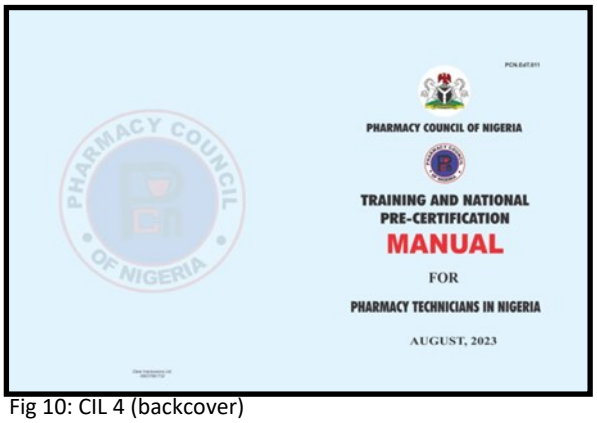

Fig 10: CIL 4 (backcover)

Fig 11: Uniben 4 (invitation card)

Fig 4: CIL 11 (backcover).

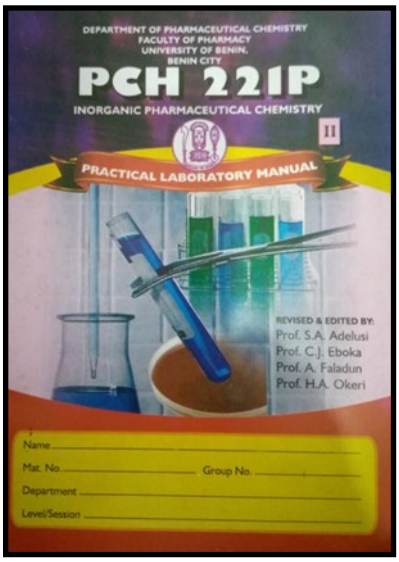

Fig 12: Uniben 5 (backcover)

Discussion of Findings

From the analyses of the all five samples each from the two print houses, it is important to observe certain reasons why print houses adopt whatever colour sequencing appropriate to their specific needs. First, professionally sensitive print houses strive to not compromise quality, prioritising customer's satisfaction. Clear Impressions Limited is one of such print houses. They have used the same colour sequencing of KCMY since they started business in 1992, for all their jobs irrespective of the quantity demanded by customers. Also it does seem that the actual professional qualifications of the head of a print house impacts positively on the quality of work done. For instance, Alhaji Iro Ibrahim-Yahaya is the Managing Director of Clear Impressions Limited. He holds a degree in Graphic Design from Ahmadu Bello University, Zaria and a higher degree in Printing Technology from a London University. These qualifications mark him out as highly professionally trained, meaning that he will not compromise quality, which is why the business is still waxing strong. Since the press is a private entity, his reputation is always at stake and he avoids anything that could bring the company into disrepute. Besides this, he also insists on the right professionals manning all positions in Clear Impressions Limited, from the client service executives, administration, accounts, pre-press, press and post-press sections. For instance, the Senior Operator, Taiwo Owolabi, has been printing since the late 80s and has vast experience on the job.

On the other hand, the University of Benin Press is almost the professional opposite of Clear Impressions Limited. Unlike Ibrahim-Yahaya's private press, it is a public business, and does not have the type of dedication evidenced in private businesses. The Press Manager, Imafidon Evans (*Personal Interview*), revealed that their output would have been better but for the fact that logistic problems sometimes hinder operations. Imafidon holds a PhD in Painting but has vast experience in the printing business and has been in charge of the University of Benin Press since 2003. According to him, in order to maximize profit, they normally adopt the YCMK sequence in the sense that there would be no need to clean the machine after each impression. In a professional sense, not washing the machine after each colour print will not give the best output and will often result in dull colours. Besides, while Imafidon has the experience to manage the press, he does not have the quality of print-specific professional training of Ibrahim-Yahaya. It is this stringent professional training that makes Ibrahim-Yahaya to not compromise in any details of the printing processes, such as the washing of colours from the machine before applying the next. Imafidon also said that he sometimes assumes the role of the graphic artist and machine operator due to the lack of manpower. At other times he is the one that does designs on computer including seeing to the day to say running of the press. The kind of multitasking being done in the University of Benin Press cannot enable them achieve print qualities generally produced at Clear Impressions Limited, because of the use of inadequate and unspecialised manpower. While Imafidon recognises that the CMYK sequence is the professional process recommended by the inventors of the printing machine, he said print houses often determine alternative sequences according to production exigencies. In his opinion, the best sequence to adopt is the KCMY because, according to him, the black guides the operator on the registration of the rest colours. However, printing black first, has its downsides in print qualities and blurring of depth and dullness of colours. Definitely, the use of manual colour separation also plays a

keen role in the bad quality prints that come out of the University of Benin Press, as against the excellent quality colour separations done digitally by Clear Impressions Limited, which gives them such beautiful impressions in print jobs.

The researcher's fieldtrips to some print houses in Benin City to speak with machine minders on what colour sequencing they adopt brought out some interesting findings. The first press visited was Ukwa Printing Press situated at Ogbesasa Street, off Sokponba Road, Benin City. One of their machine operators, Emeka Okeke, male, said that they adopt the YCMK sequencing meaning that they start from the lightest colour, which is yellow, and end with black. According to Okeke (*Personal Communication*) the reason for this is that they would not have to clean the machine after each colour, as darker colours will naturally cover or overprint the lighter ones. Lucky Adesina, whose print shop is located on First East Circular Road, Benin City, responded similarly to Okeke. Adesina (*Personal Interview*) also said that the economic situation in the country would not allow operators to wash machines after each impression, because this involves buying cleaning chemicals, so he adopts the YCMK sequencing.

Peter Ofolue, who manages a small-sized print shop called The Ma'zelli Prints at Eha-Ekpen Street, Benin City, is the only printer interviewed who adopts the CMYK sequencing. He said since CMYK is the professional and technical order of arrangement, he decided to adopt the sequencing. When asked if it is cost effective to adopt such order, he said he prefers to deliver quality jobs irrespective of the economic constraints. He said it was a simple method because cyan is not too heavy and so yellow will overlap to give green and by the time magenta overlays, it will make it easy for black to cover any mistakes of wrong registration that may have been made (*Personal Interview*). When asked about the differences in the various colour sequencing, Ofolue said all methods will arrive more-or-less at the same full colour work, but with slight variations in tonal value and registration. So he suggested that printers should stick to the method that best suits their personal purposes.

John Udenba who owns a small machine called Rota printing machine said that the method he adopts is the YCMK. According to him, it is the simplest method to adopt and that it was the method he used to train as printer and also the most cost-effective sequence (*Personal Interview*). Of the nine more medium-scale print houses in Benin visited by the researcher, three refused to grant actual interviews. However, the researcher observed that they mostly use the YCMK sequencing for the same reason of cost-cutting, except one, called "The Print House" on Dawson Road, whose Kord-64 machine operator, Mr. Afolabi Kayode said he adopts the YMCK sequence, which is yellow, magenta, cyan and black. His reason was that it was that sequence he trained with at Ibadan fifteen years ago and that he is most comfortable with it and that it is also cost-effective.

Conclusion

In all, it does seem that only a few highly professional print houses in Nigeria take quality of output into keen consideration when dealing with print jobs. This lack of attention to professional details in processes seems to be linked not just to economic down-turn, but to the actual professional competences and training of the owners or workers in print establishments. For example, Ibrahim-Yahaya of Clear Impressions Limited says he cannot sacrifice quality and his press follows the professional processes at all times, to achieve equally gratifying outputs. Besides the inadequate number of workers in the presses, with people taking on several roles, most presses are not manned by persons of actual professional training in printing, but staff with only roadside apprenticeships. Even the University of Benin Press has an educated Manager, but one who's professional training is not in the core print area. So, there does seem to be a lack of qualified professional manpower in Nigerian print houses generally, which is one of the main reasons why they cut corners and shunt professional stages in the printing processes. For most of these operators, the primary focus seems not to be on outputting a professionally quality job, but on saving costs and maximising profits. This "survival strategy" may help to put food on their lean tables, but ultimately does the printing industry in Nigeria much harm, because of the abysmal quality of jobs coming out of this mindset.

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