



ABSTRACT

Forensic Graphics is a scientific aspect of graphic design that deals with the research and development of sensitive paper documents such as banknotes, cheques, books, passports, product authentication, certificate of occupancy, stock certificates, postage stamps, identity cards and so on with the aim of protecting them against forgery and counterfeiting. Forgery and counterfeiting fuel the economic recession and poses a serious threat to financial

FORENSIC GRAPHICS: AN ESCAPE FROM FINANCIAL DILEMMA IN NIGERIA

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Introduction

Forensic Graphics is a scientific aspect of graphic design that deals with the research and development of sensitive paper documents and Products. The Forensic Graphics industry is always struggling to bring up new ideas, with more security features and less costs. The ability to produce security documents and products. Similarly, Security printing is the field of the printing industry that deals with the printing of items such as banknotes, cheques, passports, tamper-evident, product authentication, stock certificates, postage stamps and identity cards. The main goal of security printing is to prevent forgery, tampering, or counterfeiting.

The advent of the computer, direct imaging, desktop publishing and computerized image system that produces excellent color jobs make forgery and counterfeiting of sensitive paper documents and products easier and rampant. Today in Nigeria, counterfeiting and forgery of sensitive paper documents such as banknotes, certificates of occupancy, cheque books, statement of results, cash receipt, identity cards, letterhead papers, drivers' licenses, school certificates, passports, tamper-evident labels, stock certificates, postage stamps and so forth are on the increase. The crime of counterfeiting is as old as the making of Banknote itself (Giesecke & Devrient, 2015). In order to minimise the menace of forgery and counterfeiting, security features are developed by forensic graphic designers. Security features can be classified into three types; those are overt, level one security features that can be seen by naked eyes and then covert level



institutions and consumers worldwide. It is obvious that, counterfeit currency reduces the value of the genuine currency, which will, in turn, affect the consumer through the increase in prices (inflation) and also leads to monetary losses. International Police described counterfeit as the world's fastest-growing crime wave with the potentials of destabilizing the national socio-political, cultural and economic development and threatens global security, and it is a vital means by which terrorists, smugglers, human and drug traffickers, 419ners and other criminals perpetrate and or finance their evil activities. Unfortunately, in Nigeria despite the magnitudes of forgery counterfeiting as financial insurgence, the researchers, forensic designers, security printers, CBN as a regulatory body and law enforcement agencies have virtually left this menace unattended. The researcher noted that, only a few publications are available on forensic graphics and security printing globally, not to mention the third world countries like Ghana, Uganda, Kenya, South Africa and Nigeria where this menace is thrilling. Therefore, this study is embarked upon to explore analyze and address menace using the research and development (R&D) approach.

Keywords: Forensic graphics, Financial Dilemma, Security printing, Forgery and Counterfeiting

two security features and forensics that can only be seen with the aid of tools like a magnifying glass, Ultra Violet lamp, Infra-red viewer and so on, and then lastly, forensic the level three security features, this can only be identified in the laboratory with sophisticated devices, paraphernalia and equipment.

Statement of the Problem

Authenticity is a virtue in any organization because it is a sign of sincerity, security, integrity, honour and morality. It is disturbing to know that an overwhelming number of valuable paper documents and products has been counterfeits on daily basis for selfish interest. International Chamber of Commerce (ICC, 2009), notes that “the international trade in counterfeit and pirated products costs the world economy about 250 billion US Dollars annually”. Moreover, this trend puts over 2.5 million legitimate jobs at risk in the G20 countries alone (ICC, 2009). Narrowing this to Nigeria, the Global Intellectual Property Centre (GIPC) in the Guardian Newspaper (2015) notes that a yearly loss of N200 billion is attributed to forged and counterfeit products.

Counterfeiting is the “world's fastest-growing crime wave”. Phillips, (2005), International Police (INTERPOL, 2018). Annually, about two trillion Naira is taken out of the Nigerian economy to develop the capacity of printing and graphics industry of other nations to the



detriment of the Nigerian printing industry, this includes the importation of over two million metric tons of paper valued at N720 billion Per annum and printing of other finished products such as educational materials, security document, banknotes production, election materials, packaging and so forth, which can be done locally is being taken out of the country unabated. Unfortunately, this leeway to counterfeiters and resulted in the losses of over one million jobs that this industry can provide. Counterfeiting has the potential to destabilize national socio-political, cultural and economic development and threatens global security, and it is a vital means by which terrorists, smugglers, human and drug traffickers, 419ners and other criminals perpetrate and or finance their evil activities. Similarly, International Police (INTERPOL, 2018) stresses that, counterfeited currency poses a serious threat to national economic, financial institutions and consumers worldwide. It fuels economic recession, as well as finances the activities of organized criminal networks and terrorists.

It is obvious that, counterfeit currency reduces the value of the genuine currency, which will, in turn, affect the consumer through the increase in prices (inflation) and also leads to monetary losses. Regrettably, despite the aforementioned consequences of counterfeiting, the forensic graphic designers, researchers, security printers, ink producers, papermakers CBN as a regulatory body and law enforcement agencies in Nigeria have virtually left this menace unattended. Furthermore, Heij, (2017) stresses that, only a few publications are available on banknote design and production processes globally, not to mention in third world countries like Ghana, Uganda, Kenya, South Africa and Nigeria, to mention a few. Therefore, this study is embarked upon to fill the gap that exists in banknote design and production in this part of the world.

Aim and Objectives of the Study

This study aims to explore the various security printing techniques, materials and for the production and protection of sensitive paper documents and products against forgery and counterfeiting.

Justification of the Study

Gbinovia, (2011) observes that, scientific literature and serious research effort directed towards forgery and counterfeiting in Africa is conspicuously absent. Another motivating factor for embarking on this study is the lingering issue of forgery and counterfeiting in Nigeria, which has been left for decades unattended to, for example, apart from Dakyes (2006), who explored local materials to develop security printing Ink for the production of banknotes and security documents, the researcher is unaware of any research effort in the immediate past or in recent time geared to address the long-time problem of currency counterfeiting in Nigeria and Africa by extension. Moreover, this study will serve as a



stimulus for our own indigenous security printing technologies, reducing unemployment, poverty, corruption, insecurity and enhance economic development. Buhari (2015) corroborate this point,” noting that oil will no longer sustain Nigeria”, thus other sectors that could enhance the national economy need some attention.

Significance of the Study

- i. This study constitutes a first step towards developing our own unique indigenous printing technology and opens it up for further research and development endeavours.
- ii. This study serves as a channel to address the long-term problems of faking, and other related crimes in Ahmadu Bello University, Zaria, in particular, and Nigeria as a whole. Hence, Buhari (2015) notes the idea by saying “if Nigeria does not kill corruption, definitely corruption will kill Nigeria.”
- iii. The study will explore and create potential opportunities for indigenous ink producers, colour chemists, graphic designers, in-house paper mill companies as well as security printing industries in Nigeria.
- iv. The research will advance the frontiers of knowledge in the area of currency design, security printing, security design, paper document protection, product protection, piracy, counterfeiting, forgery, fraud, faking and alteration.

Literature review.

The concept of forgery, counterfeiting, piracy, faking, alteration, fraud, corruption and bribery are some of the global crimes which have received little or non-attention from the international community, governmental and non-governmental organizations (Hashim, 2016). Unfortunately, these menaces have not been well addressed, especially in third world countries like Nigeria, where the problem is becoming endemic every day. Forgery and counterfeiting are said to be an aspect of fraud that has become almost a complete way of life for Nigerians at both home and abroad Ladan, (2008). Today in Nigeria, it is hard to see an original product without seeing it's counterfeit. Many Nigerians are seriously indicted for involvement in the menace. According to Bafarawa (2016), “Nigerian corruption starts from the grassroots, therefore 90% of Nigerians are corrupt”. For example, a good number of politicians forging to win elections, civil servants counterfeiting to mismanage public funds, students faking to get admission or scholarship, lecturers forging for promotion, pharmacists fabricating substandard drugs, businessmen importing pirated products, contractors also scamming tax documents, manufacturers are producing substandard products while traders retailing counterfeited products and so forth.

Document theft in Nigeria

Forgery and counterfeiting had being practised all over the world for nefarious reasons, many different types of security printing techniques and materials had been used to



protect valuable paper documents and products from forgery and counterfeiting. In 2016, the former Nigerian's Minister of Finance, Mrs Kemi Adeosun revealed that "over 23,000 ghost workers were exposed in the federal government payroll regrettably, most of them were used forged or counterfeited paper documents in the files, accordant to Adeosun, this action alone helped the federal government of Nigeria to save over two billions Naira monthly". Moreover, President Muhammadu Buhari on the 29th of May, 2016 (Democracy Day) in his speech affirmed the fact by corroborating that "the number of the federal government of Nigeria ghost workers has increased to 42,000, which has helped the federal government of Nigeria recover over four billion Naira monthly from ghost workers' salary" (Buhari, 2016 in Nigerian Television Authority).

Daily Trust Newspaper of Saturday, June 11th 2011, reported, that "a lecturer with Abubakar Tafawa Balewa University (ATBU), Bauchi, as well as Ibrahim Badamasi Babangida University, Lapai Niger State, Daniel Ishola Owaodemi, was found to be teaching for twelve years with fake Ahmadu Bello University, Zaria Certificate". (Olamiti, 2013) Similarly, Malam Tukur Mamu, the proprietor of the Desert Herald Newspaper, was accused of faking Ahmadu Bello University, Zaria's Master's Degree certificate. (Chukwumere, 2013).

Ibeh N. (2014) reported "a group of syndicate printers that specialize in counterfeiting valuable documents for a fee. West African Examinations Council (WAEC) and National Examinations Council (NECO) certificates cost N12, 000 only and can be provided in 30 minutes". In a society like Nigeria where the emphasis is laid on paper qualification rather than capability, this makes nonsense of the need to spend six years in secondary school and four years in university for what could be obtained instantly. The counterfeits look so genuine that one wonders if the certificate does not actually come from the West African Examinations Council (WAEC) Office into the hands of counterfeiter. (Ibeh N. (2014). to mention but a few.

These menaces have brought a great setback to national development. For this reason, there is a need for serious and urgent efforts from graphic designers, researchers, and in-house security printing industries to jointly tackle this ugly phenomenon for Nigeria to move forward.

Similarly, (Ebegbulem, 2017) of Vanguard newspaper reported that, the Edo State House of Assembly has received a petition on Automated Teller Machine (ATM), of one of the New Generation Bank in Benin, for dispensing fake Naira notes to some customers. On the other hand, the online side of the Nigerian banking industry is not free from this menace as the Guardian Newspaper November, 9th 2017 reported that, ATM, Web and mobile platforms account for 77% of fraud incidences in Nigeria. Furthermore, from 2007 to 2017, the Nigerian banking industry especially through the electronic payment channels lost about N237 billion to fraudsters in ten years (Adepetun, 2017).

Unfortunately, in Nigeria, the lukewarm attitude exhibited by the government and CBN as a regulatory body over currency counterfeiting as well as the nonchalant attitude of the general public have contributed towards the escalation of currency counterfeiting in



the Country. Financial Action Task Force (FATF, 2013) states that, between June 2008 and June 2009, a total of 1.3 billion counterfeit notes were seized in Nigeria principally in Naira and US dollars. Furthermore, Jibueze (2016) of the Nation Newspaper, published an article titled, "Ex-soldier jailed seven years for Naira currency counterfeiting". On February 13, 2016, the Federal High Court in Lagos sentenced former Nigerian army personnel, James Onwuso, to seven years imprisonment for counterfeiting naira notes. Also recovered from him were machines and other materials used in currency counterfeiting. In a similar case, a 37-year-old Chinedu Oneli, was arrested and confessed to the police for buying fake naira notes at Alaba International Market, Ojo, Lagos, and exchanged same for original Naira notes through bus conductors and traders. This is just to mention but a few. Modern currency counterfeiting has become warfare. The idea is to overflow the enemy's economy with fake notes, so that, the real value of their money will have plummeted. Great Britain did this during the revolutionary war to reduce the value of the Continental Dollar. Moreover, this tactic was also employed by the United States during the American Civil War (New World Encyclopedia, 2018) and so on.

Forgery and Counterfeits

The words forgery and counterfeit are two different names that are synonymous in usage and different in action. Forgery has to do with the unlawful altering of genuine documents such as changing of name, grade, year, rank, gender, registration number, Plates, passport and or signature of a genuine document with the intent to deceive someone. While counterfeit has to do with the complete reproduction of fake documents or products to look indistinguishable from the original, with the intent to deceive the end-users. According to National Document Fraud Unit United Kingdom (NDF UK, 2014), "forgery is a form of fraud that deals with the altering of products or valuable paper documents". A forged document is an original document that is unlawfully altered with intent to deceive, while counterfeit is the complete reproduction of a fake version of an original document from scratch to resemble an officially issued document (NDF UK, 2014).

The Economics of Counterfeiting

Michael Harvey argued that a counterfeit protection system is highly essential in the corporate business environment today. That statement was made in his article 'New Ways to Combat Counterfeiting' in 1988 (Harvey, 1988). Even up to date there are very few papers that discuss the efficiency of strategies to combat this issue. Firstly, I will review theory concepts that explain why and where counterfeiting takes place. I will further present the facets within the organization that comes to play an important part in this process, thus from an organizational perspective. Moreover, I will discuss brand-degradation and how the internet/globalization has contributed to today's economic environment of virtual markets.



Furthermore, the epidemic of Counterfeit products has threatened business owners, consumers and governments all globally, on a daily basis. In 2005, international trade of counterfeited products was estimated to 200 billion USD. This analysis excluded the Internet as a trading platform due to the magnitude of information, which would have been impossible to address. Economists argue that these numbers could easily be several hundred billion more (OECD, 2008).

Counterfeiting is an illegal act, whereas the main incentives for these criminal networks are monetary. Thus, reports made have also indicated that many products may pose health risks, and safety risks, even to the extent of life-threatening risks. The economic impact of counterfeiting does not stop there; it is argued by many that the global economy is highly threatened by this economic phenomenon. It has wide implications for example the innovation process, which is important to worldwide economic growth. To put this in perspective, Berman 2008, stated; “An IDC Economic Impact Study estimates that if all global software piracy was lowered 10% over the next four years, this would contribute 2.4 million new jobs and 400 billion USD in economic growth to the global economy”. It affects governments in terms of tax losses, costs that are related to addressing this issue, and moreover, in some parts of the world corruption runs deep for criminals to be able to facilitate its illicit activities. The magnitude of this problem needs to be solved by governments, businesses and consumers in co-operations. However, we are still in an ‘initial’ state to combat counterfeiting due to insufficient and poor legislation in terms of IPR protection, patent rights and also stricter policies against counterfeiting and piracy in some parts of the world. Due to the global economy with physical distances erased, there needs to be a cohesion policy and wide implications worldwide for such actions, but unfortunately as mentioned, we are still in an early stage where one might argue that there is a lack of knowledge and information in how to handle the situation with counterfeiting both on a macro and micro level. For organizations today and specific industries, it might be considered naive to only rely upon and trust government initiatives and non-profit organizations to address this issue.

Since counterfeit products represent 6% of all global trade, there are no doubt that it is the businesses that take the hardest hit, and the losses are not only related to loss in sales revenues. Companies have to deal with several problems such as damage to their brand, whereas the brand equity (e.g. loyalty), trademark, goodwill and current reputation is being exploited and used (Harvey, 1988). Certain brands strive on their image were efforts in building public brand personality, loyalty and awareness. These processes do not come cheap. A deceptive or non-deceptive purchase has both negative implications towards the genuine business, where two markets occur namely, a primary and a secondary market, which I will discuss later in this dissertation. Nevertheless, it has as mentioned not only economic implications. Consumers that are exposed to inferior counterfeit goods in for example the pharmaceutical market are under serious risks. There have been several cases of deaths due to falsely entered counterfeit medicals. Furthermore, other industries that are being exposed and deceived by fake products are for example the audio and



visual sectors, automotive sectors, electronic sectors, food and drink sectors, pharmaceutical sector, the tobacco sector and the perfume sector to name a few. The trade of fake products to these sectors is equivalent to the national GDP of approximately 150 economies (OECD, 2008). Hence, this cause for both broad and profound effects, which also will be discussed later in this dissertation. According to the OECD counterfeiting has implications on;

- i. “General Socio-economic effects –criminal activities, environment, and employment, foreign direct investment and trade”.
- ii. “Effects on rights holders – Sales volume and price, brand value and reputation, royalties, firm-level investment, cost and the scope of operations”.
- iii. “Effects on consumers – Health and safety risks and consumer utility”
- iv. “Effects on governments – tax revenues, expenditures and corruption”. (The economic impact of counterfeiting and piracy – OECD, 2008).

All these four general effects will however not be analyzed in this study. I will address the aspect from the business perspective and the second issue mostly since it is accurate to argue that problems originate and stems from their success. At this point, there is a need for a strengthened knowledge base for this issue, both from a governmental perspective but more importantly, from a business perspective. This dissertation will give important managerial insights from global brands perspectives in strategically combat counterfeiting and piracy. Both theoretical studies and the little empirical information we have suggest that high-quality counterfeiting is expensive and only effective when few counterfeits are passed relative to the amount of genuine currency in circulation. Producing high-grade counterfeits requires access to presses, inks, and high-grade paper. The last item is the most important element because cashiers and bank tellers often rely on touch to detect counterfeits. In addition, the notes must then be either passed or distributed to others for passing, which is a complicated undertaking when large volumes of notes are produced. A bank or an individual might be fooled into accepting a batch of counterfeits once, but it seldom happens more than that. Thus, the notes must be ever more widely dispersed. Informal discussions with the Secret Service indicate that the full cost of producing and distributing high-grade counterfeit \$100s can be in excess of \$50 per counterfeit.

Research Design and Method

Rajasikaet. *al* (2013) describes research design “as a structural plan and strategy of investigation conceived to obtain answers to research questions and to control variance”. Osuala (2006) describes research as “the process of arriving at dependable solutions to problems through the planned and systematic collection, analysis and interpretation of data”.

In order to achieve the desired objectives of this study, experimental and survey research methods was employed. The justification for adopting experimental and survey research



designs lies in the fact that, Roy (2012), used experimental research design to authenticate the Indian Rupee printing techniques, similarly, Dakyes (2009), Hashim (2016), Ojo and Ojo (2017), their findings were found to have both internal and external validity. Likewise, in 2017, NOIPolls used a survey research design to investigate the level of counterfeit Naira notes in circulation, and their findings were found to have both internal and external validity.

Population of the Study

According to Awotunde and Ugodulinwa (2004), the population in research is a group of things or body which the study intends to obtain information and draw a conclusion from. The target population for this study will be drawn from the following:-

- 11 Printing techniques.
- 100 Professionals and Academics Graphic designers, Security Printers, Colour Chemists and Paper makers in the following organizations:
Nigerian Security Printing and Minting Company Plc,
Department of Industrial Design ABU Zaria

Procedure for Analyzing Data

Percentiles and frequencies were used to analyze the data collected via the questionnaires, interviews and observations. This method of data analysis appeared to be most suitable for the analysis of data collected for this kind of study because, it gave the researcher a leeway to first and foremost stockpile the data, calculate them and thereafter represent the results in tables using percentiles.

Table 1: Overall Responses Rate of the Questionnaire administered

	Questionnaire Distributed	Questionnaire Retrieved	Questionnaire Valid for Analysis	Percentage
Professional graphic designers working in the security printing industries and graphic design lecturers.	114	107	86	75.4%

Source: Hashim (2018)



Table 4.1 the above demonstrates the responses rate of the questionnaires that were developed and administered for the study. A total number of 114 copies of the questionnaire were distributed to the Professional graphic designers working in the Nigerian security printing industries, graphic design lecturers and postgraduate students, out of which only 107 copies were retrieved, also only 86 questionnaires (75.5%) were examined and found to be valid for analysis. By implication, this percentage ratio of the response rate was highly worthy to be accepted for analysis.

Descriptive Statistical Analysis

The results were analyzed both quantitatively and qualitatively. The descriptive analysis in terms of percentile and frequency were used to illustrate the outcome of the research to enable a clear understanding of each item, while percentile rank was used for the inferential analysis of the data was used for the analysis of the data collected as used by Joshua (2015) and Muhammad (2018).

Table 2 which of the following printing techniques are mostly used in counterfeiting Naira notes?

techniques used in counterfeiting	SA		A		U		SD		D		Result
	F	%	F	%	F	%	F	%	F	%	
Scanning technique	61	70.9%	13	15.1%	2	2.3%	3	3.5%	7	8.1%	Accepted
Re- Printing technique	16	18.6%	13	15.1%	43	50.0%	6	7.0%	8	9.3%	Rejected
Excess Print	11	12.8%	5	5.8%	43	50.0%	11	12.8%	16	18.6%	Rejected
Copying technique	43	50.0%	2	2.5.6%	7	8.1%	3	3.5%	11	12.8%	Accepted
Altering technique	0	0.0%	0	0.0%	35	40.7%	37	43.0%	14	16.3%	Rejected
TOTAL	131	30.5%	53	12.3%	130	30.2%	60	14.0%	56	13.0%	

Source: Hashim 2019



The above revealed the outcome of the research question two, which asked, which of the following banknote printing techniques are mostly used in the counterfeiting of valuable paper documents and products? Five reproduction techniques were listed: scanning technique, re-printing technique, excess print technique, copying technique, as well as altering technique.

Table 2 shows that 74 respondents out of eighty six which represents (86.0%) agreed with the fact that scanning technique is mostly used in counterfeiting valuable paper documents and products, followed by copying technique with 72 respondents out of eighty six which represents (75.6%). At the same time, the respondents are uncertain either or not excess print and re-printing techniques are used in counterfeiting valuable paper documents and products. Furthermore, the study rejected the fact that the altering technique is used in counterfeiting valuable paper documents and products. By observation naira notes are mostly reproduced through scanning and re-printing techniques, this stresses the finding of Chambers (2014) who states that, the scanning technique in currency counterfeiting is more troublesome than photocopying as counterfeiters can process images using Photoshop editing software, and it will give room for a precision modification specifically of serial numbers making duplicates potentially difficult to detect depending on the print, ink and substrate fidelity.

Findings

INTERPOL, (2018) observes that, there are five major counterfeiting techniques those scanning technique, reprinting technique, excess print, copying technique, and altering technique. This research finds that, scanning and copying techniques are mostly used in counterfeiting valuable paper documents and products. This stresses the finding of Chambers (2014) who states that scanning technique in currency counterfeiting is more troublesome than photocopying as counterfeiters can process images using Photoshop editing software which will give room for a precision modification specifically of serial numbers making duplicates potentially difficult to detect depending on the print, ink and substrate fidelity.

Two sets of forensic graphic designers were identified: such as CBN certified security printers and self-acclaimed security printers. While the CBN certified security printers had in-depth knowledge of security printing inks and their applications security printing, but the self-acclaimed security printers are lacking adequate knowledge of one of the components of security printing which is inks.

Three levels of security features were identified which are: the Overt (level one.), Covert (level two.), and Forensics (level three.) security features.



Recommendations

Based on the findings of this study, is hereby recommended that:-

- It is recommended that, security printing law (Printing Special act) should be formed to regulate, control, certified and penalize any person, press or organization (self-acclaimed security printing) that fund designing or printing any aspect of forensic graphics or security printing with authorization.
- It is recommended to integrate the security features that are easy to recognize without any need for a lens or devices.
- Naira notes are printed outside Nigeria by the overseas security printing companies such as Giesecke+Devrient (G+D) in Germany, De La Rue In the United Kingdom, Crane Currency in the United States of America and international printers not by the Nigerian Security Printing and Minting Company (NSPMC). Unfortunately, Olatujoye, (2006). Affirms that, the printing of a country's currency outside the frontier may give room to lapses in printing and minting of such currency. This can also open up opportunities for currency counterfeiters in faraway countries.
- It is recommended that, Nigerian Security Printing and Minting Company (NSPMC) should put more effort into localizing the production of the Nigerians' currency locally, by encouraging and sponsoring research effort on forensic graphics and security printing from the recognised institutions of learning. For instance the efforts of Dakyes 2016.
- It is necessary to equip Nigerian Security Printing and Minting Company (NSPMC) with state-of-the-art machinery in order to localize the production of the Nigerian currency note.
- It is necessary to develop in-house non-commercially available security ink that can protect naira notes from unauthorized reproduction through scanning and copying techniques.
- It is recommended to explore indigenous images, symbols motifs and national features on Nigerian currency notes as security features that will enhance the allure of the Nigerian currency and Products.

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