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Trends and Patterns of Cyber Crime Research Publications in Nigeria: An Infometrics Analysis

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Abstract

This study measured, identified and determined the research visibility, productivity and trend in cybercrime research publications in Nigeria from 2009 to 2018 using an informetric method. The study analysed the informetric growth rate of cybercrime research productivity; the performance of researchers in cybercrime; the preferred research communication outlet by Nigerian researchers in cybercrime; research productivity of authors in cybercrime; the trend of research in cybercrime among Nigerian universities; the research collaboration pattern of Nigerian researchers with other countries; how researchers in cybercrime communicate in Nigeria; and the citation analysis of researchers in cybercrime in Nigeria. The descriptive informetric technique of content analysis was used as the primary research instrument in which 69 documents were retrieved from SCOPUS for the analyses. Information relating to cybercrime was harvested from SCOPUS and quantitatively evaluated using semi-log growth model, and frequencies of occurrence of different indicators, such as authors, years, affiliation, the trend of collaboration and citation analysis concerning cybercrime within the timeframe of ten years. The research revealed among others, that although there were few existing publications by Nigerian scholars, there was a steady increase in cybercrime publications output within the time frame studied, with the publications appearing in a total of 7 journal titles; the major sources of research communication being journal articles and Conference Proceedings. It shows that the trend of research collaboration between Nigerian researchers and scholars in other countries of the world was low. The study recommends better research funding for investigation into cybercrime. The grants should be made widely available by the various Universities and other higher institutions, to galvanize research efforts of those interested in researching into cybercrime in Nigeria. This will also enable the conduct of quality research that will be publishable in high impact and visible communication outlets.

Keywords: *cybercrime, internet fraud, identity theft, hacking, internet fraudsters, Nigeria, informetric, research output, research productivity.*

Introduction

The cyberspace is inundated with a lot of business opportunities and has become a global market square of both virtual and physical products. Given this limitless opportunities and possibilities, it has also become an avenue for swindlers whose intension is to ambush and take advantage of the unsuspecting victim by robbing them of valuables under the deception of doing legitimate business. Nigeria has acquired notoriety with internet scams, and the activities of these internet fraudsters have been captured in the country's Criminal Code, Section 419 (Bergiel, Bergiel and Balsmeier, 2008:133). The level of internet fraud has assumed alarming proportions, to the extent that it has constituted a grave security threat capable of jeopardising the image of the country even further. Youngsters known in local parlance as "yahoo boys" are engaged in numerous internet aided crimes, such as fraudulent e-mails, pornography, identity theft, cyberbullying, hacking, spamming, phishing, automated teller machine spoofing, piracy and violation of privacy with the purpose of blackmailing (Omodunbi, Odiase, Olaniyan & Esan, 2016).

Activities of hackers pose a grave danger to banks across the globe; Nigeria, just like the rest of the world, continues to pay a heavy price for any loophole capitalised on by cyber fraudsters; causing the country to lose an estimated sum of US $500 million per annum, which is an enormous sum for a middle-income nation. Africa is the most affected continent in the world in terms of infected IT infrastructure as most of the counterfeit software end up in the continent partly as a result of the high cost of buying original versions, while 82% of software

in Nigeria is counterfeit (Ablon, 2018). Given these challenges, many internet networks have become prone to cyberattacks (Shiloh and Fassassi, 2016). The mobile telephone revolution in Africa represents 3.7% of the GDP of the whole continent, which is three times higher than even in developed nations, but it has also become another problematic area which has made the mobile banking sector susceptible to cyberattacks (Center for Strategic and International Studies, 2017). The furthermost Pan-African legal framework is the African Union Convention on Cyber Security and Personal Data Protection, which was adopted in June 2014. Regardless of this, many countries still have limitations in the enforcement of the law (Henry and Alexander, 2012*)*.

Statement of the problem

Cybercrime has increasingly become a big problem and smear to the Nigerian society and it needs to be eliminated. Although there is a common understanding that many teenagers get involved in cybercrime for reasons such as: to gain superiority over their peers; to gain acceptability before friends of similar inclination; having access to convenient easy-to-use hacking tools; or for the financial gains given the excuse of high unemployment in Nigeria as the motivating factor, more understanding about the phenomenon is needed by way of empirical research. This will create deeper understanding of its root causes, effects and how to curb the spread. As was noted by Ajiferuke, (2011), research in the African continent is confronted by many challenges, leading to it having the lowest research output in informetric evaluation globally. The field of cybercrime research appears to be worst hit by those challenges and a lack of research interest by scholars, precipitating a dearth of empirical evidence to substantiate or disprove the widely held beliefs on cybercrime. The gap in knowledge orchestrated by this lacuna is worrisome and is the interest of this study to contribute in filling by evaluating trends and patterns of cybercrime research publications among scholars in Nigeria.

There are countless benefits of cybercrime analysis and assessment, one of which is that it provides warning signs that will help to protect against the perils and threats of cybercrime by giving useful recommendations to improving cyber security. Infometric evaluation of cybercrime helps to identify vulnerabilities, security requirements, and educate the populace (D'mello, 2019).

Objectives of the Study

The aim of this study was to measure, identify and determine the research visibility, productivity and trend in cybercrime research productivity in Nigeria in a period of ten years, 2009 to 2018 using an informetric method, while the specific objectives were to:

i. measure the informetric growth rate of cybercrime research productivity;

ii. examine the performance of researchers in cybercrime;

iii. identify the preferred research communication outlet by Nigerian researchers in cybercrime;

iv. identify research productivity of authors in cybercrime;

v. reveal the trend of research in cybercrime among Nigerian universities;

vi. examine the research collaboration pattern of Nigerian researchers with other countries;

vii. evaluate how researchers in cybercrime communicate in Nigeria; and

viii. assess the citation analysis of researchers in cybercrime in Nigeria.

Research method and procedure

The research was limited to publications , namely: articles, conference papers, book chapters and reviews) produced between 2009 and 2018, because they are the only available research contribution on SCOPUS. The descriptive informetric procedure of content analysis was used as the primary research instrument technique. Informetrics is one of the foremost subfields of information management and also quantitative aspects of information, which include production, dissemination and use of information, regardless of its form or sources. Conducting informetric research entails insightful knowledge of how to access

different data sources, download and arrange data appropriately to get meaningful outcomes**.** Informetric analysis is generally carried out on the numbers of publication output and citations to get a more comprehensive assessment of research productivities and facilitate comparisons. For the sake of this research, information concerning cybercrime in Nigeria between 2009 to 2018 was accessed using SCOPUS which is an online subscription-based database providing wide-ranging citation coverage since the year 1900.It encompasses over 50,000 academic books, 12,000 journals and 160,000 conference proceedings (Clarivate Analytics, 2017). In accessing the information, 69 document results were harvested, and Microsoft Excel was used for the analysis and presented in quantitative data with the semi-log growth model, and frequencies of occurrence of different indicators, such as authors, years, affiliation, the trend of collaboration and citation analysis concerning cybercrime within the timeframe of ten years.

Significance of the study

The National Universities Commission's (2019) listing of 174 accredited universities in Nigeria, shows the abundance of scholarly manpower to research into any subject matter. In spite of this manpower abundance, there is scarcity of research publication by Nigerian scholars on research relating to cybercrime, despite the social and economic problem it constitutes as reflected in the number of visible publications harvested for this study from SCOPUS. Given the abundance of human resources available in Nigeria, this lacuna in investigating the phenomenon is surprising. This subject matter is a contemporary issue however, and may account for this gap in research efforts and available empirical literature. Although there is possibility that other databases may hold same or other publications relating to cybercrime research in Nigeria, this study is limited to the hits obtained from a search on the SCOPUS database. Only 69 research outputs on the subject matter were found on SCOPUS which is one of the largest and widely used electronic databases in the world.

This research will be of high significance to society in three areas:the first being that it will add to the body of knowledge by expanding the existing literature; the second significanceis that it will improve existing theory and knowledge about cybercrime and points the attention to the urgency of the practice of fighting cybercrime. The third significance is that the research presents a social problem that has not attracted significant attention of scholars in Nigeria by the evidence of scarcity of empirical research, and therefore, will likely lead to policy changes on the fight agains cybercrime. Achieving a policy change is urgent given that cybercrime takes place in the cyberspace which often time leaves no physical proof; therefore,a conventional method may be lacking in fighting this nature of crime; hence contemporary policy must change to include more effective crime-fighting strategies.

Research in the African continent is confronted by many challenges, leading to having the lowest research output in informetric evaluation (Ajiferuke, 2011). This is the first informetric assessment of cybercrime research by any researcher in the context of the Nigerian environment. Although Durodolu, Adeleke and Ojo (2019) evaluated the trend and pattern of medical research in Nigerian Universities within the span of ten years and also Durodolu and Ojo (2018) conducted the informetric growth analysis of Engineering research within the space of ten years in the same country, this subject matter is different and novel. Other studies outside the Nigerian context have also confirmed the paucity of research in cybercrime, such as Leukfeldt (2017) who confirmed that the utmost tenacious issue in research into the human dynamic in cybercrime and cybersecurity is the scarcity of longitudinal studies. Owing to this dearth, there is insufficient research to establish the causes and effects of cybercrime in different contexts to enable comparisons of data over a long period of time and to facilitate ability to tackle the root causes of the problem and offering appropriate long-term interventions, training programmes and awareness campaigns.

Results and discussions

The results are presented in the eight sections below.

What is the informetric growth rate of cybercrime research productivity in Nigeria (2009–2018)?

The growth rate of cybercrime research productivity in Nigeria between 2009 and 2018

This presents a semi-log growth rate model of cybercrime research productivity in Nigeria between 2009 and 2018. The ordinary least squares (OLS) method of time series regression was used to estimate the model. The result showed that the growth rate of cybercrime research productivity is 20.28% between 2009 and 2018, as indicated by the t-value of 0.202831. The probability value (0.0078) showed that research productivity in the cybercrime space in Nigeria has significantly increased within the space of ten years. The growth rate was found to be statistically significant at 5% level of significance. Therefore, the researcher is ninety-five per cent confident that the growth rate of cybercrime research productivity in Nigeria is sacrosanct. The R^2 value of 0.607686 indicates that a 60.8% variation in the growth rate of productivity of cybercrime research is accounted for by time. The F-statistic of 12.39185 (p=0.007844) showed that the model obtained is considered useful and worthwhile to forecast the future growth of cybercrime research productivity in Nigeria. This result implies that cybercrime research productivity in Nigeria has been highly prolific in the research environment over the period under consideration. Nevertheless, the quality of any research work is adjourned beyond the proliferation of research outputs. Factors such as several citations received in the past, current and future journals and impact criteria occupy higher precedence than research copiousness in consideration of the impact of research published on the development of the society.

Time series analysis requires strict adherence to certain assumptions. Hence, it was needful to test key informetric requirements, namely the Breusch-Godfrey serial correlation test, heteroskedasticity, Jarque-Bera statistics and residual tests of stationarity to avoid unbiased, spurious and incorrect result which has often littered the informetric research space. The Breusch-Godfrey serial correlation value of 1.640627 (p=0.4403) indicates no serial correlation at p>5% level of significance. The heteroskedasticity value of 0.245232 (p=0. 6205) to no heteroskedasticity at p>5% level of significance, Jarque-Bera statistics of 0.852297 (p=0.653) suggests that the residual of the semi-log model is normally distributed at p>5% level of significance. The residual was stationary at p>5% for all the auto and partial correlation values. Therefore, it can be accepted that the semi-log time series regression model obtained is highly valid and reliable for estimating the growth of research on cybercrime in Nigeria between 2009 and 2018. For the full result of the statistics on the informetric assumptions, see the Appendix.

Dependent variable: LOG (Y)
Method: Least squares
Date: 06/21/19 Time: 07:02
Sample: 1 10
Included observations: 10

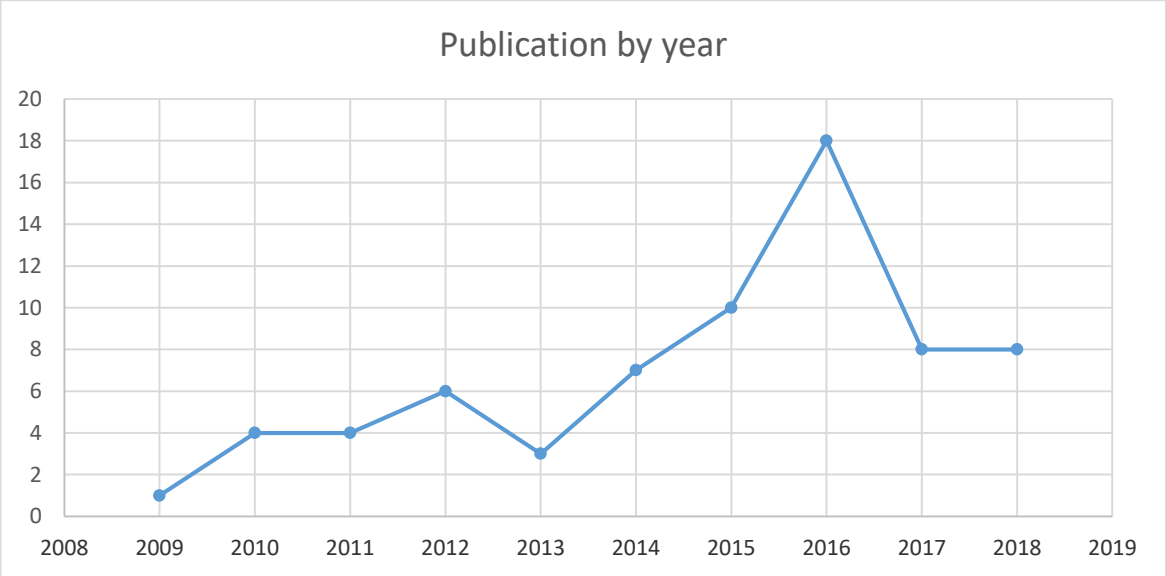
Variable	Coefficient	Std. error	t-Statistic	Prob.
C	0.580499	0.357517	1.623694	0.1431
T	0.202831	0.057619	3.520207	0.0078

R-squared	0.607686	Mean dependent var	1.696071
Adjusted R-squared	0.558647	S.D. dependent var	0.787773
S.E. of regression	0.523352	Akaike info criterion	1.719731
Sum squared resid	2.191178	Schwarz criterion	1.780248
Log-likelihood	-6.598656	Hannan-Quinn criteria.	1.653344
F-statistic	12.39185	Durbin-Watson stat	1.798855
Prob(F-statistic)	0.007844		

What are the performances of researchers in cybercrime in Nigeria?

The research productivity index in figure 1 revealed continuous research outputs from 2009 to 2016 of all of the 69 research publications within the observed years, rising steadily from one research article to 18, but there was significant downward output from 2017 to 2018. A closer look at the report of the yearly research output, namely 2009 (1 representing 1.45%), 2010 (4 representing 5.79%), 2011 (4 representing 5.79%), 2012 (6 representing 8.70%), 2013 (3 representing 4.35%), 2014 (7 representing 10.14%), 2015 (10 representing 14.49%), 2016 (18 representing 26.09%), 2017 (8 representing 11.59%) and 2018 (8 representing 11.59%) of the research performance of Nigerian universities, emphasises the research outputs in visible accredited journals, books and appropriate publications in conference proceedings.

Figure 1: Research Productivity Index



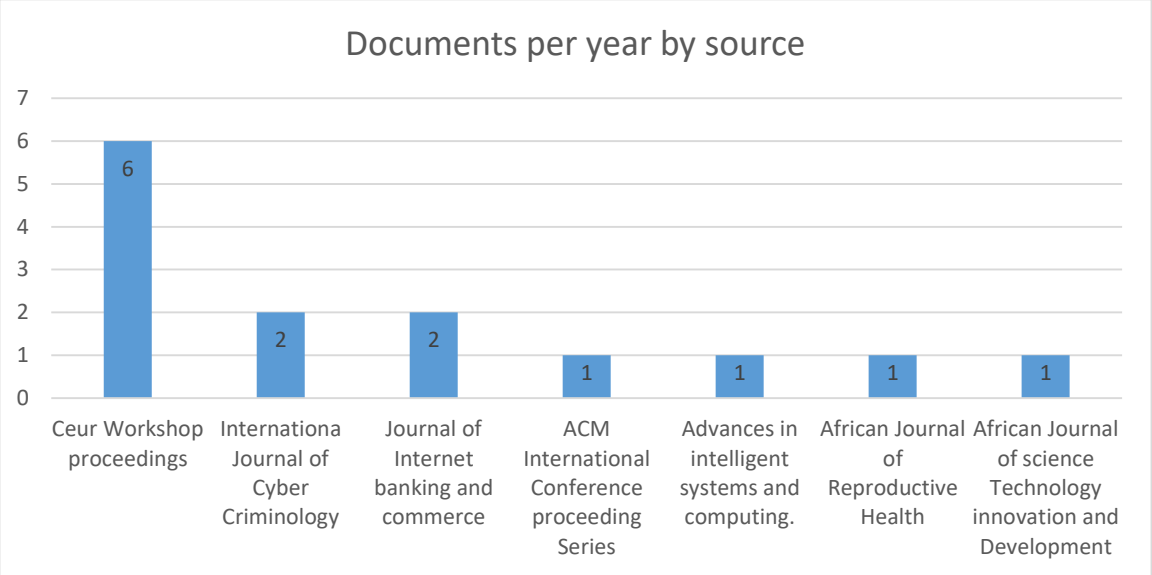
What are the preferred research communication outlets by Nigerian researchers in cybercrime?

Figure 2 revealed the publishing sources of researchers in Nigeria in the subject area of cybercrime, under the reviewed years of 2009 to 2018, showing the top sources of publications. Evaluating those sources revealed that researchers in cybercrime in Nigeria communicate their research output through peer-reviewed sources indexed in SCOPUS, which means when the research was carried out, it was assessed and appraised by another expert in the field of study to ensure and ascertain the quality. The communication outlets were Ceur Workshop Proceedings which had six (6) published documents, followed by the International Journal of Cyber Criminology and the Journal of Internet Banking and Commerce which had two (2) published documents respectively. The remaining four (4) outlets had one (1) publication each respectively, and they include: ACM International Conference Proceedings Series; Advances in Intelligent Systems and Computing; African Journal of Reproductive Health; and African Journal of Science, Technology, Innovation and Development.

The implication of this trend is that there is not much presence of Nigerian researchers in the frontline cyber crime journal which is the International Journal of Cyber Criminology, which had a paltry 2 publications per year average. Given that highest average of six (6) per year was obtained in a conference proceeding which has limited readership of those within the field of the conferences, the implication is that the findings of those papers presented may not be widely appreciated and therefore, may not have a far reaching impact on policy changes and curative actions on cyber crime spread. The return of one (1) publication per year average for the rest is a meagre outcome that speaks for itself over the paucity of research publications output by scholars in Nigeria, with implications that without

adequately investigating and providing empirical knowledge about how to curb the menace of cyber crime in Nigeria, the malady will continue to fester.

Figure 2: Published Documents per Year



How productive are Nigerian authors in cybercrime?

Table 1 shows the level of productivity among ten leading authors. Research productivity is the quintessential gauge of proficiency in any knowledge production system. It has become a usual practice in informetrics evaluation to define research outputs based on the number of publications outputs per researcher, distinguishing it from impact. The table revealed the list of researchers investigating factors surrounding cybercrime in Nigeria within the space of ten years. Ten of those prolific researchers were selected for this study. The investigation revealed that Tade, O. contributed four articles, which represented 5.79% out of the total output of 69; on the order hand, Chukwudebe, G.A. and Osho, O. contributed three articles, which is 4.34% respectively. Other contributors to the research are Adeniyi, O., Akanle, O., Alhassan, J.K., Kayode, A.B., Misra, S., Ndubueze, P.N., and Okafor, K.C. who made a contribution of two articles respectively, representing 2.89% each.

Table 1: Ranking of the most published authors on cybercrime research (N=69)

S/N	Name of authors	Institution	No. of articles	%
1	Tade, O.	University of Ibadan	4	5.79
2	Chukwudebe, G. A	Federal University of Technology, Owerri	3	4.34
3	Osho, O.	Federal University of Technology, Minna	3	4.34
4	Adeniyi, O.	University of Ibadan	2	2.89
5	Akanle, O.	University of Ibadan	2	2.89
6	Alhassan, J.K.	Federal University of Technology, Minna	2	2.89
7	Kayode, A.B.	Federal University of Technology, Akure	2	2.89
8	Misra, S.	Covenant University, Ogun State, Nigeria	2	2.89
9	Ndubueze, P.N.	University of Nigeria, Nsukka	2	2.89
10	Okafor, K.C.	Federal University of Technology, Owerri	2	2.89

What is the trend of research on cybercrime among Nigerian universities?

Table 2 revealed the trend of research among Nigerian universities. Among the higher institutions of learning in Nigeria, the University of Ibadan is more visible in its contribution to cybercrime by having 17 publications representing 24.6% of the total research output in the subject matter, followed

by the Federal University of Technology, Minna, Covenant University, Federal University of Technology, Owerri with 9 (13.04%), 8 (11.59%) and 6 (8.69%) respectively. Other universities are Obafemi Awolowo University and Federal University of Technology, Akure, with 4 (5.79%) each. Trailing behind other institutions are the University of Nigeria and the University of Lagos with 3 (4.34%) and 2 (2.89%) respectively.

Table 2: Distribution of research by affiliation

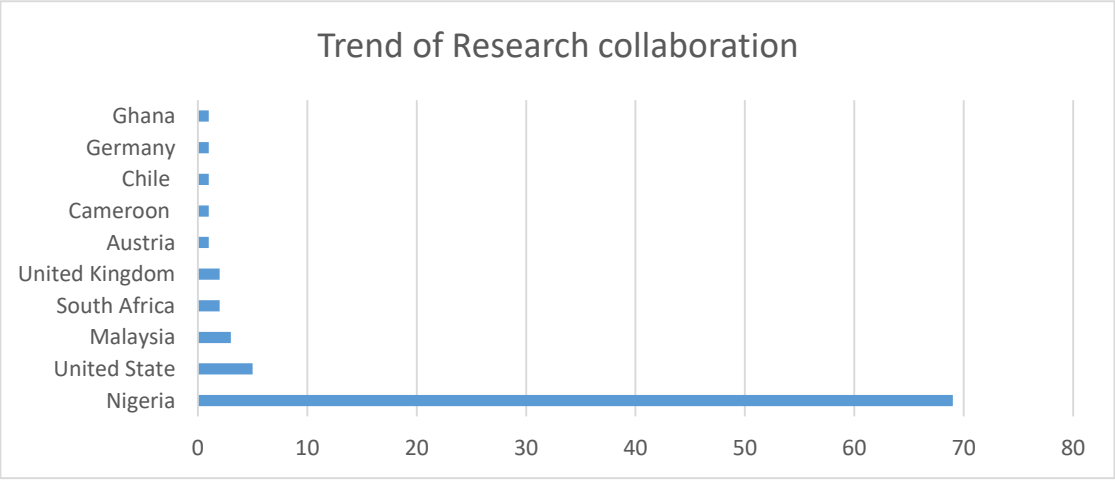
S/N	Distribution of research by affiliation	Number of articles	%
1	University of Ibadan	17	24.6
2	Federal University of Technology, Minna	9	13.04
3	Covenant University	8	11.59
4	Federal University of Technology, Owerri	6	8.69
5	Obafemi Awolowo University	4	5.79
6	Federal University of Technology, Akure	4	5.79
7	University of Nigeria	3	4.34
8	University of Lagos	2	2.89

What is the research collaboration pattern of Nigerian researchers with other countries in relation to cybercrime?

Figure 3 shows research collaboration that exists where scholars in a similar or diverse discipline team up within a faculty, university or intercontinentally to investigate a mutually beneficial area of study and give a solution. This is a reflection of the fact that internationalisation is rapidly growing among Nigerian scholars because of the channel of communication that has been open between Nigeria and many other countries of the world. As indicated in the figure, it shows that in the research area of cybercrime, the United State of America tops the list of countries collaborating with Nigeria. Out of the 69 research publications in Nigeria in the subject area of cybercrime, Nigerian scholars teamed up with scholars from the United States in 5 research articles representing 7.24%, followed by Malaysia in 3 (4.34%), South Africa and the United Kingdom in 2 (2.89%), and other countries like Australia, Cameroon, Chile, Germany and Ghana have 1 publication each representing 1.44%.

In a related study, Onyancha (2018) is of the opinion that research collaboration has the capacity to increase research output and that it is significant that institution should initiate plans that will produce favourable environments for research collaboration.

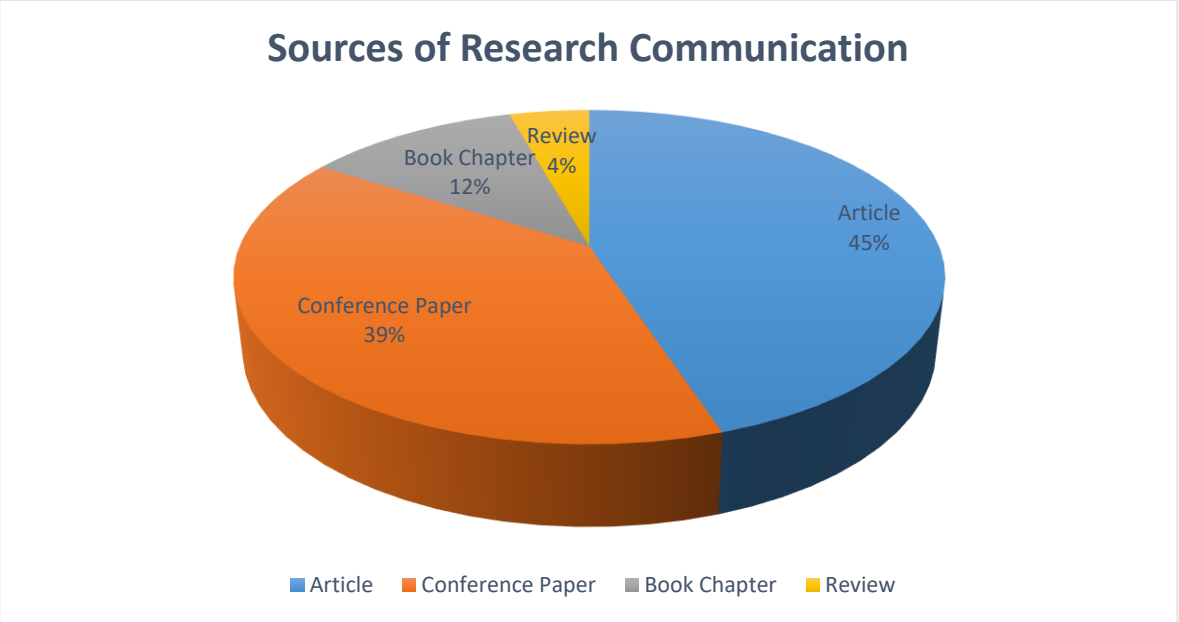
Figure 3: Trend of Nigerian Researchers' Collaboration with those in Other Countries



How researchers in cybercrime in Nigeria communicate research output

Figure 4 shows how Nigerian scholars in cybercrime communicate their research finding. A research article communicates the outcomes of innovative research, evaluates its impact on the body of knowledge in a particular subject area, and is published in a peer-reviewed scholarly journal. In cybercrime, 31 research findings were communicated through research articles representing 45% of all the publications; this is followed by conference papers which is 27 (39%), and book chapters and reviews which are 8 (12%) and 3 (4%) respectively.

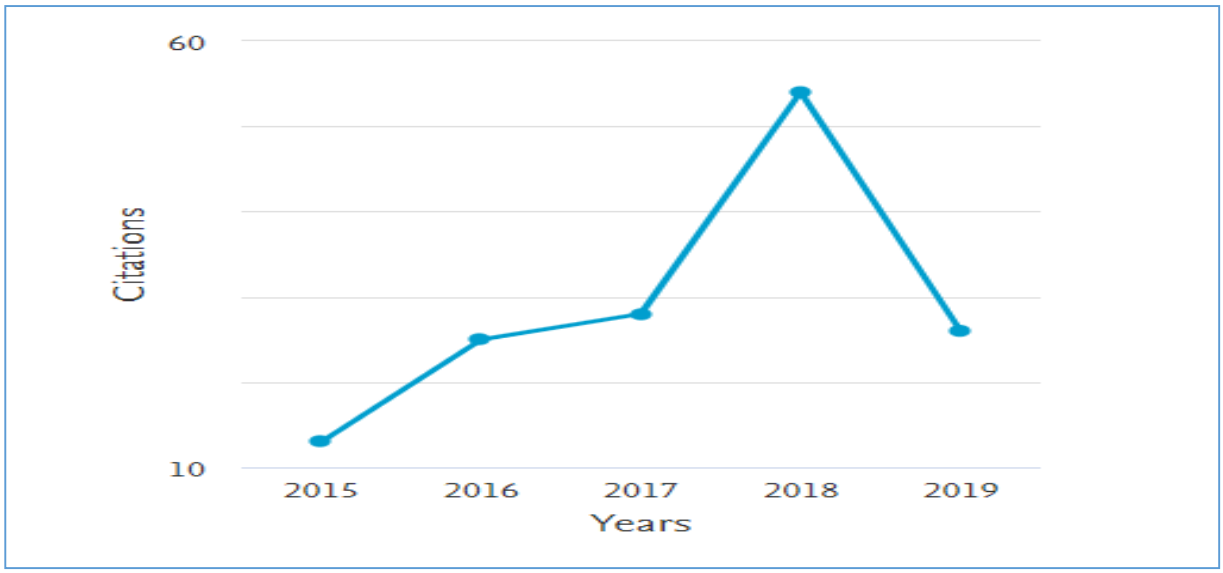
Figure 4: Sources of Research Communication



What is the citation indices of researchers on cybercrime in Nigeria?

Figure 4 shows the citation indices of the authors. Even though the research covers between 2009 to 2018, the publications did not start accumulating citation until 2015 and it got to the peak in 2018 as shown in the diagram. A citation index is done to establish the impact and quality of the publication in a particular discipline. The figure shows gradual and incremental growth in cybercrime research in Nigeria within the timeframe. For instance, in 2015, there were 13 citations of research works published on cybercrime in Nigeria, while in 2016, 25 citations were recorded. The upward trajectory in the citation indices of researchers on cybercrime in Nigeria shows that 2017 got 28 citations, whereas 2018 nearly doubled this figure by attracting 54 citations from local and foreign researchers.

Figure 4: Citations Index



Conclusion

There was a steady rise in the research publications on cyber crime by scholars in Nigeria within the time frame studied. This rose from one publication to eighteen publications in a single year, but on average per year per title descended to a paltry six, with this highest figure obtained in publications that appeared in Ceur Conference Proceedings. The preponderant choice of conference proceedings, book chapters and reviews which accounted for 65% of the sources of research communcation has the potential of obscuring readership on a wide scale, thereby impinging on the chances that the findings would influence understanding of the phenomenon, policy decisions and actions on the part of relevant authorities and stakeholders.

In total, there was a limited number of publication outlets in which the Nigerian scholars communicated their research on cyber crime; seven in all. This is very low given the number of internationally reputable journals that could have been utilized for this purpose, and has implications for wide spread readership on the publication efforts made. On each scholar's ooutput or productivity, the number of papers contributed per author was low, with the highest being four by a single author for the period. However, it could be concluded that there is some level of interest which could be leveraged on to encourage wider participation of researchers into the problem of cyber crime in Nigeria.

With the findings indicating that the University of Ibadan, a first generation University, and the Universities of Nigeria and Lagos respectively, came last on the visibility of their scholars contributions to cybercrime research, and a mixture of others coming in-between, it could be inferred that age of the university and clout does not influence the problem of the dearth of research publications on the phenomenon. The problem is ingrained and wide spread across the institutions, and is exacerbated by the paucity of collaborations with researchers in other parts of the world as shown in the findings.

Recommendations

The study makes the following recommendations:

1. That research grants be made widely available by the various universities and other higher institutions, to galvanize research efforts of those interested in researching into cybercrime in Nigeria. This will also enable the conduct of quality research that will be publishable in high impact and visible communication outlets.
2. That the Nigerian researchers on the problem of cyber crime be encouraged to target high quality open access journals for communicating their findings. This is in order to enhance the

visibility of their publications to wider readership.

3. That the researchers be encouraged to engage in more collaborations with scholars in different regions of the world, in order to understand better the global dimensions and implications of the cybercrime menace.

References

Ablon, L (2018). Data Thieves: The Motivations of Cyber Threat Actors and Their Use and Monetization of Stolen Data. Retrieved at 21/03/2020, from http://www.rand.org/pubs/testimonies/CT490.html

Ajiferuke, I. (2011). How to overcome some of the challenges that African scholars are facing in conducting informetrics research. *South Africa Journal Library & Information Science*. *77*(2),

Bergiel, B, J., & Balsmeier, P. W. (2008). Internet Cross Border Crime: A Growing Problem. *Journal of Website Promotion*, *3*(3/4), 133–142. https://doi.org/10.1080/15533610802077164

Center for Strategic and International Studies. (2017). The Mobile Economy of Sub-Saharan Africa 2017. Retrieved 15/08/2019, fromhttps://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download

Clarivate Analytics. (2017) Web of Science. Retrieved 13/08/2019, fromhttp://www.fsts.ac.ma/wp-content/uploads/2018/07/Web-of-Science-Brochure.pdf

D'mello, A. (2019). Five benefits of cyber security risk assessment. Retrieved 15/08/2019, from https://www.iot-now.com/2019/07/08/97141-five-benefits-cyber-security-risk-assessment/

Durodolu, O.O.& Ojo J. O. (2018). Informetric Growth Analysis of Engineering Research in Nigerian Universities, 2007 - 2016 Survey. *Journal of Applied Information Science and Technology (JAIST)11* (1), .33-48.

Durodolu, O. O, Adeleke, A.A & Ojo, J.O (2019). Infometrics Growth Analysis of Medical Science Researchers in Nigeria during 2007 to 2016. *DESIDOC Journal of Library & Information Technology,* 39(5), 244-250, DOI: 10.14429/djlit.39.5.14494

Henry, Q. & Alexander, M. (2012) "Fighting Cybercrime in Africa", *Computer Science and Engineering*, *2*, 98-100.

Leukfeldt, R. (2017). Research agenda the human factor in cybercrime and cybersecurity. The Hague: Eleven International Publishing.

National Bureau of Statistics. (2018) Labor Force Statistics - Volume I: Unemployment and Underemployment Report. Retrieved 20/08/2019, from file:///C:/Users/USER/Downloads/q4_2017_-_q3_2018_unemployment_report.pdf

Omodunbi, B. A. Odiase, P. O. Olaniyan, O. M & Esan, A. O. (2016) Cybercrimes in Nigeria: Analysis, Detection and Prevention. *FUOYE Journal of Engineering and Technology*, 1(1),

Onyancha, O.B. (2018), "Mapping collaboration and impact of library and information science research in sub-Saharan Africa, from 1995 to 2016", Library Management, Vol. 39 No. 6-7, pp. 349-363. https://doi.org/10.1108/LM-06-2017-0059

Shiloh, J.& Fassassi, A. (2016) Cybercrime in Africa: Facts and figures. Retrieved 15/08/2019, from https://www.scidev.net/sub-saharan-africa/icts/feature/cybercrime-africa-facts-figures.html

Trading Economics. (2019)Nigeria – Employment in agriculture (% of total employment). Accessed 20/08/2019, from https://tradingeconomics.com/nigeria/employment-in-agriculture-percent-of-total-employment-wb-data.html

National Universities Commission. (2019).List of accredited universities in Nigeria.Accessed 20/08/2019, from https://nuc.edu.ng/

APPENDIX

Informetric assumptions of the semi-log model

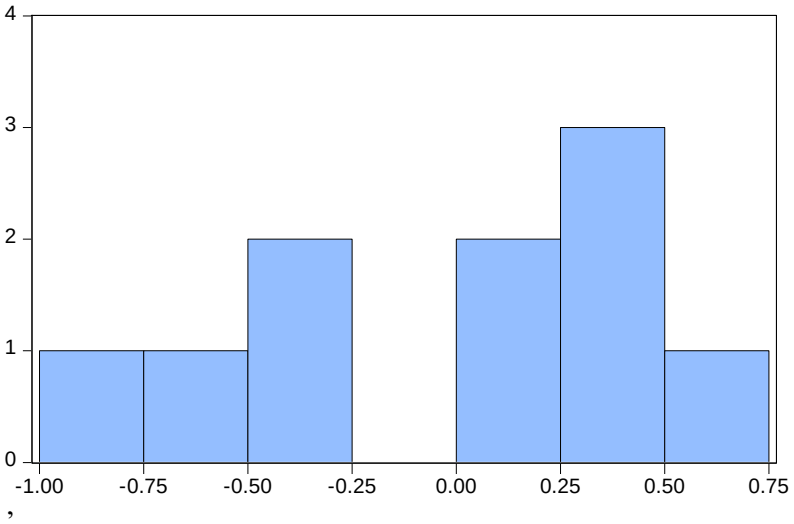
Breusch-Godfrey serial correlation test

F-statistic	0.588786	Prob. F(2,6)	0.5841
Obs*R-squared	1.640627	Prob. Chi-Square(2)	0.4403

Heteroskedasticity Test

F-statistic	0.201117	Prob. F(1,8)	0.6657
Obs*R-squared	0.245232	Prob. Chi-Square(1)	0.6205
Scaled explained SS	0.054172	Prob. Chi-Square(1)	0.8160

Jarque-Bera Statistics



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Series: Residuals
Sample 1 10
Observations 10

Mean	0.000000
Median	0.172863
Maximum	0.687222
Minimum	-0.783330
Std. Dev.	0.493421
Skewness	-0.287338
Kurtosis	1.690320
Jarque-Bera	0.852297
Probability	0.653019

Residual test

Date: 06/21/19 Time: 07:17

Sample: 1 10

Included observations: 10

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. *| . |	. *| . |	1	-0.103	-0.103	0.1425	0.706
. **| . |	. **| . |	2	-0.248	-0.262	1.0653	0.587
. ***| . |	.****| . |	3	-0.416	-0.516	4.0283	0.258
. |*** . |	. |** . |	4	0.395	0.222	7.1511	0.128
. |* . |	. | . |	5	0.124	-0.020	7.5217	0.185
. *| . |	. *| . |	6	-0.109	-0.195	7.8754	0.247
. ***| . |	. *| . |	7	-0.353	-0.140	12.859	0.076
. | . |	. **| . |	8	0.020	-0.228	12.883	0.116
. |* . |	. *| . |	9	0.189	-0.137	17.181	0.046