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PERCEPTION AND APPLICATION OF DATA DRIVEN JOURNALISM AMONG KANO JOURNALISTS IN NIGERIA

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Abstract: *The demand for information about government and other important institutions is growing in the areas of service, performance, and spending. Every day, more citizens turn to the Internet for government information, searching for more data, policy, and services. Consequently, the context and scope of data-driven journalism have expanded considerably from its evolutionary antecedent, following the explosion of data generated in and about nearly every aspect of society. Data journalists can now use free powerful online tools and open source software to rapidly collect, clean, and publish data in interactive features, mobile apps, and maps. As data journalists grow in skill and craft, they move from using basic statistics in their reporting to working in spreadsheets, to more complex data analysis and visualization, finally arriving at computational journalism. This study employs social survey to examine the perception and application of data driven journalism techniques among registered journalists in Kano state. The population was stratified in to television, radio and newspaper organizations from which proportionate samples were drawn. Consequently, a sample of 123 journalists from a population of 426 registered journalists was considered for analysis. The study found that 56.1% of journalists in Kano have an elementary or undifferentiated consciousness on Data Driven Journalism, 1.6% of journalists are highly knowledgeable on Data Driven Journalism and only 1.6% of journalists in Kano understand and apply the principles of data journalism in journalistic contents. The study concludes that there is a very low awareness, knowledge, understanding and application of the principle of data driven journalism among journalists in Kano. The study recommends frequent organization of capacity building programmes on data driven journalism for journalists and the integration of Data Driven Journalism into the curriculum of Mass Communication education in all journalistic training institutions in Nigeria.*

Keywords: *Data; Journalism; Perception; Application; Internet*

Introduction

Journalists have been using data in their stories for as long as the profession has existed. A revolution in computing in the 20th century created opportunities for data integration into investigations, as journalists began to bring technology into their work. In the 21st century, a revolution in connectivity is leading the media toward new horizons. The Internet, cloud computing, agile development, mobile devices, and open source software have transformed the practice of journalism, leading to the emergence of a new term: Data Journalism (Rogers, 2012).

Rogers (2012) observed that although journalists have been using data in their stories for as long as they have been engaged in reporting, data journalism is more than traditional journalism with more data. He further noticed that decades after early pioneers successfully applied computer-assisted reporting and social science to investigative journalism, journalists are creating news apps and interactive features that help people understand data, explore it, and act upon the insights derived from it. Moreover, new business models are emerging in which data is a raw material for profit, impact, and insight, co-created with an audience that was formerly reduced to passive consumption. Consequently, Journalists around the world Nigeria inclusive are grappling with the excitement and the challenge of telling compelling stories by harnessing the vast quantity of data that our increasingly networked lives, devices, businesses, and governments produce every day.

The world is awash with unprecedented amounts of data and an expanding network of sources for news. As of 2012, there were an estimated 2.5 quintillion bytes of data being created daily, with this amount doubling every 40 months. It is an extraordinary moment in so many ways. All of that data generation and connectivity have created new opportunities and challenges for media organizations that have already been fundamentally disrupted by the Internet. Stories are now shared by socially connected friends, family, and colleagues—and delivered by applications and streaming video accessed from mobile devices, apps, and tablets. Newsrooms are now just a component of a dramatically different environment for news. They are also not always the original source for it. News often breaks first on social networks, and is published by people closest to the event. From there, it is gathered, shared, and analyzed; then fact-checked and synthesized into contextualized journalism (Colombia Journalism School/ Tow Center for Digital Journalism, 2009).

Media organizations must be able to put data to work quickly. This need was amply demonstrated during Hurricane Sandy, when public, open government data feeds became critical infrastructure. Given a 2014 Supreme Court decision in which Chief Justice John Roberts opined that disclosure through online databases would balance the effect of classifying political donations as protected by the First Amendment, it is worth emphasizing that much of the "modern technology" that is a "particularly effective means of arming the voting public with information" has been built and maintained by journalists and nonprofit organizations (Colombia Journalism School/ Tow Center for Digital Journalism, 2009).

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Bounegru and Gray (2012) observed that the open question is not whether data, computers, and algorithms can be used by journalists in the public interest, but rather how, when, where, why, and by whom. Today, journalists can treat all of that data as a source, interrogating it for

answers as they would a human. That work is data journalism, or gathering, cleaning, organizing, analyzing, visualizing, and publishing data to support the creation of acts of journalism. A more succinct definition might be simply the application of data science to journalism, where data science is defined as the study of the extraction of knowledge from data. In its most elemental forms, data journalism combines: The treatment of data as a source to be gathered and validated, the application of statistics to interrogate it, visualizations to present it, as in a comparison of batting averages or stock prices.

Some proponents (Rogers, Anderson and Ingram) of open data journalism hold that there should be four components, where data journalists archive and publish the underlying raw data behind their investigations, along with the methodology and code used in the analyses that led to their published conclusions. In a broad sense, data journalism is telling stories with numbers, or finding stories in them. It is treating data as a source to complement human witnesses, officials, and experts. Many different kinds of journalists use data to augment their reporting, even if they may not define themselves or their work in this way.

Rogers (2014) emphasized that to become a good data journalist it helps to begin by becoming a good journalist. Hone your storytelling skills, experiment with different ways to tell a story, and understand that data is created by people. We tend to think that data is this immutable, empirically true thing that exists independent of people. It's not, and it doesn't. Data is socially constructed. In order to understand a data set, it is helpful to start with understanding the people who created the data set—think about what they were trying to do, or what they were trying to discover. Once you think about those people, and their goals, you're already beginning to tell a story.

Rogers concluded that data-driven reporting and analysis require more than providing context to readers and sorting fact from fictions and falsehoods in vast amounts of data. Achieving that goal will require media organizations that can think differently about how they work and whose contributions they value or honor. In 2014, technically gifted investigators in the corner of the newsroom may well be of more strategic value to a media company than a well-paid pundit in the corner office. Publishers will need to continue to evolve toward a multidisciplinary approach to delivering the news, where reporters, developers, designers, editors, and community managers collaborate on storytelling, instead of being segregated by departments or buildings.

Howard (2012) observed that many of the pioneers in this emerging practice of data-driven journalism won't be found on broadcast television or in the lists of the top journalists over the past century. They're drawn from the pool of people who are building collaborative newsrooms and extending the theory and practice of data journalism. These people see the reporting that provisions their journalism as data, a body of work that itself can be collected, analyzed, shared, and used to create insights about how society, industry, or government are changing.

Problem Statement

Mass Media throughout Africa and particularly Nigeria is facing enormous challenges: fighting obstinate public officials, paper records, no access to information laws, and outright threats and

physical violence directed at journalists. Building the capacity of journalists to practice data-driven journalism has now taken on new prominence, as the digital disruption that has permanently altered the models of more developed countries bears down on countries in the African continent. The challenges that data journalism in Africa and especially Nigeria faces are significant, though these are not unique from elsewhere on the continent (Colombia Journalism School/ Tow Center for Digital Journalism, 2009). In Nigeria the constitution has acknowledged the media as the fourth estate of the realm, thus to hold government accountable and curtail the excesses of power in governance. Consequently, the demand for information about governments is growing, in the areas of service, performance, and spending. Every day, more citizens including journalists turn to the Internet for government information, searching for more data, policy, and services.

Research on community information systems from the Pew Internet and Life Project shows strong citizen interest in online resources for government and civic information. When citizens are both aware of government information being released and can find it, open government policies can lead to higher levels of community satisfaction. At the local level, however, limited budgets and technical ability will make opening data difficult (Howard, 2012).

Kaplan (2014) argued that the context and scope of data-driven journalism have expanded considerably from its evolutionary antecedent, following the explosion of data generated in and about nearly every aspect of society, from government, to industry, to research, to social media. Data journalists can now use free, powerful online tools and open source software to rapidly collect, clean, and publish data in interactive features, mobile apps, and maps.

Data journalists are in demand today throughout the news industry and beyond. They can get scoops, draw large audiences, and augment the work of other journalists in a media organization or other collaboration. On every desk in the newsroom, reporters are starting to understand that if you don't know how to understand and manipulate data, someone who can will be faster than you (Rogers, 2012; Kaplan, 2014; Rogers, 2014).

Rogers (2014) argued that while the potential of data journalism is immense, the pitfalls and challenges to its adoption throughout the media are similarly significant, from digital literacy to competition for scarce resources in newsrooms. Global threats to press freedom, digital security, and limited access to data create difficult working conditions for journalists in many countries especially in less developed countries like Nigeria where political structures are poor and subjective while technological sophistication and professional standards are relatively low.

Base on the preceding arguments, this study examined the perception and application of data driven journalism among journalists in Kano state.
The study is set to achieve the following objectives

1) To identify the awareness level on data driven journalism among journalists in Kano state.
2) To identify the knowledge level on data driven journalism among journalists in Kano state.
3) To examine the extent of application of data in journalistic content by journalists in Kano state

Background Literature

By the middle of the 20th century, investigative journalism featured teams of professional reporters combing through government statistics, court records, and business reports acquired by visiting state houses, archives, and dusty courthouse basements; or obtaining official or leaked confidential documents. These lists of numbers and accounts in the ledgers and filing cabinets of the world's bureaucracies have always been a rich source of data, long before data could be published in a digital form and shared instantaneously around the world (Slocum, 2011, Howard; 2012 and Rogers, 2014).

Database-driven journalism arrived in most newsrooms in a real sense over three decades ago, when microcomputers became commonplace in the 1980s—although the first pioneers used punch cards. When computers became both accessible and affordable to newsrooms, however, the way data could be used changed how investigations were conducted, and much more. Before the first laptop entered the newsroom, technically inclined reporters and editors had found that crunching numbers on computers on mainframes, microcomputers, and servers could enable more powerful investigative journalism (Rogers, 2014).

Computer Assisted Reporting

The various histories of the development of computer-assisted reporting offer context for the work of today, most historians place its start in the latter half of the 20th century. Casual observers may not realize that many aspects of what is now frequently called data journalism are the direct evolutionary descendants of decades of computer-assisted reporting (CAR) in the United States (Rogers, 2014).

In 1952, CBS famously used a mainframe computer, a Remington Rand UNIVAC, and statistical models to predict the outcome of the presidential race. Meanwhile, Grace Hopper worked with a team of programmers to input voting statistics from earlier elections into the ENIAC and wrote algorithms that enabled the computer to correctly predict the result. The model she built not only accurately predicted the ultimate outcome—a landslide victory for Dwight D. Eisenhower—with just 5 percent of the total vote in, but did so to within one percent (Rogers, 2014).

In the years that followed this signal media event, change was slow, marked by pioneers experimenting with computer-assisted reporting in investigations. It was almost two more decades before CAR pioneers like Meyer Elliot and Philip Meyer began putting cheaper, faster computers to work, collecting and analyzing data for investigative journalism. After he was granted a Nieman Fellowship at Harvard University in the late 1960s to study the application of quantitative methods used in social science, Philip Meyer proposed applying the social science research methods to journalism using computers and programming. He called this "precision journalism, which included sound practices for data collection and sampling, careful analysis and clear presentation of the results of the inquiry (Kaplan, 2014).

Meyer subsequently applied that methodology to investigating the underlying causes of rioting in Detroit in 1967 a contribution that was cited when the Detroit Free Press won the Pulitzer Prize for Local General Reporting the next year. Meyer's analysis showed that college

graduates were as likely to have participated in the riots as high school dropouts, rebutting one popular theory correlating economic and educational status with a propensity to riot, and another regarding immigrants from the American South. Meyer's investigations found that the primary drivers for the Detroit riots were lack of jobs, poor housing, crowded living conditions, and police brutality (Kaplan, 2014).

In the following decades, journalists around the country steadily explored and expanded how data and analysis could be used to inform reporting and readers. Microcomputers and personal computers changed the practice and forms of CAR significantly as the tools and environment available to journalists expanded. More people began waking up to "newsmen enlisting the machine," as Time magazine put it in 1996.

By the early 1990s, journalists were using CAR techniques and databases in many major investigations in the United States and beyond. Data-driven reporting increasingly became part of the work behind the winners of journalism's most prestigious prize: From Eliot Jaspin's Pulitzer at the Providence Journal in 1979, to the work of Chris Hambly at the Center for Public Integrity in 2014, CAR has mattered to important stories.

Rogers (2014) found Brant Houston, former executive director of Investigative Reporters and Editors (IRE), said in an interview:

> The practice of CAR has changed over time as the tools and environment in the digital world has changed. So it began in the time of mainframes in the late 60s and then moved onto PCs (which increased speed and flexibility of analysis and presentation) and then moved onto the Web, which accelerated the ability to gather, analyze, and present data.

The basic goals have remained the same: To sift through data and make sense of it, often with social science methods. CAR tends to be an umbrella term—one that includes precision journalism and data-driven journalism and any methodology that makes sense of data, such as visualization and effective presentations of data. By 2013, CAR had been recognized as an important journalistic discipline, Data had become not only an integral part of many prize-winning investigations, but also the raw material for applications, visualizations, audience creation, revenue, and tantalizing scoops (Rogers, 2014).

Kaplan (2014) noticed that at the start of the 21st century, a revolution in mobile computing; increases in online connectivity, access, and speed; and explosion in data creation fundamentally changed the landscape for computer-assisted reporting. It may seem obvious, but of course the Internet changed it all, and for a while it got smashed in with trying to learn how to navigate the Internet for stories, and how to download data.

Laukides (2010) observed that there was a stage when everyone was building internal intranets to deliver public records inside newsrooms to help find people on deadline, etc. So for much of the time, it was focused on reporting, not publishing or presentation. Now the data journalism folks have emerged from the other direction: People who are using data obtained through APIs often skip the reporting side, and use the same techniques to deliver unfiltered information to their readers in an easier format than the government is giving us.

Moreover, Rogers (2014) argued that there is probably not a single reporter or editor working in a newsroom in the United States or Europe today, after all, who isn't using a computer in the course of his or her journalism. Many members of the media, in fact, may use several during the day, from the powerful handheld computers we call smartphones, to crunching away at analysis or transformations on laptops and desktops, to relying on servers and cloud storage for processing big data at Internet scale.

A big change in CAR is that we have got the opportunity to present the data itself to readers—that is, not just summarized in a story but as data itself. In the early days of CAR, we gathered and analyzed information to support and guide a narrative story. Data was something to be summarized for the reader in the print story, with of course graphics and tables (some quite extensive), but the end goal was typically something recognizable as a words-and-pictures story. What the Internet added is that it gave us the ability to show to people the actual data and let them look through it for themselves. It's now possible, through interaction design, to help people navigate their way through a data set just as, through good narrative writing, we have always been able to guide people through a complex story (Howard, 2012).

The Need for Data Journalism

Ingram (2009) and Slocum (2011) observed that while it is easy to get excited about gorgeous data visualizations or a national budget that is now more comprehensible to citizens, the use of data journalism in investigations that stretch over months or years is one of the most important trends in media today. Powerful Web-based tools for scraping, cleaning, analyzing, storing, and visualizing data have transformed what small newsrooms can do with limited resources. The adoption of open source software, agile development practices, coupled with a growing open data movement has breathed new life into traditional computer-assisted reporting. Collaboration across newsrooms and a focus on publishing data and code that show your work differentiate the best of today's data journalism from the CAR of decades ago.

Similarly, Kaplan (2014) and Rogers (2014) emphasized that by automating tasks, one data journalist can increase the capacity of those with whom she works in a newsroom and create databases that may be used for future reporting. We live in an age where information is plentiful, tools that can help distill and make sense of it are therefore valuable. They save time and convey important insights. News organizations cannot afford to cede that role.

Data journalism can be created quickly or slowly, over weeks, months, or years. Either way, journalists still have to confirm their sources, whether they are people or data sets, and present them in context. Using data as a source will not eliminate the need for fact-checking, adding context, or reporting that confirms the ground truth. Data journalism empowers watchdogs and journalists with new tools. It is integral to a global strategy to support investigative journalism that holds the most powerful institutions and entities in the world accountable, from the wealthiest people on Earth, to those involved in organized crime, multinational corporations, legislators, and presidents (Rogers, 2010).

The explosion in data creation and the need to understand how governments and corporations wield power has put a premium upon the adoption of new digital technologies and

development of related skills in the media. Data and journalism have become deeply intertwined, with increased prominence given to presentation, availability, and publishing. Around the world, a growing number of data journalists are doing much more than publishing data visualizations or interactive maps. They're using these tools to find corruption and hold the powerful to account. The most talented members of this journalism tribe are engaged in multiyear investigations that look for evidence that supports or disproves the most fundamental question journalists can ask (Rogers, 2012).

In the hands of the most advanced practitioners, data journalism is a powerful tool that integrates computer science, statistics, and decades of learning from the social sciences in making sense of huge databases. At that level, data journalists write algorithms to look for trends and map the relationships of influence, power, or sources. As they find patterns in the data, journalists can compare the signals and trends they discover to the shoe-leather reporting and expert sources that investigative journalists have been using for many decades, adding critical thinking and context as they go (Laukides, 2010).

Newsrooms, nonprofits, and developers across the public and private sector are all grappling with managing and getting insight from the vast amounts of data generated daily. Notably, all of those parties are tapping into the same statistical software, Web-based applications, and open source tools and frameworks to tame, manage, and analyze this data (Howard, 2014).

Building capacity in data journalism is directly connected to the role the Fourth Estate plays in democracies around the world. There are important stories buried in that explosion of data from government, industry, media, universities, sensors, and devices that are not being told because the perspective and skills required to do it properly are not widespread in the journalism industry. The need for data-driven journalism comes at a time, unfortunately, when the news organizations that have housed them over the past centuries are contracting (Howard, 2012).

Theoretical Framework

The study espouses the theoretical postulations of Media Determinism Theory. It is an offshoot of the Technological Determinism Theory as developed by Thorsten Veblen and expanded by Clarence Ayres which assumes that technology is most fundamental determinant of a society's social, political and economic structure and values. Technological Determinism is a reductionist theory whose first major elaboration came from Karl Marx who argued that changes in productive technology are the primary influence on human social relation and organizational structure and that social relations and cultural practices revolve around the technological and economic base of the society.

Media Determinism Theory is a philosophical and sociological position which posits the power of the media technology to impact socio-political and economic development in the society as conceived and expanded by Harold Innis and Marshall McLuhan. These scholars see the media as instrumental to all forms of civilization in the society.

McLuhan argues that media technology is the driver of socio-cultural phenomena and that socio-cultural, political and economic development of each historical period can be related

directly to the means of mass communication of that period. He concludes that media technology is always alive and capable of shaping human behaviour and societal development.

One of the best known examples of technological determinism in media theory is McLuhan's 'the medium is the message' a phrase coined by McLuhan to argue that the form of a media technology embeds itself in the message it conveys and creates a symbiotic relationship in which the medium influences how the message is perceived. This implies that it is the form of the media that matters and not the content. Thus media technology affects and influences socio-political and cultural development.

A contemporary example of media form and its agency on human societies is the social media and social networking sites which affect and influence human political, economic and cultural communication behaviour. These platforms expand the frontier of citizens political participation and socio-economic relations in both develop and emerging democratic societies. Media technology is therefore alive and capable of shaping human behaviour. McLuhan argued that family life, the work place, schools, healthcare, religion, politics, friendship and recreation are all influence by media technology hence concludes that every new form of media technology is an extension of some human faculty.

Critics of the theory argue that the proposition in the theory is too simplistic. They believe that social movements define technology and media processes and that audience determinism should be the viewpoint in media determinism. However, the theory is relevant to this study as its postulations will help us to understand how and why journalists in Kano state are using various new media technologies to generate, process and analyse data through social science processes to influence socio-economic and political development in the society.

Research Procedure

The study employs social survey as the primary approach of data generation. It is an approach use in social and behavioural sciences to examine the perception, attitude, beliefs, values, opinions and characteristics of a clearly conceived and defined population. Its goal is to primarily provide a comprehensive and generalize documentation or proposition about human dispositions (Wimmer and Dominick 2011).

The population of the study consists of all journalists registered with the Kano state chapter of the Nigerian Union of Journalists and working with television, radio or newspaper organization in Kano.

The population was stratified in to television, radio and newspaper organizations from which proportional samples were drawn using the Krejcie and Morgan (1970) formula to determine the sample size. This facilitated the emergence of a homogeneous stratum before sampling. Wimmer and Dominick (2011) observed that stratified sampling is more representative than simple random sampling if there is accurate and adequate information about the strata. Consequently a sample of 123 journalists from a population of 426 registered journalists in Kano as at July 2017 was considered for the study and analysis.

Self-administered structured questionnaire was used as the primary tool of data collection. The questionnaires were administered to the samples by the researcher. Journalists that fall within

the sample were identified in their organizations and given the questionnaire. A period of three weeks was used to retrieve the questionnaire from the respondents. All questionnaires were retrieved and found to be useful for the study. Descriptive statistics was used as the tool for data analysis and interpretation.

Data Presentation

This study examined the perception and application of data driven journalism by registered journalists in Kano. Structured questionnaires were administered to a sample of 123 journalists in a population of 426. The responses are analysed using descriptive statistics and presented as follows;

Table 1: Sex of the Respondents

Sex	Frequency	Percentage
Male	92	74.8%
Female	31	25.2%
Total	123	100%

Note. Field data, 2017

Table 1 presents data on the sex of the respondents. The data indicates that 92 (74.8%) of the journalists studied are male while 31 (25.2%) are female. The data point that there are more (74.8%) male registered journalists than female in Kano.

Table 2: Educational Qualification of the Respondents

Qualification	Frequency	Percentage
SSCE	15	12.2%
ND/NCE	42	34.1%
HND/B.SC/	56	45.5%
Post graduate	10	8.1%
Total	123	100%

Note. SSCE= senior school certificate of education, ND= national diploma, NCE=national certificate of education, HND=higher national diploma, B.SC= bachelor of science. Field data, 2017

Table 2 contains data on the educational qualification of the respondents. The data shows that 12.2% of the journalists in Kano have acquired a senior secondary school certificate and 34.1% have either a diploma or NCE certificate. Moreover the data indicates that 45.5% have either a higher national diploma or university degree certificate while 8.1% have a post graduate certificate. This signals the high number of journalists with either university degree or higher diploma among registered journalists in Kano.

Table 3: Perception of The Meaning of Data Driven Journalism Among Journalists in Kano

Magnitude	Scale	Frequency	Percentage
Not aware	1	37	30.1%
Fairly aware	2	11	8.9%
Neutral	3	0	0%
Aware	4	69	56.1%

Fully aware	5	6	4.9%s
Total	5	123	100%

Note. Field data, 2017

Table 3 contains data on the awareness of the meaning of data journalism among journalists in Kano. The data reveals that 4.9% are fully aware of the meaning of data journalism, 8.9% are fairly aware, 56.1% are aware and 30.1% are not aware of the meaning of data journalism. This indicates that 56.1% of journalists in Kano have an elementary or undifferentiated consciousness on meaning of data driven journalism.

Table 4: Awareness Level on Data Driven Journalism among Journalists in Kano

Awareness Level	**Frequency**	**Percentage**
Fully aware	3	75%
Aware	2	50%
Fairly aware	1	25%
Not aware	0	0%

Note. Field data, 2017

Table 4 presents data on the awareness level of data driven journalism among journalists in Kano. Awareness level was measured on the frequency of mentioning the four components of data journalism used in the study (numerical values, digital applications, computers and internet). Each of the components accrues 25%. The scale used for the rating is 0-24% = not aware, 25-49% = fairly aware, 50-74% =aware and 75-100% = fully aware. From table 3 it is clear that 6(4.9%) are fully aware of the meaning of data journalism which also represents the awareness level 3(75%) of data journalism in table 4. This implies that only 4.9% of the registered journalists in Kano have 75% awareness on data driven journalism.

Table 5: Knowledge Level on Data Driven Journalism among Journalists

Level	**Scale**	**Frequency**	**Percentage**
Not knowledgeable	1	85	69.1%
Fairly knowledgeable	2	7	5.7%
Neutral	3	0	0%
Knowledgeable	4	29	23.6%
Highly knowledgeable	5	2	1.6%
Total	5	123	100%

Note. Field data, 2017

Table 5 contains data about the knowledge level of journalists on data journalism. It reveals that 1.6% of them have comprehensively learn, think and reason about data journalism hence are highly knowledgeable, 5.7% are fairly knowledgeable, 23.6% are knowledgeable and 69.1% are not knowledgeable. This shows that knowledge of data journalism as psychological result of learning and reasoning among journalists in Kano is low.

Table 6: Extent of Application of Data Journalism in Journalistic Content among Journalists in Kano

Extent of application	scale	Frequency	Percentage
Lowest	1	11	8.9%
Fairly lower	2	4	3.3%
Lower	3	19	15.4%
Low	4	23	18.7%
Fairly large	5	48	39%
Larger	6	9	7.3%
Large	7	7	5.7%
Largest	8	2	1.6%
Total	8	123	100%

Note. Field data, 2017

Table 6 presents data that measured the extent of application of data journalism among registered journalists in Kano. The data shows that 1.6% of the journalists apply the principle to the largest extent, 5.7% use the principle to a large extent, 7.3% practice it to a larger extent and 39% apply it to a fairly large extent. Moreover, 18.7% use it to a low extent, 15.4% to a lower extent while 3.3% demonstrate a fairly lower application of the principle. Also 8.9% apply the principle to the lowest extent. This entails that only 1.6% of the registered journalists in Kano understand and apply the principle of data journalism in journalistic contents to the largest extent.

Findings

56.1% of journalists in Kano have an elementary or undifferentiated consciousness on Data Driven Journalism

1.6% of journalists are highly knowledgeable on Data Driven Journalism. This shows that knowledge of data journalism as psychological result of learning, thinking and reasoning among journalists in Kano is low.

1.6% of journalists in Kano understand and apply the of data journalism in journalistic contents to largest extent.

Discussion of Findings

Mass Media throughout Africa and particularly Nigeria is facing enormous challenges: fighting obstinate public officials, paper records, no access to information laws, and outright threats and physical violence directed at journalists. Building the capacity of journalists to understand and practice data-driven journalism has now taken on new prominence, as the digital disruption

that has permanently altered the models of more developed countries bears down on countries in the African continent. The challenges that data journalism in West Africa and especially Nigeria faces are significant, though these are not unique from elsewhere on the continent. This has corroborated the first finding of the study which discovered that 56.1% of the journalists in Kano have an elementary and undifferentiated consciousness of data driven journalism. This has therefore indicated that digital literacy is one of the fundamental challenges of data journalism in Kano state. This challenge has been found by Rogers (2014), Kaplan (2014) and Howard (2012) as one of the key challenges to data journalism in less developed countries.

Consequently, the demand for information about government is growing, in the areas of service, performance, and spending. Every day, more citizens turn to the Internet for government information, searching for more data, policy, and services. Research on community information systems from the Pew Internet and Life Project shows strong citizen interest in online resources for government and civic information. The findings of the study show that there is a low knowledge about data journalism among journalists in Kano. Only 1.6% of journalists demonstrated effective learning, thinking and reasoning about data journalism. This indicates low perception of data journalism among journalists in Kano which also one of the findings of Rogers (2014), Kaplan (2014) and Howard (2012) about journalists in countries with less ICT sophistication.

Rogers (2014) argued that while the potential of data journalism is immense, the pitfalls and challenges to its adoption throughout the media are similarly significant, from digital literacy to competition for scarce resources in newsrooms. Global threats to press freedom, digital security, and limited access to data create difficult working conditions for journalists in many countries especially in less developed countries where political structures, technological sophistication and professional standards are relatively low. The challenges of low awareness, knowledge and understanding of data journalism as discovered in this study have aggregated to poor perception and low application of the principles and techniques of data journalism by journalists in Kano state. This corroborated the findings of Rogers (2014) who found digital literacy, digital security and limited access to data as some of the challenges to data journalism.

Conclusion and Recommendations

There is a very low awareness, knowledge, understanding and application of the principle of data driven journalism among journalists in Kano as only 1.6% believes that non-human sources could be a fundamental and reliable sources of information for journalists.

Based on the conclusion reached the study recommends frequent organization of capacity building programmes on data driven journalism and other important digital or computer based journalism issues worthy of adoption by journalists as professional groups and the media as fundamental social institutions.

Moreover the study recommends the integration of Data Driven Journalism into the curriculum of Mass Communication education in all journalistic training institutions in Nigeria.

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