

# Exploring the Fences and Gains of Data Sharing Practices: From the Perception of Some States in North East Nigerian Academics

Khalid Ayuba Abdullahi (PhD)<sup>1</sup>; Yakubu Bala<sup>2</sup>  
Department of Library & Information Science,  
Abubakar Tafawa Balewa University Bauchi, Nigeria

**Abstract:-** This paper provides some of the benefits and challenges making academics to either share or withhold their data sets. Much research concentrates on either information sharing or knowledge sharing of the researchers. For data collection, qualitative method was used and a total of 12 academics participated in an interview observing benefit and hitches of sharing that encourage data sharing activities in an academic atmosphere, the results showed the majority of the interviewees acknowledged the usefulness of data sharing but most of the them are not always ready to comply with the practices to support their colleagues' data sharing exercises. This current work revealed benefits such as encouraging collaboration reputation and maximize transparency. Unsuitable infrastructure, community-culture, economic and legal challenges are the fences for data sharing. Researchers labelled sharing of data as a crucial portion aim at encouraging scholars' careers and research improvement.

**Keywords:-** Data Sharing, Research Data, Advantage, Unpleasant, North East Nigerian University, Open Access To Data.

## I. INTRODUCTION

The concept of sharing data has been in increase nowadays, thus, sharing and reusing data is of paramount portion of scientific investigation among academic societies (Tenopir et al., 2015). These days, in an attempt to offer excellence research, scholars realize spreading of data as essential as the creation data. In contemporary research, the sharing of data turn out to be so indispensable that cannot just merely abandoned (Piwowar & Vision, 2013) The concept of data sharing (DS) has been viewed, interpreted and practiced differently by variety of scholars, it values vary among disciplines (Wallis, Rolando, & Borgman, 2013). Today, research in numerous disciplines become data intensive in nature which demands collaboration and sharing within the parties involved. In 2014, a policy that encourages authors to share research findings in their manuscripts was stipulated by the Public Library of Science (PLOS) (Bloom, Ganley, & Winker, 2014). Due to the benefits involved in data sharing for example, minimizing efforts in recollection data, increase citation metrics, and preservation of information enable researchers irrespective of their field of study expressed readiness to share their available data. Data sharing allows

many researchers to examine new hypotheses, minimize duplication of resources, be alert on errors regarding methodology and ensure researchers reproduce and validate research results, disclose these results (Borgman, 2012; Hanson, Sugden, & Alberts, 2011; Roettger, Winter, & Baayen, 2019; Tenopir et al., 2011).

Historically, data sharing, has been considered a significant product for modern research, openness in undertaking research deems it possible for researchers to build on the work of others and also allows them to work in collaboration. It permits researchers to build on the work of their colleagues. Nevertheless, academic do not involve in sharing their datasets as they do in case of sharing information or knowledge among them (Corti, Van den Eynden, Bishop, & Woollard, 2019; Roche et al., 2014). A lot of scholars are not eager to share research data owing to insufficient and deficiency of academic acknowledgements. (Borgman, 2012; Hanson et al., 2011; Harvey, 2019; Tenopir et al., 2011). Some researchers see little or no value in sharing their data, even though the perception towards data sharing varies from discipline to discipline having been interpreted and practiced differently across their respective areas.

In recent time, there are a number of literature published on data sharing as research in the 21<sup>st</sup> century involved a lot of collaboration than in the past. This topic has been a significant area in the library and information science research with the growing interest from various researchers. Technological advancement in information and communication provides vital impacts on academic research turning research more of data intensive and collaboration, this has raised more expectations for data sharing. Similarly, financial exigencies brought about more concern to data sharing among researchers, particularly when grant-funding institutions commencing to require the research results and the data used by their respective beneficiaries, with the aim to preserve data to enable reuse.

This paper presents some gains and obstacles related to data sharing in universities. The concept of data sharing has incredible potential to strengthening academic research, also holds incredible promise for strengthening the practice of research and the integrity in academic environment. However, "A lot of scholars are unwilling to publicly to share their dataset as a result of perceived individual costs which clarifies the reason behind their non participating in sharing

datasets” (Pitt & Tang, 2013; Roche et al., 2014). As indicated in most of the available literature, there is insufficient literatures regarding data sharing research in almost all the emerging countries of Africa. As whispered by (Denny, Silaigwana, Wassenaar, Bull, & Parker, 2015) Data sharing research has diminutive support hence slight practice within Africa researchers. (Denny et al., 2015; Fecher, Friesike, & Hebing, 2015), undertook a systematic review regarding what drives academic data sharing? Specified that however “the impression of data sharing gets backing among the scholars, academic researchers hardly place their research data accessible to others. There are series of ways on how academics in rising countries can be encouraged to share data and how the hurdles would be perceived thus, a matter of apprehension, and to tackle these issues the current paper is appropriate and needed.

## II. LITERATURE REVIEW

The advancement of technology has resulted in making researchers creating numerous data through several and new approaches. Even though a number of researchers do share their data, studies indicated others are yet to comply with the development. “Data sharing” has varied significations, for this article, it can be professed as a means that makes scholars offer their datasets readily obtainable to others. Data sharing aids researchers as it makes them to have idea of their peers’ original research areas (Pitt & Tang, 2013). It was observed that papers were often cited more with open data more than those without the data available (Piwowar & Vision, 2013). Data are not gladly accessible as sharing is common in only a few fields and practices even within these fields are unpredictable (Rouder, 2016; Tenopir et al., 2011).

Data sharing among researchers promises a lot of benefits: it allows and helps verify results data and serve as a training tools for new generations of researchers (Tenopir et al., 2011). Sharing data enables open scientific inquiry, encourages diversity of analysis and opinions, promotes new research, facilitates the education of new researchers, enables novel applications to data not envisioned by the initial investigators, permits the creation of new datasets when data from multiple sources are combined, and provides a basis for new experiments (Kim, 2013; Pitt & Tang, 2013). If the added dataset merits publication in a higher impact journal, the paper could be cited more often” (Pronk, Wiersma, van Weerden, & Schieving, 2015). Another most important thing with data sharing is the ability of others to use and reuse the openly available research data provides the room for innovation and economic growth. For researchers, raw data are considered as ‘information currency’ (Parsons et al., 2011). Data sharing promotes the transparency of quantitative analytical work, resulting to credibility of research findings, and serves as another way for researchers to build upon existing studies (Kim & Stanton, 2013).

Conversely, data sharing normally are confirmed to be problematic; most of the studies have indicated that majority of researchers are reluctant to share their own research data with their colleagues and or other investigators. Some of these researches include; (Borgman, 2012; Kim & Stanton,

2012; Heather A Piwowar, 2011; Tenopir et al., 2011). Practicing data sharing between academics researchers are inclined to numerous glitches that are forced by different factors such as individual, technical, motivational, social, economic and legal barriers and the host of others (Van Panhuis et al., 2014). The struggle and rivalry towards attained certain position within the academics become a problem within them to share data. Some data often have confidentiality boundaries that forbid them from being shared (Puniewska, 2014). Misapplication of data repeatedly distress data sharing among the researchers, since several researchers were worry that exposing their data may lead to unfitting use of the data and result to incorrect interpretation (Bezuidenhout, 2013). Researchers see themselves as the sole owners of their datasets hence, are not always ready to allow others to benefit out of it, the impression of dominant from these data gave room for academics not to fully participate in data sharing activities (Goodman et al., 2014).

To simplify and make its practicing easy within the researchers, the establishment of useful linking devices for possible sharing and recycle of the dataset is inevitable. In rising countries of Africa, appropriate infrastructure for good data sharing is inadequate this makes it difficult for researchers to involve fully in data sharing practices. This was stated by (Olakulehin, 2008) that there are insufficient infrastructures among many Nigerian tertiary institutions. The existing of internet has raised the life-force of sharing among researchers, people that normally share their data make it via online and are constantly expecting others to do same to them (Liao, To, & Hsu, 2013). Currently, researchers practically having considerably and great interest in data sharing who usually demand to share with others but have insufficient resources to do so in an alternative absorbed on doing different thing (Ferguson, Nielson, Cragin, Bandrowski, & Martone, 2014).

### ➤ Objectives

The current study determined to identify the fences and gains of data sharing practices in some state’s universities in North East Nigeria. By this research objective, the paper attempts to response to the following research questions;

- What are the inspirations of data sharing in Nigerian universities?
- What are the hitches affecting data sharing in Nigerian universities?

## III. RESEARCH METHOD

Qualitative method was used in collecting data for this study. The target respondents comprised of scholars from some North East states’ universities in Nigeria. The authors tend to use a purposive sampling sample technique from different departments to recruit potential participants with characteristics relevant to the study and who would be the most informative. In this sense, the rule was to pick the highest- ranging researchers from each department.

#### IV. FINDINGS

Interviews revealed different motives behind academics' sharing or withholding research data.

Present research involved the total of twelve (12) partakers which were coded as (HD) and includes both sexes with ages extending from 49 to 56. The research also entails three (3) universities with a representative from each department, details can be seen in a below diagram.

Table 1: Participants of the Study

University	Department	Participant	Gender	Age
Bauchi State university	Political science, Physics, Accounting & Agricultural science.	HD1	M	51
		HD2	M	50
		HD3	M	49
		HD4	M	51
Gombe state university	Chemistry, Sociology, Commerce & Engineering	HD5	M	56
		HD6	F	55
		HD7	M	50
		HD8	M	51
Yobe state university	Agric., Biology, Education & Engineering.	HD9	F	53
		HD10	M	55
		HD11	M	56
		HD12	M	52

The questions enquired during the interview were; what are the concerns of data sharing to the researchers and what are the benefits inspiring academics in North East Nigeria to share their data? Several obstacles and gains were revealed throughout the interview but five major categories were created from both gains and hurdles to signify the diverse emerging themes acknowledged in the interviews. For hurdles a) Individual factors, b) infrastructure, c) community culture, d) economic barriers, and f) legal barriers were identified for blockades. While a) encouraging collaboration b) reputation c) maximise transparency d) reduce cost, and e) protection against faulty or fraudulent data were revealed for gains. Data analysis revealed a total of 15 and 6 codes and utterances of these codes across the 12 interviews for hurdles and gains respectively. (See table 2, and 3, Appendix).

#### V. FENCES OF DATA SHARING TO ACADEMICS

##### A. Individual factor

This aspect is one of the difficulties stated by the interviewees as personal barriers that they have confidence in are impeding data sharing between researchers. The interviewees commonly mentioned words such as mistrust, exertion, lack of confidentiality and threat as personal hitches distressing academics from partaking in data sharing.

##### B. Exertion

Considering the total period spend which some researchers seen as time wasting in sharing data is an indispensable issue that effect researchers' data sharing practices. This is because academics are certain that fruitful data sharing would require additional energy and sometimes even additional time, for instance, creating, setting and making data may give room to less participation in sharing data. Majority of the respondents disclosed time and energy are required in the course of data sharing as expressed by all the respondents (HD1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12). For example, HD1 said *"I felt discourage in sharing my data whenever I think of the time spend in doing so."*

Circumstantially, has a similar with findings of other studies conducted such as (Campbell et al., 2002) in their research discovered that 80% of geneticists circumvent putting their data easily accessible for the reason that concocting and creating research data demands a lot of time. Similarly, Louis with his contemporaries (2002) correspondingly pointed out that more than two-thirds of geneticists were always not ready to share pre-publication results for the reason that extra time and effort involved in sharing data. HD 2 in his own part, viewed that *"demanding extra work in data sharing stops me from sharing data with others"*. Researchers are certain that data sharing would require additional energy or even sometimes additional time, making them not ready to share data whenever that requires more time and effort (Carlson & Stowell-Bracke, 2013; Kim & Stanton, 2016). As a result of this, researchers may fear data requests because scholars must have to devote a substantial amount of period attending to various demands (Mannheimer, Pienta, Kirilova, Elman, & Wutich, 2019).

##### C. Threat

This is in connection to the possible indeterminate and undesirable outcomes in the course of sharing data. Researchers see data sharing as a menace which may cause trailing publication, misapplication was consider also as a condemnation by their colleagues, that destructively affect sharing data by academics. respondents that are up to 10 in number (HD1, 2, 4, 5, 6, 7, 8, 10, 11 & 12) expressed this opinion. Example, HD3 alleged *"Threat of been unprotected usually dejected me to share my research data"*. Again, a lot of academics have similarly alleged perceived risks contain in data sharing as another key motive behind not involving in sharing their data with their colleagues (Tenopir et al., 2011). As advocated by HD8 *"I am scared of giving out my data for the fright of missing substantial part of my research to some investigators"*. Various scholars are unwilling to make their data openly and this perhaps clarifies the reason behind data withholding among academics" (Pitt & Tang, 2013; Roche et al., 2014). Consequently, influences researchers' profession unenviably.

### ➤ Lack of Confidentiality

Numerous researchers have showed that deficiency of privacy and confidentiality constituted additional imperative factor which effects the way scholars participate in sharing. The fear regarding respondents' confidentiality averts several scholars in sharing research data, eleven respondents coincided to this point. This is in line with HD 4 respond who asserted that *"The surreptitious of my study can be displayed the moment I give out my data to other researchers"*. These concerns are emphasised by researchers but differ from one discipline to another for instance, lecturers in clinical are showing more worried in defending their data. To collaborate is upright and seen as flawless idea but, scholars are frightened their data will not be in a safe hand thus, professed a actual confidentiality anxiety (Reichman, Jones, & Schildhauer, 2011).

### ➤ Mistrust among Researchers

Absence of belief in their colleagues' truth, fairness, and consistency can absolutely influence the way scholars share data. previous findings discovered that academics have a lesser amount of trust within themselves. Six of the respondents have this belief. According to HD6 *"I trust no body to share my research data with in this academic environment"*. This is comparable and correlated with other researchers' findings from some countries. For instance, trust encourage communal collaboration, yet not usually common among the academic realm (Yoon, 2017). It inspires scholars to work in partnership to intensify knowledge and increase value via particular sharing (Holste & Fields, 2010). This indicates the influence of trust regarding suitable collaboration in connection to scholars' involvement in data sharing.

## VI. INFRASTRUCTURE

Deficient structure was also quoted by the respondents as further tricky prompting the effective and consecutively researchers' data sharing activities. Derisory exercise, unfitting links and deficiency of purposeful data repository are acknowledged in several Nigerian Universities.

### A. Inadequate Training

If academics are to fully participate in efficiently collaboration, acquiring positive skills become necessary. The results of this research discovered that Nigeria and most of the African nations have unsuitable infrastructure to acquire such skills hence discourage scholars to be willing to share data (Shaffer et al., 2019). In contrast, in advanced nations, positive trainings normally improve the scholars' involvement in undertaking research for example, (Mantra research data management training Whitmire, 2015). The skills learned throughout training can aid in boosting the scholar' aptitude to share data without hitches. To promote collaboration, data management skills training should be merged with postgraduate research methods exercise (Corti & Van den Eynden, 2015). Organizing productive training with skilled support services can expand academics' willingness towards sharing of any kind. In an attempt to achieve task of sharing data, researchers need both technical

and research skills that are attainable via training (Van den Eynden & Corti, 2017).

Internationally, researchers that involve in data sharing and publication required severe training with advanced knowledge, for instance, at the UK Data Service, for staff to be involved in research data sharing and publishing must undergo severe training regarding sharing and publishing, and those who provide training must equally have extensive research expertise (Van den Eynden & Corti, 2017). In recent times, a survey was conducted on institutional repository workforce in Australia and New Zealand discovered the important of training to member staff on their day to day responsibilities, identified several skills and knowledge gap within the staff (Simons & Richardson, 2012). Also, for active data sharing, researchers' training is inevitable; data literacy skills are pertinent to researchers' daily activities. To support researchers' practices in the face of a hurriedly changing research enterprise that increasingly relies on data literacy skills, relevant training should be guaranteed to all scholars (Federer, Lu, & Joubert, 2016). Therefore, providing data sharing based training programs to researchers will likely increase their level of data sharing practices.

### B. Connectivity

To encourage smooth practicing of data sharing within academics, establishment of efficient connecting plans for budding sharing and recycle of the dataset is inevitable. Results from prior studies showed insufficient connectivity and other related internet issues are experiencing in most of our highest institution of learning in Nigerian. Availability of internet has nurtured invigorated sharing between scholars, researchers that share data usually want to do via internet which is considered more suitable and easy hence advised others to do same (Liao et al., 2013). Researchers nowadays have much more interest in sharing data but been discouraged deficiency of resources to properly handle the exercise (Ferguson et al., 2014). Environment with fewer cyberspace faced a lot of challenges while trying to share, thus, researchers especially from rural areas are confronted more with such challenges as compare to their equals living in cities with virtual reality (Roberts, Anderson, Skerratt, & Farrington, 2017). Even though, high cost and scarcity of income are identified by various organizations as motives behind inadequate infrastructure or dearth of implementation of such connectivity (Townsend, Sathiaselalan, Fairhurst, & Wallace, 2013).

However, more at times, University may offer and discover technological implementation to simplify sharing among researchers but absence of interest within some of the scholars contribute negativity. In a research conducted in England by (Pavez, Correa, & Contreras, 2017), its findings revealed that skiving of interest has been ascending these days as a purpose for not using the internet. Establishment of active societal web can also improve the connectivity among organizational staff. Unreachability and absence of social networks, are entirely acknowledged in a study as some overbearing principles of non-use among young people (Eynon & Geniets, 2012).



### C. Lack of Functional Data Repository

This term has been labelled as a creativity with the intention of keeping data for logical or reportage intention. Nigerian universities high institutions in the country have insufficient data repositories aiming at assist researchers to stock, share and acquire data for recycle. Currently, since identifying the important of the word data sharing, scholars organize diverse data repositories to attain their visions (Gewin, 2016; Tenopir et al., 2015). Recent advancement related to technologies offered raping changes in creating data repositories that aided researchers in publication collaboration without struggle, thus achieving the main objective of modern research which is data driven on shared data sets (Eynon & Geniets, 2012). Currently, collaboration in form of data sharing in academics desperately needs the composition of institutional support like providing data repositories, technological set-up and even interpersonal relations (Kim & Stanton, 2012). Correspondingly, a successful academic's data sharing must encompass the similar three ranges of infrastructure, institutions and people. If we really consider data sharing practices as significant and an evolving tributary in research, creating data repositories becomes critical to modern academic communities.

It is equally important to know that research data sharing transpires in miscellaneous forms, including uploading data in data repositories, succumbing data as journal supplements and providing data by means of personal communication methods upon demand (Kim, 2017). By implication, Universities communities with more data repositories may involve in sharing practices more than those with less. Equally, even in similar communities, data sharing practices can vary based on the present of data repositories. In science, there is no doubt that the volume of data being assembled is speedily increasing more especially in biomedical research laboratories, physics experiments and genomics which necessitated the need for data repositories (Farber, 2017). Establishing data repositories in our universities can really help and influence data sharing activities of our scholars. A latest perspective (Stephens, 2015) claims that the quantity of sequencing data created is amplifying every seven months and it has been assessed that the unit cost of storage capacity declines haphazardly, this is coarsely dependable with the development of data appears to be cumulating by an order of magnitude roughly every 31 months since January 2009 (Kodama, Shumway, & Leinonen, 2011). Data repositories over the years is influencing and changing data sharing practices in the academic environment by permitting researchers to deposit their raw data as well as making such data mostly available to everybody who might want to use them.

## VII. COMMUNITY CULTURE

Culture can be described as how people go about their life that involve things like the behaviours, signs, morals, belief and trust which society agree to take and usually sent from one group to another. The culture of a certain community was also considered to be another reason that affect the scholars' performance regarding data sharing. The culture in Nigerian communities have the clue of

unchallenged and need restricted preservation of any property they own hence deject the idea of sharing (Osugawu, Mohammed, & Nwoga, 2018).

How our societies glare and consider data sharing affect it applies within the scholars of different disciplines. In most of the Nigerian highest institutions of learning, feelings concerning data sharing and other research information are described as noteworthy structures of academic partnership (Franceschet & Costantini, 2010). Among these research information, data is alleged as a precious base because it allows scholars to make changes in almost all parts of development (Corti et al., 2019). Meanwhile, research data sharing is considered an enormous effort involving a sensible practice (Curty, Yoon, Jeng, & Qin, 2016; Wei Jeng, He, & Oh, 2016). Even though changes in community culture there are happen among diverse academic societies, most people emphasise more about accessing which is more transparency (Elman & Kapiszewski, 2013). So, majority of the people in the community stress more on data sharing within diverse researchers. For more than four decades, communities in spite of these differences are managing how to expand accessing and handling resources inside their community; all are recognized as considerate requirements for data organization (Bos et al., 2007). Thus, rapid development in the field of data sharing provides new chances between several societies to help and increase their research.

Nowadays, when transparency and accountability become the order of the day, community all over are doing their best to incorporate data sharing practices and clutch the chances created through producing investigational data that are more obtainable. Aside community culture, other hurdles are also identified that are related to data sharing for example, creating models that are supportable, budding community consent about terms and definitions, identifying data stewardship tactics and construction, allows scholars to contribute in sharing and recycle of datasets, spread over different practices that safeguarding knowledgeable possessions and accept suitable selection of data, (Briggs, 2016; McKiernan et al., 2016; Steckler et al., 2015; Zinner, Pham-Kanter, & Campbell, 2016). Nonetheless, community data culture upstretched many rational and sociocultural anxieties (Hirschfeld, 2012; Pearce & Smith, 2011; Visscher & Weissman, 2011).

### A. Economic Challenges

Of recently, Nigeria's economy glided into decline sparkly adverse economic tremors, the participants still revealed undoubtedly that the pecuniary condition also has affected the participation of scholars concerning share data. Unpredictable nature of our economic plans has undesirable drawbacks on many scholars' activities. Funding giving to various universities are no longer enough to cater their needs hence discourage the scholars from doing what is needed. Prior researches have showed that data sharing is been dispirited by deficiency of inspiration and nonexistence of technical structure (W Jeng & Lyon, 2016). In sharing research data, cost and encouragements have been a back born to data sharing in academics thus, their absent turn out to a significant problem since scholars usually declining to

share data for dearth of encouragements in academic circles (Shen, 2016). Consequently, findings from other studies indicated that getting research data by researchers reduce research costs through evading needless duplication of experimentations that data are readily accessible (Callahan et al., 2017). Scholars' hard work toward share data sometimes are been commandeered and deprived of when expenditures are involved. Researchers' powerlessness to sufficiently share their data are mostly caused by may not be unconnected to lack of inadequate motivations, these motivations seem to be either monetary, reputational and or acknowledgement.

Procedure for data sharing seems to be too crucial and includes both technical and human resources for successful data groundwork (Van Panhuis et al., 2014). Further inducements may come as a result of status and citations and their negligent caused hitches to data sharing within the scholars. Among academic circle, scholars greatly depend on their reputations to show eminence and distinction that are usually offered through the superiority of their research work. To accomplish vital data sharing, substantial amount of period, and incomes need to be devoted, therefore, scholars deny their data and always claim that once their papers are published, their data are open to everyone. (Cheah et al., 2015).

#### B. Legal Challenges

Existing law and restrictions related to data practice were seen to be additional tricky which is discomfoting data sharing exercise among Nigerian higher institutions of learning. The said barricades are connected to legal devices used to confine data sharing, causing from the fundamental readiness or reluctance of scholars to share data. Data sharing practices essentially transpire in harmony with legal requirements which entices limitations with the view to regulate when, how and who to acquire which data (Weller & Kinder-Kurlanda, 2016). Numerous researchers pronounced how data sharing regulation and guidelines are accused of not defending the image of either those producing or using the data (Kaye, 2012). Law protecting some sensitive data usually avoid such data from being shared unless access permission is granted for either to reproduce or reuse data, dispute, lawsuits and restricted conditions for using such data frequently disturb data sharing practices. Certain data are banned from share, example of such data are usually contrary to the law which stop scholars to share integrated data on HIV/AIDS with others except a sturdy permission is granted (Fecher et al., 2015). Evading the breakdown of law on people confidentiality can unconditionally discourage scholars from putting their data readily obtainable (Parsons et al., 2011).

The formation of rules and procedures concerning data sharing is indispensable nevertheless, prior studies disclosed that the law and regulations offering protection which expressive the power function and mission to share data sharing practices with other people are normally absent (Burel et al., 2015; Mauthner & Parry, 2013). Likewise, the appropriate data sharing procedures, quality assurance and other significant components for sharing are usually not accessible to back the practice, consequently, the structures

for data sharing earlier futile Control. To encourage data sharing practices, appropriate laws and policies are required to control regulate data movement and defend privacy (Cadigan et al., 2013).

### VIII. GAINS OF DATA SHARING TO ACADEMICS

#### A. Collaboration

Recently, the concept of data sharing has become a common practice in many academic environments. It enhances cooperation among the parties involved by inspiring more connection and collaboration between researchers. This in return provides important new findings within the field, allows researchers to share resources. Majority of the respondents disclosed that data sharing paves ways for teamwork (respondents HD1, 2, 3, 4, 6, 7, 8, 9, 10, and 11) articulated the same opinion. For instance, respondent HD7 states that *"Data sharing makes me relates with experienced scholars facilitates my research understanding"*.

Collaboration leads to the exchange of data between more than one investigator, researchers who choose to share data also choose to mingle with competent scholars. "One significance of data sharing among researchers is it can help answer new research questions that cannot be answered when researchers work independently with more limited data-sets" (Wallis et al., 2013). Respondent HD8 and 11 said that "library science professionals in particular find it easy to work together with others through data sharing which helps to create groups, collaboration dynamically, publishes, exchange, share and cooperates any related research data".

#### B. Reputation

Academia has been described as a reputation environment, a system in which data sharing is motivated by a desire to accumulate reputation. Is also frequently mentioned in the interview that data sharing will increase the reputation of the data donor, six of the respondents shared this assertion (HD 1, 2, 4, 6, 8 AND 11). One of the respondent (HD 4) declared that *"Data sharing provides high citation rate and improving my status in the research community"*. Making research data available to others will no doubt facilitate the status of the researchers involved in the exercise by enhancing the research visibility of scholarly work. It was observed that papers were often cited more with open data compare with those without the data available (Piwowar & Vision, 2013).

#### C. Maximise Transparency

Nowadays, there is rising demand from the academics and other research organizations to increase the transparency, openness and reproducibility of research. Data sharing has not been left behind as it is part of this development. Promotes transparency of quantitative analytical work, resulting to credibility of research findings, and serves as another way of building upon existing studies (Kim & Stanton, 2013). Funding agencies encourage reproducibility of research by supporting different authors with the transparency and openness promotion (TOP) guidelines. To some of the respondents (HD 1, 3, 4, 6, and 12) "commitment to the principles of openness, transparency and reproducibility

facilitate my performance towards data sharing practices". Data sharing promotes the transparency of quantitative analytical work, resulting to credibility of research findings, and serves as another way for researchers to build upon existing studies (Kim & Stanton, 2013).

It is believed that making data readily available allows for the flexibility required in addressing the varied data-sharing requirements of diverse disciplines. Correspondingly, to achieve this, authors now inspire to share data or sometimes make a data availability statement by their various journal publishers with the aim of facilitating research integrity and transparency. Transparency and openness promotion (TOP) guidelines remain some strategies and inducements for improving transparency of research data.

#### D. Reduce Cost

One of the key principle of data sharing is to reduce cost in generating new data. It avoids duplication of data collection effort hence, minimise what to spend on data and data collection. Research can embark on with more data, within a shortage period of time and at lower cost (Horton & Katsanidou, 2011). Eight of the respondents (HD1, 2, 3, 4, 6, 7, 8, 10, 11 and 12) revealed that a lot costs are save with researchers reused research data. HD 7 and HD 8 specified that *"Insufficient money with less allocation has necessitated researchers to depend on data shared by peers in producing their research"*. Placing data openly available particularly via data repository can also facilitate participation in data sharing without spending money.

Advance in technology has transformed and increased the number of research data produced and shared across all disciplines in academic communities. Research can successfully undertake with more data, within a shortage period of time and at lower cost (Horton & Katsanidou, 2011). The availability and sharing data has grown significantly with pressure being placed on researchers and authors across all disciplines in academic communities to make their raw data more open and accessible.

#### E. Protection Against Faulty or Fraudulent Data

Effective data sharing has the potential to strengthen the credibility of scholarly publications and easily accessible data leads to the awareness of different researches to several readers. It can minimize research fraud; with available data, for example, a researcher should be able to reproduce scientific results without problem. Data sharing helps researchers in identifying inefficiencies, duplications and outright fraud that usually affect research regression.

Data sharing means the data would not be with a single individual thus, will be able to expose all the immoral acts that may occur in the process of generating such data.

Sharing data minimises data manipulation by making free access to researchers so keeps all data fraudsters away. Seven respondents (HD1, 2, 4, 6, 8, 10 & 12) expressed this view. For example, HD6 said *"There is value in sharing data, its obvious advantage includes accountability and*

*transparent compliance minimise to the lower-level dishonest activities"*.

## IX. DISCUSSIONS

The main purpose behind the formation of this study was to explicitly recognize the numerous hitches confronting the Nigerian scholars while participating in data sharing exercise in their various institutions. In spite of several benefits related with data sharing in institutions, scholars acknowledged several problems affecting scholars from sharing data elsewhere. Some of the recognized hitches include but not limited to the following technical, economic, individual factor, community culture, legal factors and insufficient infrastructure. Coincidentally, many works emphasised the correlated hitches involving the procedure of having such sharing practice especially within the learned society this was evidently spelled out by van Panhuis et al., (2014) in their work "review of barriers to data sharing in public health" and concurs with the results of Barry & Bannister in (2014).

This study realised that fences concerning data sharing in academics' setting caused a lot of hindrances which usually make it hard for lecturers to share the most valuable data to their counterparts hence this is considered as calamitous. The interview after completion showed the significance of academics' involvement in sharing data which practically brought about collaboration. The current study further revealed data sharing as a crucial fragment of a movement that facilitate research improvement and career promotion of every scholar. However, these identified problems serve as setback for academics especially while trying to obtain some information related to participants' private statistics (Butler & Cyranoski, 2013).

Concerning individual barriers, numerous hitches are exposed as connected to personal challenges which are caused while sharing data within the academics for example, misused of data this depress many scholars from making their data accessible. Other personal barriers include the danger and energy involved, confidentiality and distrust among others. Academics whispered that exercise of such nature can pave ways to misuse and can result to condemnation from colleagues which can have harmful consequences on the data donors' profession (Bezuidenhout, 2013). For infrastructure, certain reason like pitiful training, in adequate network and absence of efficient data repository were seen and acknowledged throughout the interview. It was also discovered during the interview that there is not suitable infrastructure for training that can inspire scholars' participation practicing data sharing. Nigeria are yet to prepare to enjoy suitable basic infrastructure rather they still battle with unfortunate links and cyberspace connections (Adeosun, 2010).

Relating to community culture, results from this study showed that when it comes to community culture Nigerians appreciate safeguarding of possessions which anguish collaboration among every scholar. Nigerian community culture believe with the notion of controlling and like

exclusive protection of whatever belongs to them hence dishearten any form of sharing (Olufunke, 2011).

For technical barriers, findings from this study shows majority of the people in academic particularly those with decades experiences have technical deficiency thus lack technical ability needed to smoothly share their data with their colleagues with facing difficulties. This is because majority of such lecturers lack the practical know-how wanted in making data obtainable to their peers. Greatest number of academics in rising countries of Africa practical know-how needed in sharing with others (Barry & Bannister, 2014).

About economic barriers, looking at the current economic circumstances in our country, where the usual money allocating to Nigerian institutions is harshly abridged with fewer inspiration to scholars which unswervingly influence their doings for which data sharing practice is not exclusive. To (Jeng & Lyon 2016) diverse researches have revealed that data sharing is been dispirited by the nature of our economic insolvent for instance, absence of incentives and money to acquire desired infrastructure.

Regarding legal challenges, a lot of the interviewees participants labelled so many ways law and policies concerning data sharing have been accused of not defending the right of either the data benefactor and or user thus this averts many of the scholars from data sharing. This has corresponded with the results of (Cadigan et al., 2013) who asserted that laws and policies are substantial in protecting individual rights therefore, such appropriate law are really required in controlling and protecting data movement and confidentiality.

## X. CONCLUSION

Totally, our paper reveals the identified problems are having an undesirable effect on data sharing practices in the academic circles. Consequently, an appeal can be forwarded to both administrator and the scholars to collectively gather together with the aim addressing and offer lifelong resolutions for the advancement of data sharing practice in academic. These can successfully be transpired only if clear protection of both ethics and privacy of the participant's data are take into consideration before sharing, establishment of appropriate technical infrastructure and knowhow, applying modest and stretchy law and policies which can encourage sharing, creating functional data repositories, and organizing orientations on the significant of data sharing to academics most importantly offering suitable economic resources.

Nevertheless, current study discovered some positive features that stimulated academics from sharing their data with their counterparts, example can be related to altruism and helpfulness involved in research data sharing permit some scholars to share their data. The effort involved while collecting research data has extremely reduced the practice and dishearten sharing with other scholars. At present, majority of our academics have access to research data via

collaboration with other scholars that offers adequate data for further study.

## XI. LIMITATIONS AND FUTURE RESEARCH

Lastly, the use of inconsequential sample size has negative effects on the representativeness of the entire sample and generalization of the findings. Subsequently, supplementary researches should incorporate a large sample all over the academics for further passionate outcomes. In addition, present research takes on single method thus, mixed method is suggested to collect comprehensive information unlike using of qualitative method alone. Therefore, there is need for additional study to be conducted separate from academic setting this would be beneficial to countless people draw from both inside and outside the academic societies.

## REFERENCES

- [1]. Adeosun, O. (2010). Quality basic education development in Nigeria: Imperative for use of ICT. *Journal of International Cooperation in education*, 13(2), 193-211.
- [2]. Barry, E., & Bannister, F. (2014). Barriers to open data release: A view from the top. *Information Polity*, 19(1, 2), 129-152.
- [3]. Bezuidenhout, L. (2013). Data sharing and dual-use issues. *Science and engineering ethics*, 19(1), 83-92.
- [4]. Bloom, T., Ganley, E., & Winker, M. (2014). Data access for the open access literature: PLOS's data policy. In: Public Library of Science.
- [5]. Borgman, C. L. (2012). The conundrum of sharing research data. *Journal of the American Society for Information Science and Technology*, 63(6), 1059-1078.
- [6]. Bos, N., Zimmerman, A., Olson, J., Yew, J., Yerkie, J., Dahl, E., & Olson, G. (2007). From shared databases to communities of practice: A taxonomy of collaboratories. *Journal of Computer-Mediated Communication*, 12(2), 652-672.
- [7]. Burel, J.-M., Besson, S., Blackburn, C., Carroll, M., Ferguson, R. K., Flynn, H., . . . Lindner, D. (2015). Publishing and sharing multi-dimensional image data with OMERO. *Mammalian Genome*, 26(9-10), 441-447.
- [8]. Butler, D., & Cyranoski, D. (2013). Flu papers spark row over credit for data. *Nature News*, 497(7447), 14.
- [9]. Cadigan, R. J., Lassiter, D., Haldeman, K., Conlon, I., Reavely, E., & Henderson, G. E. (2013). Neglected ethical issues in biobank management: Results from a US study. *Life sciences, society and policy*, 9(1), 1.
- [10]. Callahan, A., Anderson, K. D., Beattie, M. S., Bixby, J. L., Ferguson, A. R., Fouad, K., . . . Schwab, J. M. (2017). Developing a data sharing community for spinal cord injury research. *Experimental neurology*, 295, 135-143.
- [11]. Carlson, J., & Stowell-Bracke, M. (2013). Data management and sharing from the perspective of graduate students: An examination of the culture and practice at the water quality field station. *portal: Libraries and the Academy*, 13(4), 343-361.



- [12]. Cheah, P. Y., Tangseefa, D., Somsaman, A., Chunsuttiwat, T., Nosten, F., Day, N. P., . . . Parker, M. (2015). Perceived benefits, harms, and views about how to share data responsibly: A qualitative study of experiences with and attitudes toward data sharing among research staff and community representatives in Thailand. *Journal of Empirical Research on Human Research Ethics*, 10(3), 278-289.
- [13]. Corti, L., & Van den Eynden, V. (2015). Learning to manage and share data: Jump-starting the research methods curriculum. *International Journal of Social Research Methodology*, 18(5), 545-559.
- [14]. Corti, L., Van den Eynden, V., Bishop, L., & Woollard, M. (2019). *Managing and sharing research data: a guide to good practice*: SAGE Publications Limited.
- [15]. Curty, R., Yoon, A., Jeng, W., & Qin, J. (2016). *Untangling data sharing and reuse in social sciences*. Paper presented at the Proceedings of the 79th ASIS&T Annual Meeting: Creating Knowledge, Enhancing Lives Through Information & Technology.
- [16]. Denny, S. G., Silaigwana, B., Wassenaar, D., Bull, S., & Parker, M. (2015). Developing ethical practices for public health research data sharing in South Africa: The views and experiences from a diverse sample of research stakeholders. *Journal of Empirical Research on Human Research Ethics*, 10(3), 290-301.
- [17]. Elman, C., & Kapiszewski, D. (2013). A Guide to Sharing Qualitative Data. *Syracuse University: center for qualitative and multi method inquiry (CQMI)*.
- [18]. Eynon, R., & Geniets, A. (2012). On the periphery? Understanding low and discontinued Internet use amongst young people in Britain. *Understanding Low and Discontinued Internet Use Amongst Young People in Britain (August 16, 2012). Report for the Nominet Trust*.
- [19]. Farber, G. K. (2017). Can data repositories help find effective treatments for complex diseases? *Progress in neurobiology*, 152, 200-212.
- [20]. Fecher, B., Friesike, S., & Hebing, M. (2015). What drives academic data sharing? *PloS one*, 10(2), e0118053.
- [21]. Federer, L. M., Lu, Y.-L., & Joubert, D. J. (2016). Data literacy training needs of biomedical researchers. *Journal of the Medical Library Association: JMLA*, 104(1), 52.
- [22]. Ferguson, A. R., Nielson, J. L., Cragin, M. H., Bandrowski, A. E., & Martone, M. E. (2014). Big data from small data: data-sharing in the long tail of neuroscience. *Nature neuroscience*, 17(11), 1442.
- [23]. Franceschet, M., & Costantini, A. (2010). The effect of scholar collaboration on impact and quality of academic papers. *Journal of informetrics*, 4(4), 540-553.
- [24]. Goodman, A., Pepe, A., Blocker, A. W., Borgman, C. L., Cranmer, K., Crosas, M., . . . Hedstrom, M. (2014). Ten simple rules for the care and feeding of scientific data. In: Public Library of Science.
- [25]. Hanson, B., Sugden, A., & Alberts, B. (2011). Making data maximally available. In: American Association for the Advancement of Science.
- [26]. Harvey, C. (2019). Data Sharing in NIH-Funded Research: a Case Study of Data Sharing Practices and Opportunities.
- [27]. Holste, J. S., & Fields, D. (2010). Trust and tacit knowledge sharing and use. *Journal of Knowledge Management*, 14(1), 128-140.
- [28]. Horton, L., & Katsanidou, A. (2011). Purposing your survey. *IASSIST Quarterly*, 35(4).
- [29]. Jeng, W., He, D., & Oh, J. S. (2016). *Toward a conceptual framework for data sharing practices in social sciences: A profile approach*. Paper presented at the Proceedings of the 79th ASIS&T Annual Meeting: Creating Knowledge, Enhancing Lives through Information & Technology.
- [30]. Jeng, W., & Lyon, L. (2016). *A report of data-intensive capability, institutional support, and data management practices in social sciences*. Paper presented at the Proceedings from the 11th International Digital Curation Conference.
- [31]. Kaye, J. (2012). The tension between data sharing and the protection of privacy in genomics research. *Annual review of genomics and human genetics*, 13, 415-431.
- [32]. Kim, Y. (2017). Fostering scientists' data sharing behaviors via data repositories, journal supplements, and personal communication methods. *Information Processing & Management*, 53(4), 871-885.
- [33]. Kim, Y., & Stanton, J. M. (2012). Institutional and individual influences on scientists' data sharing practices. *Journal of Computational Science Education*, 3(1), 47-56.
- [34]. Kim, Y., & Stanton, J. M. (2013). *Institutional and individual influences on scientists' data sharing behaviors: A multilevel analysis*. Paper presented at the Proceedings of the 76th ASIS&T Annual Meeting: Beyond the Cloud: Rethinking Information Boundaries.
- [35]. Kim, Y., & Stanton, J. M. (2016). Institutional and individual factors affecting scientists' data-sharing behaviors: A multilevel analysis. *Journal of the Association for Information Science and Technology*, 67(4), 776-799.
- [36]. Kodama, Y., Shumway, M., & Leinonen, R. (2011). The Sequence Read Archive: explosive growth of sequencing data. *Nucleic acids research*, 40(D1), D54-D56.
- [37]. Liao, C., To, P.-L., & Hsu, F.-C. (2013). Exploring knowledge sharing in virtual communities. *Online Information Review*, 37(6), 891-909.
- [38]. Mannheimer, S., Pienta, A., Kirilova, D., Elman, C., & Wutich, A. (2019). Qualitative data sharing: Data repositories and academic libraries as key partners in addressing challenges. *American Behavioral Scientist*, 63(5), 643-664.
- [39]. Martínez Suárez, Y., de Salvador Agra, S., & de Salvador González, X. (2015). Triplemente marcadas: desconexiones comunicativas en la Amazonía sur ecuatoriana. *Cuadernos. info*(36), 89-107.
- [40]. Mauthner, N. S., & Parry, O. (2013). Open access digital data sharing: Principles, policies and practices. *Social Epistemology*, 27(1), 47-67.

- [41]. Olufunke, A. M. (2011). Education for maintenance culture in Nigeria: Implications for community development. *International Journal of Sociology and Anthropology*, 3(8), 290-294.
- [42]. Osuagwu, C. O., Mohammed, R. S., & Nwoga, C. C. (2018). GLOBALIZATION AND NIGERIAN ECONOMY AND CULTURE. *SOUTH EAST JOURNAL OF POLITICAL SCIENCE*, 4(1).
- [43]. Parsons, M. A., Godøy, Ø., LeDrew, E., De Bruin, T. F., Danis, B., Tomlinson, S., & Carlson, D. (2011). A conceptual framework for managing very diverse data for complex, interdisciplinary science. *Journal of Information Science*, 37(6), 555-569.
- [44]. Pavez, I., Correa, T., & Contreras, J. (2017). Meanings of (dis) connection: Exploring non-users in isolated rural communities with internet access infrastructure. *Poetics*, 63, 11-21.
- [45]. Pitt, M. A., & Tang, Y. (2013). What should be the data sharing policy of cognitive science? *Topics in cognitive science*, 5(1), 214-221.
- [46]. Piwowar, H. A., & Vision, T. J. (2013). Data reuse and the open data citation advantage. *PeerJ*, 1, e175.
- [47]. Pronk, T. E., Wiersma, P. H., van Weerden, A., & Schieving, F. (2015). A game theoretic analysis of research data sharing. *PeerJ*, 3, e1242.
- [48]. Puniewska, M. (2014). Scientists have a sharing problem. *The Atlantic*.
- [49]. Reichman, O. J., Jones, M. B., & Schildhauer, M. P. (2011). Challenges and opportunities of open data in ecology. *Science*, 331(6018), 703-705.
- [50]. Roberts, E., Anderson, B. A., Skerratt, S., & Farrington, J. (2017). A review of the rural-digital policy agenda from a community resilience perspective. *Journal of Rural Studies*, 54, 372-385.
- [51]. Roche, D. G., Lanfear, R., Binning, S. A., Haff, T. M., Schwanz, L. E., Cain, K. E., . . . Kruuk, L. E. (2014). Troubleshooting public data archiving: suggestions to increase participation. *PLoS biology*, 12(1), e1001779.
- [52]. Roettger, T. B., Winter, B., & Baayen, H. (2019). Emergent data analysis in phonetic sciences: Towards pluralism and reproducibility. *Journal of Phonetics*, 73, 1-7.
- [53]. Rouder, J. N. (2016). The what, why, and how of born-open data. *Behavior research methods*, 48(3), 1062-1069.
- [54]. Shaffer, J. G., Mather, F. J., Wele, M., Li, J., Tangara, C. O., Kassogue, Y., . . . Sangare, M. (2019). Expanding Research Capacity in Sub-Saharan Africa Through Informatics, Bioinformatics, and Data Science Training Programs in Mali. *Frontiers in genetics*, 10.
- [55]. Shen, Y. (2016). Research data sharing and reuse practices of academic faculty researchers: A Study of the Virginia Tech Data Landscape. *International Journal of Digital Curation*, 10(2), 157-175.
- [56]. Simons, N., & Richardson, J. (2012). New Roles, New Responsibilities: Examining Training Needs of Repository Staff. *Journal of Librarianship & Scholarly Communication*, 1(2).
- [57]. Stephens, D. C. (2015). Large-scale data storage and delivery system. In: Google Patents.
- [58]. Tenopir, C., Allard, S., Douglass, K., Aydinoglu, A. U., Wu, L., Read, E., . . . Frame, M. (2011). Data sharing by scientists: practices and perceptions. *PLoS one*, 6(6), e21101.
- [59]. Tenopir, C., Dalton, E. D., Allard, S., Frame, M., Pjesivac, I., Birch, B., . . . Dorsett, K. (2015). Changes in data sharing and data reuse practices and perceptions among scientists worldwide. *PLoS one*, 10(8), e0134826.
- [60]. Townsend, L., Sathiaselan, A., Fairhurst, G., & Wallace, C. (2013). Enhanced broadband access as a solution to the social and economic problems of the rural digital divide. *Local Economy*, 28(6), 580-595.
- [61]. Van den Eynden, V., & Corti, L. (2017). Advancing research data publishing practices for the social sciences: from archive activity to empowering researchers. *International Journal on Digital Libraries*, 18(2), 113-121.
- [62]. Van Panhuis, W. G., Paul, P., Emerson, C., Grefenstette, J., Wilder, R., Herbst, A. J., . . . Burke, D. S. (2014). A systematic review of barriers to data sharing in public health. *BMC public health*, 14(1), 1144.
- [63]. Wallis, J. C., Rolando, E., & Borgman, C. L. (2013). If we share data, will anyone use them? Data sharing and reuse in the long tail of science and technology. *PLoS one*, 8(7), e67332.
- [64]. Weller, K., & Kinder-Kurlanda, K. E. (2015). *Uncovering the Challenges in Collection, Sharing and Documentation: The Hidden Data of Social Media Research?* Paper presented at the Ninth International AAAI Conference on Web and Social Media.
- [65]. Weller, K., & Kinder-Kurlanda, K. E. (2016). *A manifesto for data sharing in social media research*. Paper presented at the Proceedings of the 8th ACM Conference on Web Science.
- [66]. Yoon, A. (2017). Data reusers' trust development. *Journal of the Association for Information Science and Technology*, 68(4), 946-956.

## APPENDIX

Summary of coding results. Column sources (S) signify the number of individual interviews where the factor befallen. References (R) denote the total utterances of each factor across the different interviews.

Table 2: Summary of the Coding for Fences of Data Sharing

Individual factors					
Category/Fences		S	R	Description	Sources
IF1	Perceived exertion	12		the situation where the researcher believes that successful data sharing would demand extra energy, work or even extra time, for example, forming, fixing and preparing data	(Carlson & Stowell-Bracke, 2013; Kim & Stanton, 2016)
IF2	Threat	10		Potential uncertain and negative outcomes in the process of sharing data.	(Tenopir et al., 2011).
IF3	Lack of confidentiality	11		Protection of data from authorised disclosure	(Reichman et al., 2011).
IF4	Trust	7		The belief in other researchers' integrity, fairness, and reliability	(Berry, 2011).
Infrastructure					
IS1	Training	10		Developing skills to enhance the researchers' ability to share their data with others	(Van den Eynden & Corti, 2017).
IS2	Connectivity	12		ICT infrastructure that will help researchers in sharing data with one another.	(Martinez Suarez, et al., 2015)
IS3	Data repository	8		A bank that seeks to preserve and promote data in an institution.	(Gewin, 2016)
	Community culture				
CM1	Conservatism	11		Opposition to change and innovation.	Dictionary
CM2	Extra monopolistic	10		Exclusive preservation of property by someone	Lewis, et al., (2009)
	Technical barriers				
TB1	Lack of expertise	11		Inadequate special skills, knowledge to share data	
TB2	Fragmentation of software	12		absence of standardization and incompatibility among surveillance databases	(Hoffman & Podgurski, 2013)
	Economic barriers				
EB1	Inconsistent economy	9		Unreliable financial sources	(Jeng & Lyon, 2016)
EB2	Low allocation	11		Insufficient funding giving to an institution	(Weller & Kinder-Kurlanda, 2015)
	Legal barriers				
LB1	Limited conditions of using data	8		Restrictions of having the potential to use a particular data.	(Weller & Kinder-Kurlanda, 2016)
LB2	Data protection laws	6		Relevant laws and policies that control data flow and protect confidentiality	(Cadigan et al., 2013).

Table 3: Summary of the Coding for Gains of Data Sharing

Categories/Gains		S	R	Description	Sources
Collaboration					
CL	Encourage cooperation	9		the ability of the academics to act together for the purpose of facilitating data sharing.	(Tenopir et al., 2011)
Reputation					
RP	Citation	6		An act of acknowledging the source of data used in your research.	(Fecher et al., 2015)
Maximise transparency					
MT1	Reproducibility	5		To reproduce a new result with an old data	(Kim, 2013)
MT2	Openness	5		Unrestricted access to research data	(Kim, 2013)
Reduce cost					
RC	Lower cost	8		The process of removing unjustified expenses spent in finding data for research.	(Horton & Katsanidou, 2011)
Protection against fraudulent data					
PFD	Minimize data manipulation	7		Curtail data dishonest	Pendyala, & Riehl (2003)