

# Library Support for the Creation and Management of Research and Intellectual Output of Central Banks and International Financial Institutions (CBIFI)

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## BACKGROUND

Central banks and International Financial Institutions (CIBFIs) play a crucial role in maintaining price stability and promoting economic growth and development at a time of rapid technological advancements and expanding knowledge. The research, data sets, publications, and other intellectual outputs created by CIBFIs are valuable resources that need to be preserved and safeguarded. Central bank libraries safeguard and promote the intellectual property while promoting research and publication. Libraries affiliated with CIBFI, such as the Central Bank of Nigeria (CBN) Library, have difficulties in effectively handling both physical and digital resources in the age of digitalisation. Restrictions on key documents are imposed due to concerns about deterioration, and the absence of a centralised institutional repository prevents collaboration and promotes research. Lack of unique digital identifiers and value-added services reduce the global visibility and impact of CBN research. This study investigates the methods that CBIFI libraries use to support to the creation and management of intellectual output in their organisations. By doing so, they enhance long-term preservation, ensure persistent access, promote global visibility, increase utilisation, and monitor the effect of institutional research.

## INTRODUCTION

Central banks in their bid to fulfil their mandate of ensuring price and monetary stability create new knowledge through research. Findings have it that these researches help policymakers to do their jobs better by enabling them to understand current theories and their application to policy practice and improves the credibility of policymakers and the policy they produce based on the quality research capacity (Cecchetti, 2002). High-quality research enables central banks to make better monetary policy because the findings ensure that central banks are well equipped to cope with the challenges associated with ensuring monetary stability, low inflation and economic growth in their countries (Goodfriend, Konig, & Repullo, 2004). Because better price and monetary policies are products of quality research, further researches are required to assess the impact of policies on the economy. Central banks and financial institutions create conducive environments to enhance knowledge creation and management. Research findings and policies that emanated from these findings are communicated to stakeholders (financial markets, monetary authorities) and the public in form of publications, speeches, press releases through channels like the media and mostly the Bank's websites (Ehrmann, Fratzscher, De Haan, & Jansen, 2008: 910). In addition to these central banks and create knowledge other peer reviewed learning events and knowledge management activities. The authorities of central banks must use efficient strategies to manage knowledge and save the achieved knowledge of the employees and get assured about their use in daily duties of the Central bank. By so doing, the risk of missing knowledge as a result of the exit of experienced staff due to retirement and resignation are minimised (Siadat, YahyapourRezakolaei, ManiYekta, & Marashipour, 2016:21).

Central banks' intellectual output would be wasted if they are not preserved for posterity. Towards this end, central bank libraries are expected to provide a range of information services to support the creation and management of peer-reviewed and non-peer reviewed knowledge which constitutes the intellectual output of the institution. They achieve this through activities that include identification, acquisition, organisation,

preservation and dissemination of these intellectual resources using relevant services and technologies. By collecting, organising and distributing the intellectual asset of the institution, the central bank library does not only acts as a conduit for existing knowledge but serves as a catalyst for new (Matarazzo, 2009).

Intellectual output within the context of this study include: monographs; peer-reviewed research publications like journals (pre-print and post-print); unpublished research (working paper, occasional papers, workshop presentations etc.); conference proceedings, learning resources (presentations in power point, audio and video formats); Datasets (in CSV, Excel and other format). Because of their importance, it has become important to devote resources in managing locally produced research to ensure that they are easily accessible locally and globally. It has equally become important for libraries to support and be involved in the creation of internally generated knowledge through more innovative services. Within this context, this research sought to examine library support across the broad spectrum of activities that span the research and publication life cycle in central banks and other international financial institutions (CBIFI's) libraries.

## Problem Statement

Research and other knowledge creation and dissemination activities are key to the operations of central banks and other financial institutions. In the words of (Siadat, & Garshasbi, (2014:1147):

*...intellectual assets are as important as financial capital for the success of organisations. Consequently, creation and acquisition organisational knowledge, and its maintenance, distribution, sharing and development have become the one of the most important duties of managers in organization.*

Towards this end, central banks and financial institutions (CIBFI) libraries are established to support the knowledge creation, preservation and dissemination process. The extents to which CIBIFI libraries have been able to achieve this objective have not been clearly determined from existing literature.

Similarly, the proliferation of intellectual output and the diversity of their formats that are produced by CIBIFI's have made it difficult for traditional library services and technologies to adequately manage them. They have become ill-suited for this purpose due to the fact that they are to manage mostly external content, with scant attention to internally produced content (Banach, & Li, 2011).

Though CIBIFI's use e-mails, websites and portals for the communication and dissemination of research findings they are by no means the most appropriate tool for the efficient organisation, long term preservation and retrieval of information. Kumarasinghe, (2013) for instance, observed that the use of websites for dissemination of research publications are sometimes not database-driven thus, they provide limited access points and are not amenable to long term preservation. Also, Stierholz (2015) observed that the platform for managing the Federal Reserve (United States) information resources was complex and pose several challenges which included: not all materials were comprehensively distributed; not all materials were published; library collections of Federal Reserve materials were often incomplete; web searching for Federal Reserve materials was difficult; and only current materials were available. The above picture is true for most central banks including the Central Bank of Nigeria Library scenario. Research publications of the Central Bank of Nigeria has accumulated from its inception in 1961 to date to the point that it is becoming physically impossible and technologically complex to manage the print publication and their electronic formats respectively. The Central Bank of Nigeria (CBN) Library, for instance, has in its possession, a copy of the 1963 annual report with access to this document restricted to prevent its deterioration. This is the same for many valuable publications.

Other challenges facing the CBN Library in its quest to support the creation and management of intellectual output in the Bank include the following:

- research in the Central Bank of Nigeria is conducted in silos with Department's engaging in research activities with little collaboration. The risk of duplication of research effort becomes more likely given that there is an absence of a centralised repository to organise and archive past research. Such a repository would to give a clear picture of what research had been done and areas not covered;

- absence of a mechanism to enhance and measure the impact of various research activities in terms visibility and utilisation;
- absence of relevant identifies like International Standard Book Number (ISBN), International Standard Serial Number (ISSN) in some publications with the consequence that global visibility would be impeded;
- inadequate value-added services like back-of-the-book-index, pre-publication cataloguing; and
- Lack of uniformity in the publication, citation and referencing styles; and
- absence of subscription management and electronic commerce capabilities for publications; and

### **Objectives and Justification of the Study**

Because of the increasing challenges being confronted by Central Bank of Nigeria in managing intellectual output, this study is aimed at exploring how library support and involvement in the creation and management of the intellectual output can enhance the process. This would examine specific strategies to be put in place, tools to be used, the challenges faced by other central banks libraries that had implemented the process. Findings from this study are expected to provide valuable insights that would be used by the Bank to develop appropriate strategies to support the research and publication life cycle of the Bank. This should culminate in the effective long-term preservation, persistent access in order to ensure that there is global visibility, utilisation, and more accurate measure of impact of CBN research. This study would specifically: identify the research and publication lifecycle in CBIFI's and library services and technology support that are provided to support them; identify challenges faced by CBIFI's libraries while providing support for the creation and management of research and publication in their organisations; make relevant recommendations towards enhance the creation and management of intellectual output in the Bank. To establish a premise upon which to conduct the study relevant literature was examined.

### **Research Questions:**

To help resolve these issues and challenges the study was expected to address the following questions

- How do library services and technologies the research and publication life cycle in their in the Central Banks and International Financial Institutions (CBIFIs)?
- What specific strategies and tools can enhance library support for the creation and management of research output in CBIFIs?
- What are the challenges that CBIFI libraries face in providing library support for the creation and management of research and publication and how can they be addressed
- How might an improved library support help to the long-term preservation, continuous access, worldwide exposure, utilisation, and assessment of the effect of research output at the Central Bank of Nigeria?

### **LITERATURE REVIEW**

The literature surveyed issues that could lead to a better understanding of the challenges central banks libraries face as they provide support for the creation and management of research and publication in their organisations. Consequently, the literature covered: the need for the creation and management of intellectual output in central banks; the research and publication life cycle; library support for research and publication activities using the life cycle framework; the role of libraries within central bank research and publication life cycle; library technologies that support the creation and management of intellectual output.

### **The need for the creation and management of intellectual output in CBIFI's**

Intellectual output as stated earlier includes peer-reviewed research and non-peer-reviewed knowledge that are produced in different formats. The creation and management of intellectual output particularly, high-quality research, is essential to ensure that central banks are well equipped to cope with the challenges associated with conducting monetary policy in their countries aimed at the improvement of a country's economic wellbeing (Goodfriend, Konig, & Repullo, 2004). According to Cecchetti, (2002), a central bank, as an institution

entrusted with improving a country's economic wellbeing, is a natural place to produce contributions to knowledge. Because of this, all central banks conduct research in the fields of macro and monetary economics, concerning the financial system in their respective countries, and they exchange their findings not only among themselves but with the wider research community as well (Debreczeni, 2015). For these research efforts to be effective, it is important that the findings are communicated to relevant stakeholders (internal and external).

Communication can be an important and powerful part of the central bank's toolkit since it can move financial markets, enhance the predictability of monetary policy decisions, and potentially help achieve central banks' macroeconomic objectives (Blinder, Ehrmann, Fratzscher, De Haan, & Jansen, 2008: 910-945). Central banks communicate through speeches by the governors and MPC members, minutes of MPC meetings, an internet website, quarterly bulletins, annual reports, and research papers produced by the Bank's staff (Fracasso, Genberg, & Wyplosz, 2003:8). In addition, central banks create valuable non-scholarly Knowledge whose contribution towards the realisation of institutional objectives are invaluable. These activities include knowledge management process and practices; learning activities like workshops, conference, seminars and trainings (Oluikpe, 2012). The creation of knowledge whether peer-reviewed or non-scholarly knowledge involves key activities that are best explained using the research life cycle.

### **The research and publication life cycle**

The research life cycle represents a useful way of thinking about the research process in its entirety. It provides a means of designating the resources likely to be of most use when considering the challenges posed by each stage of the lifecycle (JISC n.d). Such is the importance of the life cycle approach to the research process that various models of the research life cycle have been outlined (Wallis, Pepe, Mayernik, & Borgman, 2008; Patel, 2011; Jeffreys, 2012; Corti, Van den Eynden, Bishop, & Woollard, 2014; Vaughan, Hayes, Lerner, McElfresh, Pavlech, Romito, & Morris, 2013; Brown, 2016). Wallis, *et al.* (2008) identified nine stages namely: design, calibration and setup, capture or generation, cleaning, integration, derivation, analysis, publication. Patel, (2011) provides a that model includes: research concept and/or experiment design, write proposal peer review proposal, start project, acquire sample, conduct experiment/process data, analyse data, interprets and analyse results data, prepare supplementary data, prepare manuscript, peer review, Publish research. Jeffreys (2012) provided a model with the following phases: pre-proposal, grant proposal, award/offer, conducting the research, publication, data curation and accessibility. The research life cycle by Vaughan, *et al.* (2013) comprise of: idea development, funding, proposal, conducting and disseminating. The model by Corti, *et al.* (2014) consist of data discovery, discovery and planning, data collection, data processing and analysis, publishing and sharing, long term management, and reuse of data. The life cycle model by Brown (2016) include ideas; partners; proposal writing; research process (simulate, experiment, observe, manage the data, analyse data, share data-repositories and good resource discovery tools); virtual research environments; publication. The cycle any institution adopts should help it achieve its aim of conducting research.

### **Library support for research and publication activities using the life cycle framework**

Libraries had all this while supported research activities using traditional services revolving around information discovery, collection development and information management. This focus is however shifting from managing information in its published form to managing data sets; playing critical role in the digital knowledge creation and sharing process by acting not only as custodians of 'downstream' but also contributing through less visible but critical 'upstream' interventions like preservation (Lake, 2012). This 'upstream' interventions, Gold (2007) argues, could leverage on libraries experience with institutional repositories, to create more dynamic repositories that support pre-publication workflows, including collaboration environments supporting data integration, analysis, and visualization. This implies that library services should cover the entire spectrum of activities that are related to the process of creating and managing intellectual output in an organisation.

Available literature suggests that library services could be provided with greater efficiency if it is done within the framework of a research life cycle model (Lake, 2012; Gold, 2007; Deng, & Hu, 2014; Deng, 2013; Carlson, 2014; Sferdean, 2014; Willet, 2014; Emery, & Stone, 2015; Cross, 2016; Jester, 2016; Maxwell, 2016).

Deng, & Hu (2014) outlined the University of Virginia Library Research Life Cycle support model. A knowledge map (KM) was created based on the Research Lifecycle to provide campus - wide services and resources to researchers. The map describes the research processes and their associated services as presented in the Research Lifecycle, and links these points to various campus resources including those provided by the University Libraries, the Office of Research and Commercialization, the Institute for Simulation and Training and the Faculty Centre for Teaching and Learning.

Deng, 2013; Carlson, (2014); Sferdean (2014); Willet (2014); Emery, & Stone (2015); Jester (2016); and Maxwell (2016) presented the case for crafting of the library's strategic plan around the research lifecycle. Maxwell (2016) stressed that libraries cannot thrive without aligning their workings directly to the core mission of their host institutions, strategic alignment of the library ought to be linked to the parent organization's objectives and goals.

### **The role of libraries within central bank research and publication life cycle**

The need for efficient and innovative library services for central banks have been emphasised by Mihaljek (2009); Debreczeni (2015); and Koers (2015). Koers (2015) for instance noted that apart from developing and maintaining efficient information search and retrieval, central bank libraries need to maintain a centralised organised archive, provide external information (library, data vendors, portals), actively get involved in knowledge management

Debreczeni (2015) reported a survey carried out to determine services and resources provided by central bank libraries. The author noted the following: responsibilities carried out by libraries included user services was (most cited); budget and acquisition and e-resource management. Other services identified included technology and outreach related tasks; provision of more of digital than traditional; integration of different but related information services (library, records, archives and others); plans to increase digital resources and services. In terms of communicating with patrons, central bank libraries employed methods like use of emails, live chat and instant messaging.

Libraries support the research process from the conception of research idea to the publication of its findings. Vaughan, Hayes, Lerner, McElfresh, Pavlech, Romito, & Morris (2013:310-314) identified the various stages of the research life cycle and described the library services provided during each of the stages of the life cycle. Their model of the research life cycle includes the following stages: idea development; funding, proposal, conducting and dissemination. The library services provided at the idea development stage include finding background literature, locating data sources, identifying collaborators. At the funding stage library support services include identifying grant seeking tools, and identifying grant opportunities. At the proposal stage, library support activities include preparation of data management plan, navigate repository options. At the conducting state, library support activities include management of citations. At the dissemination stage the library support activities include selecting journals, managing copyright, track research impact and depositing work in digital repository.

Semertzaki (2015) enumerated the role and competencies of embedded or liaison librarians to include: providing online info sources that are accessible from the desktop of users; involvement/embedding in organizational activities (strategic planning, research, teaching, learning); maintaining physical appearance with users; developing collaborative programs that use library resources; using events to promote library services; and going where the action in the organization is taking place.

Libraries are struggling with how to preserve the scholarly and cultural record now that information is increasingly being produced in digital formats. Preservation of information during the era of print-only was relatively easier since paper is a durable format when made properly and stored under the proper conditions. However, preserving information in the digital age has become a more complex task. This is because digital information is fragile and faces many threats like technological obsolescence and the deterioration of storage media. While the capacity to record, information has increased exponentially over time, the longevity of the media used to store the information has decreased equivalently. An instance is while handwritten or printed manuscripts can last centuries, the life span of a compact disc (CD) is 15 years (Banach, & Li, 2011)

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## **Library technologies that support the creation and management of intellectual output**

The proliferation of information resource, sources and diversity of formats and the challenges of seamlessly integrating and providing unfettered access to these sources and formats have given rise to a series of innovative library services that require adequate technology support (Banach, & Li, 2011; Lorimer, 2012). In addition, given the complexity and significant volume of intellectual content being produced by organisations and institutions, robust cyber infrastructure is increasingly being required to manage foster its utilization (Banach, & Li, 2011). Services include: access to electronic resources, literature search, OPAC, search and discovery services, institutional repositories, bibliographic services (citation, ISBN, ISSN) user education, embedded/liaison services, publication hosting services.

### **Institutional repositories**

An institutional repository is a type of digital library that capture the original research and other intellectual property generated by an institution or organisation (Burns, Lana, & Budd, 2013). Academic and research libraries are actively involved in building digital collections by using institutional repositories to preserve and disseminate scholarly or intellectual materials created by their parent institution and community members. Scholarly materials that are such books, papers, pre-prints, post-prints, technical reports, theses and dissertations, data sets (Wegner, & Zemsky, 2007). According to Cullen, & Chawner, (2008) institutional repositories address problems inherent in scholarly publishing namely: increase in subscription costs of journals and reduction in library budgets; loss of key resources if e-journal and database subscriptions are cancelled by libraries; loss of access to research resources as well as output which consequently reduce the research impact of the work of scholars, and researchers. They are also seen as having a role to play in overcoming these problems, a cost-effective method of providing access to research findings and improving the 'research impact' of an institution. Debreczeni (2015) supported this by stressing that the motive for undertaking an IR project was always the need for long-term preservation and dissemination.

### **Library management systems**

Library management systems, also known as integrated library systems (US) have over the years been the key library technology used for the automation of the routine operations of the library (Adamson, Bacsich, Chad, Kay, & Plenderleith, 2008). The operations that are automated using the library management system include: acquisitions; cataloguing and classification of library resources/materials; circulation of materials to users by lending and receiving them back; serials management through the racking magazine, journals, and newspaper holdings; the provision of online catalogue (OPAC) the interface that enables users interact with the library and to browse, search and view the library's collections remotely (Wang, & Dawes, 2012:76).

### **Discovery services/solutions**

The growth of electronic resources (eBooks, e-journals, article databases, statistical databases) meant that libraries can provide users with access to numerous resources remotely irrespective of time and distance. The diversity of the formats and locations of these resources have however posed a challenge to libraries. Users must search numerous resources from disparate sources and remember several login details. Library's strategic goal is that of ensuring that external and local resources of the library are available and accessible to all users. Discovery services/solutions are technologies that support this goal by providing a single point to search and retrieve information from the library's collections (Vaughan, 2012:32-36; Breeding, 2014).

### **Citation and reference tools,**

Reference Managers are lightweight database management systems that serve as a tool for students, researchers, and lecturers to create and track references / citations and to create bibliographies or reference lists formatted in the appropriate style, such as APA, MLA, Chicago or Turabian (Zhang, 2012:45).

Modern Reference Management packages are usually integrated with word processors so that a reference list in the appropriate format is produced automatically as an article is written, reducing the risk that a cited source is

not included in the reference list. They also have a facility for importing the details of publications from bibliographic databases (Francese, 2013: 145-174). Some examples include Mendeley, EndNote, EndNote Web, Zotero and RefWorks (Coombs & Hollister 2010:163-183; Francese 2013:145-174).

### **Online publishing system**

Libraries could make journal hosting available to scholars to ease the creation and administration of alternative journals, and could provide them with wide, and sometimes open, accessibility by hosting new journals (Lorimer, 2012:1-18). In 2013, 55% of the 33 respondents studied were already providing hosting services and related support and another 24% were considering the provision of such services (Morrison & Owen, 2010).

### **Electronic resource access tools: Remote authentication**

Some electronic resource publishers provide access to their platforms via Internet Protocol (IP) authentication. This means that library users are required to be within their instructional computer networks before they can access these resources (Namuleme, 2015:367). This reduces the time these resources are accessible to users leading to their underutilisation. It also negates the principle of full-accessibility to library services at all times from anywhere. Remote authentication systems have been developed remote access facilities to maximize the use of their expensive electronic resources (e-books, e-journal, database, data source subscriptions even when they are outside their organisation's network (Choy, 2005:4). Remote authentication systems like Ezyproxy are web-based solutions that facilitate access to library resources from remote locations (Namuleme, 2015:367).

## **METHODOLOGY**

### **Mixed Method Study**

This study used a sequential exploratory mixed method study to explore and determine the importance of library support and level of involvement for the creation and management of intellectual output in central banks and international financial institutions. Because of the need to collect and analyse objective numerical data that seeks to generalise the subjective experiential views of participants, the study was approached from a dual philosophical perspective of constructivism and post-positivism. The first phase involved the qualitative exploration of how central banks and international financial institutions manage the creation and management of intellectual output in their institution. Consequently, the views, opinions and perspectives from ten (10) central bank and international financial institutions librarians were collected using an online interview protocol. The online interview protocol was developed and administered via an email list (cbfalist) established by Central Bank and International Financial Institutions Librarians. The aim of the protocol was to elicit the subjective experiences of the participants on library services/technologies used to support the creation and management of intellectual output within the research life cycle by CBIFI's. The transcripts of the online interview protocol were analysed by excerpting, coding and analysed using Dedoose a qualitative data analysis platform. Themes from this qualitative data were modified into a quantitative survey instrument with numerical scale to address the research questions (West, 2011; Terrell, 2012: 263; Law, 2015: 21-54; Snelson, 2016).

The second phase which was conducted to validate and corroborate the findings from the qualitative phase involved the collection and analysis of quantitative data using a larger sample to corroborate the qualitative findings (West, 2011; Terrell, 2012: 263; Law, 2015: 21-54; Snelson, 2016).

### **Justification for the choice of an Exploratory Sequential Mixed Methods Study**

The choice of exploratory sequential mixed methods study for this study was predicated on the nature of the study which was expected to draw from the experiential views and options of participants during the first, exploratory and qualitative phase while utilising quantitative techniques in the second phase. Mixed methods research is a combination technique where statistical information obtained from quantitative measurement is supported and enriched by qualitative information obtained from the explanation provided by the research participants (Manzoor, 2016:79). According to (Mukherjee, & Kamaruzuzman, 2016:39), mixed methods

research is being articulated as the third major research approach along with quantitative and qualitative approaches for research. It is one of the recent research methodologies that has gained attention from education and social science research (Manzoor, 2016:79)

Similarly, the use of a dual philosophical worldviews to provide a basis for this study stems from the fact that both quantitative and qualitative approaches to data collection and analysis were required for a balanced perspective during the study. Library services, research, publication and other activities related to the creation and management of intellectual output of central banks are essentially, social activities. Eliciting information on these activities is best done by gathering the subjective, multiple and varied experiences, opinions and views of the participants. Similarly, the quantitative measurement the variables (Library resources, services, technologies) using the instrument developed based on the findings from the qualitative data seeks to corroborate and validate the findings.

### **Philosophical Orientation of the study**

The constructivism philosophical worldview or paradigm holds it that reality is subjective and experiential consequently, human beings construct their own social realities, are varied and/or multiple. As a result, the researcher focuses on the participant's views in order to interpret the meanings that they have of the situation being studied (Creswell, 2014:8). The post-positivism paradigm that informs the quantitative phase of this study holds it that causes determines effects or outcomes. These causes need to be established in order to determine their influence on the outcome of a phenomena (being studied) through careful observation and measurement of discrete sets of variables. The Post-positivist researcher is objective and strives to minimise bias (Creswell, 2014:8; Meissner, 2016: 1-10; Zidane, 2016:53-58).

The choice of these worldviews was anchored on the premise that had been established by Greene and Caracelli (2003); Johnson, & Onwuegbuzie (2004:14-26); Teddlie and Tashakkori (2010: 14-16); Cameron (2011:101); Hall (2012); Stockman (2015); Creamer, & Tendhar (2016:1-16); Matsaganis (2016: 1335) and Mertens (2016). Their various analyses of paradigm stances in mixed methods research provides a framework for researchers to choose from in order to engage in mixed methods studies. The paradigmatic stances include: a-paradigmatic; the substantive theory stance; complementary strengths stance; multiple paradigms; dialectic stance; and the Single paradigm stance.

In the case of this study, the adoption of mixed methods is best understood from the standpoint of Halcomb, & Hickman (2015:45) who argues that research problems with multiple perspectives that require a more detailed understanding than could be gleaned from a single perspective are best suited to mixed methods designs.

### **Mixed Methods studies in Library and Information Science research**

Evidence of Mixed Methods studies in Library and Information Science research include: Venkatesh, Brown, & Bala, (2013:22) who encourage information science researchers to engage in mixed methods research to provide rich insights into various phenomena; Bowles-Terry (2012: 82-95) appraised empirical studies examining the impact of clinical information-retrieval technology on physicians and medical students; Ngulube (2010: 252-261) explored the use of mixed methods research (MMR) in articles published in library and information science (LIS) journals in Sub-Saharan Africa (SSA) from 2004 to 2008; Fink, & Beck (2015: 633-651) developed and evaluated an online program to improve older adults' skills in identifying high-quality web-based health information; Wakeling, Rutter, Birdi, & Pinfield (2016) studied inter-lending and resource sharing in UK public libraries, based on the results of a survey distributed to both senior library managers and inter-lending staff, and in-depth follow-up interviews with 20 respondents.

### **Study population and sample**

The Population of this study comprised of 300 CBIFI librarians. For the qualitative data collection, 10 librarians were used while 70 librarians participated in the quantitative phase of the study.



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## Qualitative data collection

### Qualitative sample and sampling Technique

For the qualitative phase, 10 Librarians were selected using the maximum variation sample. This type of purposive sample was used to enable researchers document the diverse and varied characteristics (years of experience, qualification, area of specialization) of participants and to enable the sample to be more representative than a random sample (Vitcu, Vitcu, & Marcu, 2007; Palinkas, Horwitz, Green, Wisdom, Duan, & Hoagwood, 2015). Participants were selected based on the assumption that they possess adequate knowledge and experience with the phenomenon of interest (the creation and management of intellectual output in central banks and international financial institutions) (Palinkas, Horwitz, Green, Wisdom, Duan, & Hoagwood, 2015). According to Anca Vitcu, Vitcu, & Marcu (2007:8), if participants that differ in a variety of ways are interviewed, their aggregate answers can be close to the whole population. Similarly, Creswell (2014) stated that when a researcher maximizes the differences at the beginning of a study, there is a greater likelihood that the findings would reflect diverse perspective which is ideal.

### Qualitative data presentation and analysis

Charles, & Tashakkori (2009); Onwuegbuzie, Leech, & Collins (2010) and Creswell (2014) identified strategies for collecting qualitative data to include interviews, focus groups, observations, and documents/material culture as four major sources of data.

### Instrument for Qualitative Data collection

For this study, an online interview protocol was developed and administered to participants to respond to via the Central Bank Librarians online bulletin board and mailing list. According to Zwaanswijk, & van Dulmen (2014), participants in an online interview can participate at a moment most convenient to them; they respond from their own home and do not have to travel to participate; some participants prefer to give answers anonymously. This was supported by Williams, Clausen, Robertson, Peacock, & McPherson, 2012:362 who stated that lack of physical presence and the asynchronous, longitudinal aspects enable participants who might not normally contribute to research studies to reflect on their personal stories before disclosing them to the researcher.

### Procedure for Qualitative Data analysis

Baptiste (2001) identified four phases defining the analysis, classifying data, making connections between and among categories of data, and conveying the message/write-up. Creswell (2014) on the other hand identified six which include representation using matrix; Describing using context; Classifying using categories; Reading and reflecting; and Memoing using note writing. For this study however, data was analysed according to the following phases: organisation and preparation of the data for analysis; reading through all the data; using detailed analysis with a coding process; generating description of the coded data using context, and categories or themes; Classifying and representing categories and themes; and interpreting or giving meaning of the data.

### Reading through data and memoing

Reading through data and memoing involved reading through and making notes (memos) of key concepts, phrases, ideas that occur in the transcripts.

### Coding Using Dedoose Mixed and Qualitative Data Analysis Software

Coding of the data was achieved manually and further analysed using Dedoose a mixed methods and qualitative data analysis software. According to Saldana (2013) coding is the process of identifying and extracting codes from a qualitative data transcript or excerpt. The data was described and classified according to themes, codes and quotes by specifically aggregating small categories of information from the transcript. The labels of the data are terms based on the researchers' interpretation (*priori*) or in the actual language of the participant (*in-vivo*).

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## **Generating a description of classified themes**

At this stage, the coding process was used to generate a description of the categories of themes for analysis. According to Baptiste (2001) this process begins at the inception of the study with the coding process and intensifies as the analysis proceeds. The themes which show multiple perspectives from individuals and is supported by diverse quotations and specific evidence constitute major findings in qualitative studies and are stated under separate headings in the findings sections of studies (Creswell, 2003; Creswell, & Clark, 2012; Creswell, 2014).

## **Representation and visualisation of data**

The data representation is in the form of figures, tables (Cresswell, 2014). Themes are represented in the qualitative narrative passage to convey the findings of the analysis. The Dedoose platform enabled the representation and visualization of the themes, codes and quotes. A detailed discussion of the themes, sub-themes, multiple perspectives from participants, and exact quotations from participants were derived from the online interview protocol transcripts (Creswell, 2003).

## **Interpreting qualitative data**

This involves making sense of the data like, lessons learnt from the analysis (Creswell, 2014). Such lessons could be the researcher's personal interpretation or their individual understanding based on knowledge, and experiences. It could also be meanings derived from a comparison of the findings with information gleaned from the literature or extant theories. In this way, the findings confirm past information or diverge from them (Creswell, 2003).

## **Quantitative Data collection and analysis**

### **Quantitative data collection procedure**

An online survey instruments consisting of 33 items was used for the collection of quantitative data. The result from the qualitative phase (themes, codes and quotes that were generated from the transcripts) formed the basis for the survey instrument that was designed for the qualitative phase. The survey instrument was developed using Google forms. The link to the online form was shared via the CBFAList accessible to approximately 300 CBIFI librarians (BIS Library, 2015) to be filled by CBIFI librarians. A total of 63 forms were completed.

### **Quantitative data collection instrument**

The instrument was specifically designed to evaluate library support, level of involvement and participants' perceived importance of library support for creation and management of intellectual output in CIBIFI's.

The survey instrument used for the study was 33 item online questionnaire that was a mix of dichotomous (two-point questions), multiple choice, matrix and five-point scale Likert scales response type questions. The questionnaire consisted of two main sections demographics and the main questionnaire which was further divided along the themes that were derived of the qualitative. Quantitative data collection was based on the response from the 33 item online survey questionnaire. Five sections derived from the qualitative themes. The data was therefore based on the predetermined responses.

### **Quantitative data analysis**

The questionnaires were coded and then analysed by using the Statistical Package for Social Sciences (SPSS). Questionnaire items were assessed for reliability by using Cronbach alpha, a statistical tool used to evaluate the internal consistency or reliability of scales or test items, especially in surveys and questionnaires with multiple items. Afterwards descriptive analysis of the variables was undertaken (Koopman, Petroski, Canfield, Stuppy, & Mehr (2014).

## RESULTS AND FINDINGS

This exploratory sequential mixed methods study was conducted to explore how central banks and international financial institutions libraries support the creation and management of intellectual output of their parent organization across the research life cycle.

The study which involved two phases combined a qualitative exploration of the issues under study by using an online interview to collect and analyses qualitative data. The findings were used to develop the instrument that was used to generalise the findings obtained from the qualitative phase. This generalisation was achieved by collecting and analysing quantitative data in the second phase using an online survey questionnaire.

### Qualitative data analysis

Responses from participants sought to address the issues surrounding how libraries of Central Bank and International Financial Institutions (CBIFI) provide support for the creation and management of intellectual output in the institutions. The small sample size (10 librarians) based on maximum variation sampling technique to document diverse variation of participants based on specific characteristics (Creswell, 2014). The aim of the online interview was to establish the level of involvement, type of services that are provided by CBIFI libraries to support the creation and management of intellectual output in their institutions. These also include technologies that support the services. An online interview protocol was distributed to 10 CBIFI Librarians who completed and sent back to the interview protocol.

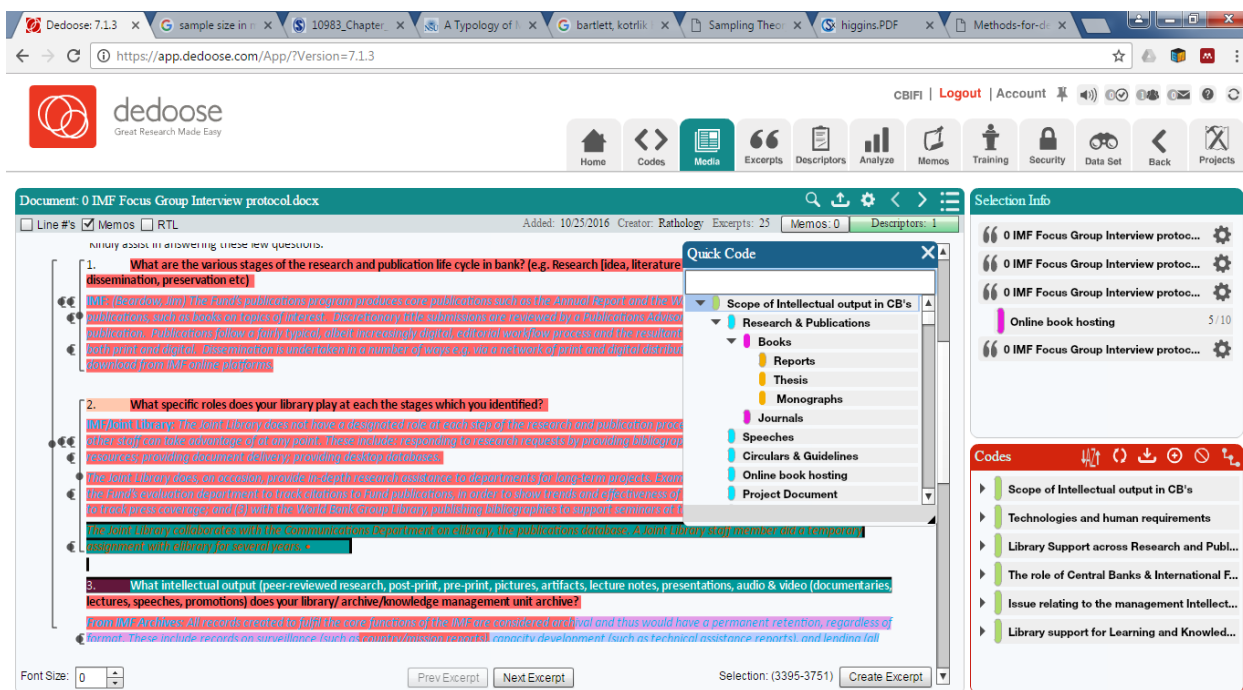


Figure 1: Dedoose platform

Transcript read-throughs resulted in the development of codes and themes which were uploaded onto the Dedoose platform for analysis. The Dedoose platform shown in Figure 1 for coding comprise of interfaces for displaying transcript, excerpts codes, and code tree (structure and hierarchy)

The results based on the analysis of the themes and codes are presented in the next section.

Seven themes emerged from the interview protocol which included: The role of CBIFI Libraries; research and publication life cycle in CBIFI's; library support across research and publication life cycle; technologies required to support the creation and management of intellectual output in CBIFI's; issue relating to the management of intellectual output.



using to enhance their services. Participants equally identified new services that support of enhancing access to knowledge roles Embedded or liaison services; Data 'e-science' service news monitoring using services like Factiva, Knowledge Management to support the CBIFI Library's role as the custodian of institutional knowledge. It also included embedded librarianship which seeks to provide strategic business unit focused service. Similarly, access to reference resources (dictionaries, encyclopaedia) bibliographic services Information literacy/user education, Chat & Phone assistance. Preservation of knowledge used to be in form in form of print archive now involves the digital conversion of the resources for long term preservation

### **Research and Publication Life Cycle in CBIFI's.**

It was important to identify all activities related to the creation of intellectual output. It was equally important to establish the sequence of these activities. The research life cycle was used as a framework to categorise these responses. The responses indicated the following life cycle as the sequence of activities in their institution. Participant 3 life cycle included: identification of research project/topic; approval from relevant authority, appraisal/ assessment of the topic, implementation, support, publication, completion, evaluation, research; Fore three participants: the research life cycle: idea, planning. Participants 1 and 5 life cycle included: research; editorial; publication; dissemination, and preservation. Participants 4, 7: research; publishing; dissemination, and preservation. Participants 6 and 10 life cycle included: life cycle included research concept, planning, project (experiment, analysis, conclusion); publication (manuscript) peer-review, publication); dissemination. Participants 2 & 9: research idea, literature review, research planning, research implementation, publication, preservation and dissemination. Lastly participant 8 life cycle had; planning (ideas, research planning); project (development, experiment, data/output, conclusion); publication and dissemination (manuscript, peer-review, copyright/intellectual property); and preservation.

### **Library Support across Research and Publication Life Cycle**

Results for the theme library support for the research and publication life cycle grouped into five sub-categories namely: research stage, editorial stage, publishing stage, dissemination state and preservation stage. Results for code occurrences on the 10 transcripts for the research theme identified provision of access to print and electronic information resources, as major service that CBIFI library provide to support the creation of intellectual output at the research stage. These were further categorised into print resources like: monograph, reference materials and journals; and electronic resources like: electronic books, articles databases, electronic journals, data sources. Citation tools are provided at this stage to enhance the quality of research. Citation tools are important as stated by participant 5 because they '*...enable researchers avoid plagiarism, cite and compile good references that would make their papers acceptable in peer-reviewed journals.*'

Embedded library services: allows for a more focused approach, and for librarians to become fully engaged in the work of the team, group or department they inhabit.

The result indicates that CBIFI library services that support the creation of knowledge during the editorial Stage include indexing and copyright advisory services. Two participants highlighted online journal hosting, online book hosting as services that has become necessary to support the editorial. Three participants indicated that such services are provided in their institutions, but the library does not play any role in their implementation and management.

At the publishing stage participants identified services provided by CBIFI libraries to support activities to include copyright advisory services like issues of intellectual property rights issues, obtaining identifiers like International Standard Book Number (ISBN), International Standard Serials Number (ISSN), and digital object identifier (DOI) (for journal articles, eBooks). Participants also mentioned the need for CBIFI libraries to provide support for online hosting of publications (journals and books). Participant 2, 3, suggested that CBIFI libraries should be involved in online hosting of publications where such infrastructure is absent. They argued that the library being the custodian of intellectual property should be involved in the creation even if it is to provide cyber infrastructure. They added that libraries are better placed to provide value-added like managing digital object identifier (DOI), pre-publication cataloguing, and open access advisory. In addition, they suggested that where there is adequate capacity and less workload in the library the final, a CBIFI library

should be involved in publication support like online hosting. At the dissemination stage, participants identify services like document delivery, embedded library service using subject guides, institutional repository, and cataloguing of intellectual output and providing remote access via online catalogue (OPAC). Participants identified library services CBIFI libraries provide to support activities the preservation stage Institutional repository

### **Technologies required for supporting the creation and management of intellectual output in CBIFI**

While responding to the question on what services the library provides to support the creation of intellectual output in their institution, participants equally identified technologies (software) that the CBIFI Libraries deploy to support the services. At the research stage, respondents identified technologies at the research stage to include library management system (Integrated library system) like Millennium, Koha, Aleph which are being phased out by next-generation systems (unified resource management system) which included Open Skies, Alma, and Sierra. The equally identified the discovery service, a key technology that seeks to provide a centralised interface from which users could search and retrieve all the libraries electronic resources (subscribed and internal). Respondents identified examples of this technology to include Primo, EBSCO Discovery, and Summon. Similarly, participants identified subject guides as a technology which support embedded services which seeks to meet customer needs based on their activities and roles in the organisation. Respondents also identified citation managers like RefWorks, Mendeley, Zotero, Endnote which supports effective citation and compilation of references and bibliographies in CBIFI research publications. In addition to these, participants identified the use of content management system as library portals from where library services and resources that are aggregated could be accessed by users. Other technology supports identified include the following: journal and book hosting or publishing systems at the editorial stage and the publication stages; Institutional repository system was identified by all participants as a technology for the digital preservation of intellectual output of CBIFI's was. Other technologies associated with the digital preservation of knowledge that produced by CBIFI include scanners for digitisation of print publications. Similarly, optical character recognition (OCR) software was identified as necessary for the conversion of scanned documents to editable text. Digital cameras and multimedia editors were identified as hardware and software enable the conversion of multimedia intellectual output (Pictures, artefacts, audio and video). In responding to challenges of using these technologies, challenges like vendor-lock-in of proprietary systems which restricts libraries from complete ownership of the application. In view of the challenges of vendor-lock-in, participants identified open source software as most appropriate since it doesn't "*hold the library to ransom as in the case of proprietary software*". In addition, Open source software enables libraries with budgetary constraints that want to develop local capacity to enjoy the benefits of implementing enterprise library management system without the attendant high cost. Also, cloud computing was identified as a technology that enables CBIFI libraries provide library services discovery services, online catalogue, digital preservation of intellectual output with little or no infrastructure. Participants equally identified remote access to electronic resources as essential in extending library services outside institution computer network. This enables users access to resources can only be accessed within the institutions network. Mobile technology was equally identified as a key technology which also supports CBIFI libraries extend services irrespective of time and location.

### **Issue relating to library services and technology support for the management Intellectual output**

These themes focused on the challenges faced and prospects of implementing relevant technologies to support the creations and management output in CBIFI's. The next sections provide the challenges and prospects as identified by the participants.

### **Challenges of Library services and technology support for the creation of intellectual output in CBIFI's**

In the case of challenges CBIFIC's face participants identified the following issues: technical issues like the complexities of software. The equally identified that they appear to be in competition search engines like Google and the open Internet which seem to be the first port of call for users when searching for information. Participants indicated that this preference was irrespective of the type of information (from the most basic to the most scholarly). Another challenge that was identified included inadequate knowledge and skills required to provide the services that were heavily technology-driven like the implementation of an institutional

repository and online journal hosting system. Two participants mentioned the development of systems requirements, request for proposal and implementation as the most challenging aspect of implementing technologies to support these services.

Budgetary constraint was mentioned by all participants as a major impediment to the provision of library services. The high cost of cost of software was equally identified by participants as a factor that limits the ability of CBIFI to provide technology-driven library services. One participant mentioned that *'if it were not for open source software, it would be difficult to implement any service that requires software'*. Poor support and maintenance was mentioned by two participants.

### **Prospects of Library services and technology support for the creation of intellectual output in CBIFI's**

On the prospects of CBIFI's library services that support the creation and management of intellectual output, participants identified reduction in cost of computing, proliferation internally produced information, advances in digitisation, ubiquity of computing devices.

Participants mentioned that reduction in cost of computing one reason that would encourage CBIFI to implement services that support the creation and management of intellectual output. Similarly, the increase in internally produced research publication, knowledge and information materials makes a strong case for the provision of library services tailored to support their creation and management. Advances in in technologies like search and retrieval, cloud computing, digitisation, digital preservation, remote access are likely to motivate CBIFI libraries to adopt relevant technologies that would enable them to better support the creation and management of their institutions intellectual output.

The next issue that participants identified was the benefits of technology driven library services aimed at supporting the creation and management of intellectual output. These benefits included: multiple accessibility, greater visibility, current information, enhanced access, and long-term preservation.

The ability to access, analyse assess usage of resources and services due to advances in analytic technologies had made generation and utilisation of usage statistics a mainstream library routine. With the advent of the acquisition of electronic resources (external) and digitisation (internal) of resources, new measures are being used ascertain the usage of resources to support decision making. Based on the responses of 6 participants, CBIFI's perform one form of measurement or the other to determine the impact of their institutions research. Metrics used to measure and determine research impact as identified by participants include: circulation of library materials, impact factor, altmetrics, usage statistics, page views/visits per page, downloads, publication views, citation analysis. A participant mentions that for internal (in institutional repository) and external resources: *'we track usage (either visits per page, circulation of library materials, number of downloads'*. In identifying the importance of evaluating the impact of research through usability metrics, a participant stated: *'we use the metrics to show the value...breadth and scope of request and usage'*.

Computer mediated communication, the role of the "classic" reference desk in the academic library, for example as an information centre, is more flexible in space and time. This allows the librarians to collaborate pro-actively based on their specific skills and expertise, for instance in research projects, in the sense of a role substitute as embedded librarians.

### **Quantitative data analysis**

This section provides a descriptive statistic of the quantitative data that was collected using the online survey questionnaire based on the Google form. The essence of this was to determine if the quantitative results were able to generalise the qualitative finding.

### **Demographic for Quantitative data**

The results for the distribution of the participants by gender indicates that female participants were 36 (57.1%) while male participants were 27 (42.9%). Result for the distribution of participants by age indicates the

following: the age group 25 to 34 had 9 (14.3%) participants; the age group 35 to 44 had (42.9%) participants; 45 to 54 had 22 (34.9%) participants; and 55 to 64 had 5 (7.9%) participants.

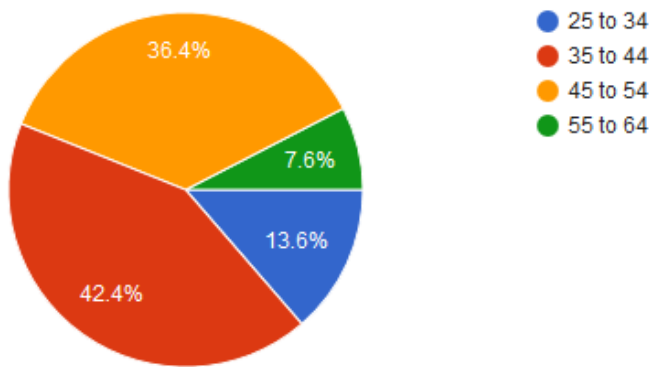


Figure 4 Distribution of participants by Age

Distribution of participants by years of experience group indicates that: 5 participants representing (7.9%) had between 1-5 years working experience; 10 participants representing (16.7%) had between 6-10 years working experience; 12 participants representing (19.0%) had between 11-14 years working experience; 7 participants representing (11.1%) had between 15-18 years working experience; 7 participants representing (11.1%) had between 19-22 years working experience; 16 participants representing (25.4%) had between 23-26 years working experience; 2 participants representing (3.2%) had less than 1 year working experience; 2 participants representing (3.2%) had over 30 years working experience. This demography indicating that most CBIFI librarians were aged over 45 is corroborated by BIS Library (2015) *survey of central banks librarians* which found out that more than half of the respondents (51.3%) were aged over 50 followed by the respondents aged 41-50 (25.0%).

Result for the distribution of participants by area of specialisation/office indicates that 3 (4.8%) participants specialise in archive/institutional repository /records; 7 (11.1%) participants specialise in cataloguing /classification; 17 (27.0%) specialise in circulation/user service; 11 (17.5%) participants specialise in electronic resources; 6 (9.5%) participants specialise in other areas; 14 (22.2%) participants specialise in reference/liaison; 5 (7.9%) participants specialise systems/web.

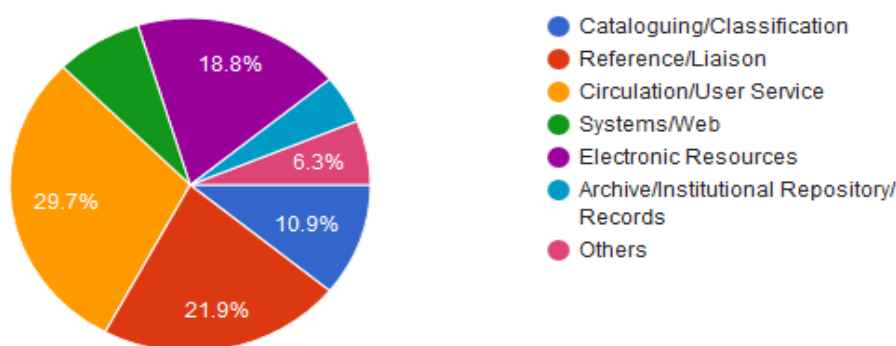


Figure 5 Distribution of participants by area of specialisation/office

### Library support across the research and publication life cycle

Result of for level of support CBIFI libraries provide at the research stage (idea, literature review, data collection, data analysis) of the life cycle ( $M=1.305$ ,  $SD=1.704$ ) indicated the following: the libraries of 45 (71.4%) participants provided full support for activities at the research stage; the libraries of 6 (9.5%) participants provided minimal support for activities at the publication stage; The library of 1 (1.6%) participant was yet to provide support and still do not plan to provide support in future at the research stage. Similarly, the library of 1 (1.6%) participant was yet to but plans to provide support in future for activities at the publication stage. Libraries of 10 (15.9%) participants provided provide partial support for activities at the research stage.



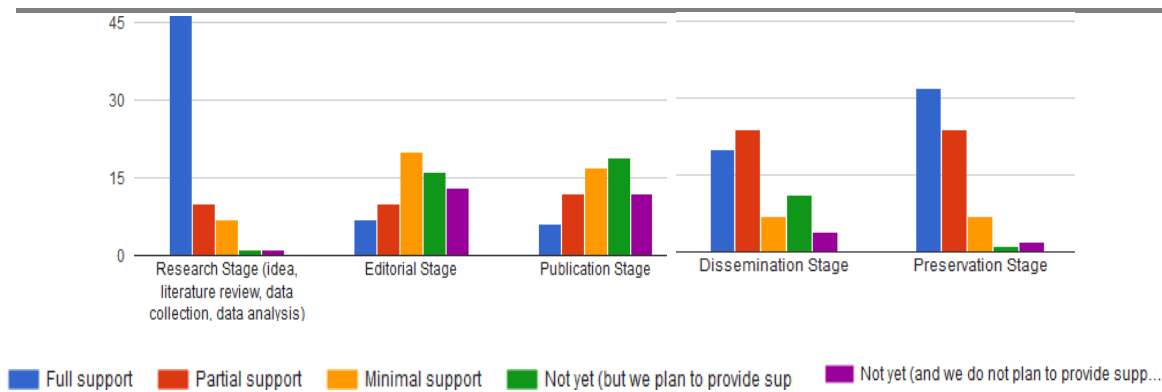


Figure 6 Library support across the research and publication life cycle

Results for level of support the CIBIFI libraries provide the editorial Stage ( $M=1.57$ ,  $SD=1.304$ ) was as follows: libraries of 6 (9.5%) provided full support for activities at the editorial Stage; libraries of 18 (28.6%) participants provided minimal support for activities at the editorial Stage; libraries of 12 participants were yet to provide support and still do not plan to provide support in future at the editorial Stage. On the other hand, the libraries of 12 (19.0%) participants were yet to but plan to provide support in future for activities at the editorial Stage. Libraries of 10 (15.9%) participants provided provide partial support for activities at the editorial Stage.

Results for level of support the library provide the publication stage ( $M=1.57$ ;  $SD=1.304$ ) indicated the following: libraries of 6 (9.5%) participants provided full support for activities at the publication stage; libraries of 17 (27.0%) participants provided minimal support for activities at the publication stage; libraries of 12 (19.0%) participants were yet to provide support and still do not plan to provide support in future at the publication stage. On the other hand, the libraries of 17 (27.0%) participants were yet to but plan to provide support in future for activities at the publication stage. Libraries of 11 (17.5%) participants provided provide partial support for activities at the publication stage.

The results for the level of support the library provides at the dissemination Stage ( $M=2.57$ ,  $SD=1.353$ ) indicated that the libraries of 18 (28.6%) participants provided full support for activities at the dissemination Stage; the libraries of 6 (9.5%) participants provided minimal support for activities at the dissemination Stage; libraries of (6.3%) participants were yet to provide support and still do not plan to provide support in future at the dissemination Stage. On the other hand, the libraries of 10 (15.9%) participants were yet to but plan to provide support in future for activities at the publication stage. Libraries of 25 (39.7%) participants provided provide partial support for activities at the dissemination Stage.

The results for the level of support at the preservation stage ( $M=3.06$ ,  $SD=1.256$ ) indicated that: the libraries of 30 (47.6%) participants provided full support for activities at the preservation stage; the libraries of 7 (11.1%) participants provided minimal support for activities at the preservation stage; The library of 1 (1.6%) participant was yet to provide support and still do not plan to provide support in future at the preservation stage. Similarly, the library of 1 (1.6%) participant was yet to but plans to provide support in future for activities at the preservation stage. Libraries of 24 (38.1%) participants provided provide partial support for activities at the preservation stage.

### Library service and technology support provided at the research stage

This question sought to Determining support libraries provide to researchers at the stage of literature review, methodology, data collection and analysis.

The results indicate that the libraries of 7 (11.1%) participants use a combination of access to online resources and citation and reference manager to support activities at the research stage. The libraries of 3 (4.8%) participants use a combination of citation and reference manager, online access to electronic resources. Libraries of 27 (42.9%) participants use a combination of online access to electronic resource. Libraries of 3 (4.8%) participants use a combination of Secondary data sources; Citation & reference manager. The libraries

of 9 (14.3%) participants use a combination of Secondary data sources; Citation & reference manager; online access to electronic resources. Libraries' of 1 (1.6%) participant use a combination of secondary data sources, citation and reference manager, online access to electronic resources; workshop on how to get published. Lastly, libraries of 13 (20.6%) participants use a combination of secondary data sources as well as online access to electronic resources.

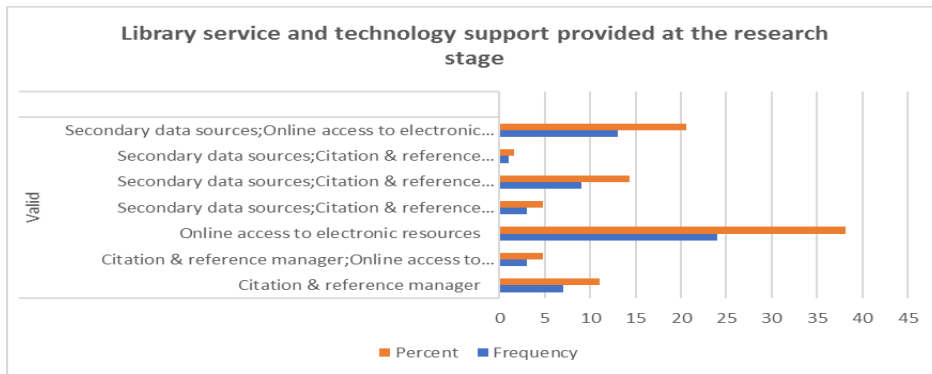


Figure 7 Library services and technology support at the research stage

### Library service and technology support at the editorial stage

The results indicate that the libraries of 7 (11.1%) participants use copy-editing services to support activities at the editorial stage. The libraries of 21 (33.3%) participants provide indexing (back of the book) services to support activities at the editorial stage. The libraries of 3 (4.8%) participants use a combination of online journal hosting services to support activities at the editorial stage. The libraries of 2 (3.2%) use a combination of online book hosting, online journal hosting, back of the book indexing, and copy-editing services to support activities at the editorial stage. The Library of 1 (1.6%) participant each, use a combination of: Indexing (back of the book) and copy-editing; indexing (back of the book) and copy-editing; online monograph hosting, and back of the book indexing; online journal hosting, copy-editing; online journal hosting and back of the book hosting; online book hosting, online journal hosting and copy-editing;

On the other hand, libraries of 9 (13.2%) participants provide no service to support activities at the editorial stage.

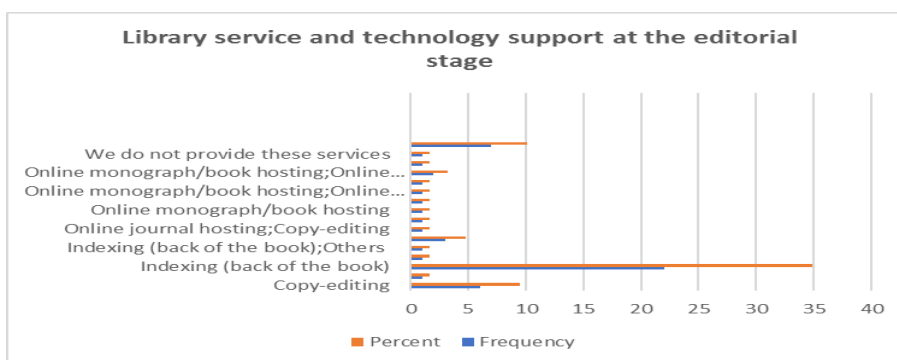


Figure 8 Library service and technology support at the editorial stage

### Library service and technology support at the publication stage

The results indicate that the libraries of 6 (9.5%) participants provide copyright information and guidance services to support activities at the publication stage. The libraries of 2 (3.2%) participants use a combination of DOI for publications and online book hosting services to support activities at the publication stage. Libraries of 19 (30.2%) participants provide only ISBN service to support activities at the publication stage. The libraries of 10 (15.9%) participants use a combination of ISBN and copyright information and guidance services to support activities at the publication stage. The libraries of 3 (3.2%) participants provide ISBN,

copyright information and guidance, DOI for publications, online book hosting; online journal hosting services to support activities at the publication stage. The results indicate that the libraries of 2 (3.2%) participants use a combination of ISBN; online book hosting services to support activities at the publication stage. The results indicate that the libraries of 1 (1.6%) participant provide a combination of the following services to support activities at the publication stage: copyright information and guidance and DOI for publications, ISBN, Copyright information and guidance, DOI for publications, online book hosting; ISBN; Copyright information and guidance, DOI for publications, online book hosting and online journal hosting; ISBN; online monograph, online journal hosting. 13 (20.7%) participants do not use any. One participant indicated that the institutions digital publishing team does this work

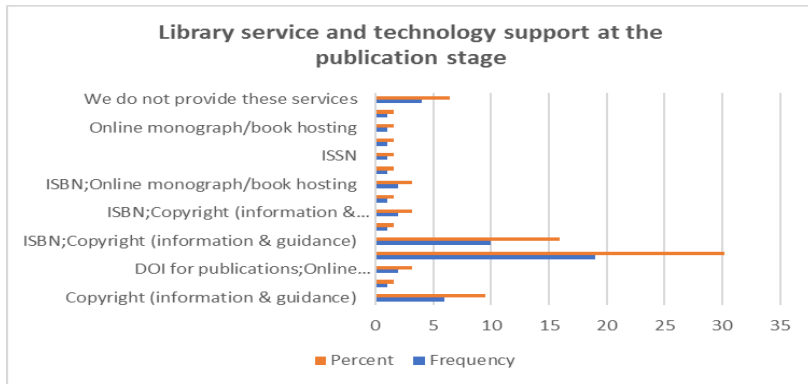


Figure 9 Library service and technology support at the publication stage

### Library services and technology support at the dissemination stage

The results indicate that the libraries of 5 (17.9%) participants provide discovery services to support activities at the dissemination stage. The libraries of 4 (6.3%) participants use a combination of Institutional repository management services to support activities at the dissemination stage. The libraries of 5 (7.9%) participants use a combination of institutional repository management and online public access catalogue (OPAC) services to support activities at the dissemination stage. The libraries of 5 (7.9%) participants use a combination of institutional repository management, online public access catalogue (OPAC) and discovery services to support activities at the dissemination stage. Libraries of 3 (4.8%) participants use a combination of institutional repository management, subject guides and online public access catalogue (OPAC) services to support activities at the dissemination stage. The libraries of 2 (3.2%) participants use a combination of institutional repository management, subject guides and online public access catalogue (OPAC) services to support activities at the dissemination stage. The libraries of 2 (3.2%) participants use a combination of discovery services to support activities at the dissemination stage. The results indicate that the libraries of 19 (30.2%) participants provide online public access catalogue (OPAC) services to support activities at the dissemination stage. The results also indicate that the libraries of 1 participant representing (1.6%) participant provide a combination of the following services to support activities at the publication stage: online public access catalogue (OPAC) and discovery services; subject guides; subject guides; discovery services; subject guides, online public access catalogue (OPAC) and discovery services; subject guides, online public access catalogue.

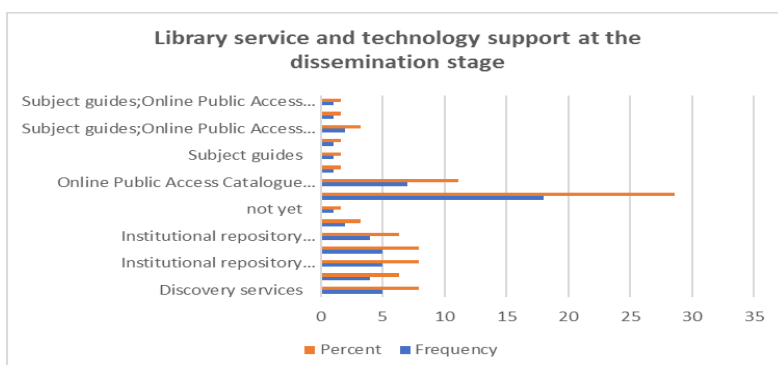


Figure 10 Library service and technology support at the dissemination stage

### Library service and technology support at the preservation stage

The results indicate that the libraries of 5 (7.9%) participants use content management system services to support activities at the preservation stage. The libraries of 2 (3.2%) participants use a combination of content management system; portal/website services to support activities at the preservation stage. The libraries of 5 (7.9%) participants use a combination of digital archiving tools (e.g. LOCKSS/portico) services to support activities at the preservation stage. The libraries of 14 (22.2%) participants use institutional repository system services to support activities at the preservation stage. The libraries of 2 (3.2%) participants use institutional repository; content management system services to support activities at the preservation stage. The libraries of 7 (11.1%) participants use a combination of institutional repository; content management system and digital archiving tools (e.g. LOCKSS/portico) services to support activities at the preservation stage. The libraries of 2 (3.2%) participants use a combination of portal/website system services to support activities at the preservation stage. The libraries of 3 (4.8%) participants use a combination of Institutional repository; portal, web site services to support activities at the preservation stage. The libraries of 17 (27.0%) participants use a combination of Portal/Website services to support activities at the preservation stage.

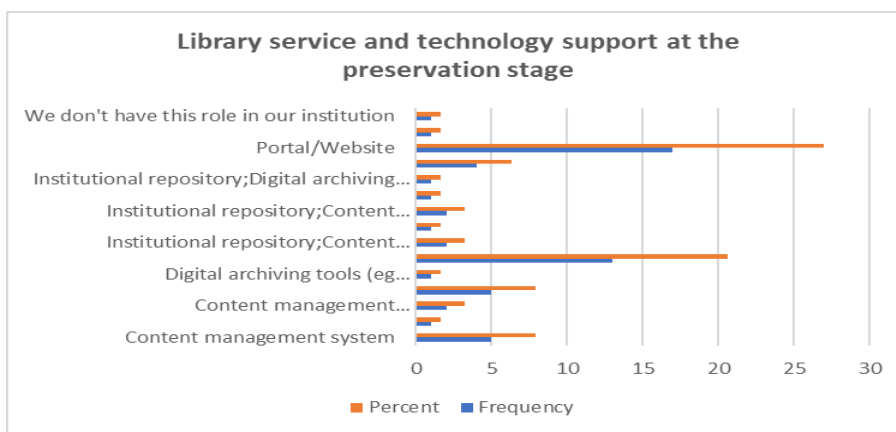


Figure 11 Library service and technology support at the preservation stage

### How Library services/technologies enhance support for the creation and management of intellectual output CBIFI's

The result on how services and technologies enhance support for the creation and management of intellectual output in CBIFI's, the following was recorded: On whether the presence of an institutional repository would enhance long-term preservation of institutional intellectual output ( $M=3.71$   $SD=.559$ ): 10 (15.9%) participants agreed while 1 (1.6%) participant disagreed. 4 (6.3%) participants were not sure while 48 (76.2%) participants strongly agreed.

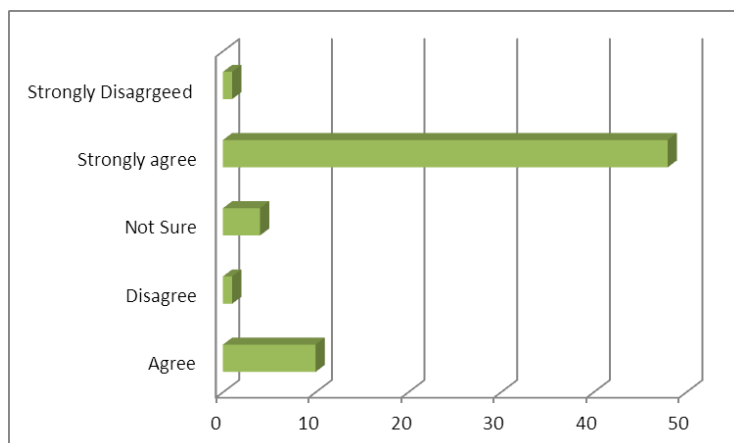


Figure 12 Library services/technologies enhance support for the creation and management of intellectual output CBIFI's

On whether an institutional repository would enhance global visibility of institutional intellectual output of in CBIFI's ( $M=3.25$ ,  $SD=.756$ ) 28 (44.4%) participants agreed, 1 (1.6%) participant disagreed and 1 (1.6%) participant strongly Disagreed. On the other hand (11.1%) participants were not sure while 26 (41.3%) participants strongly agreed.

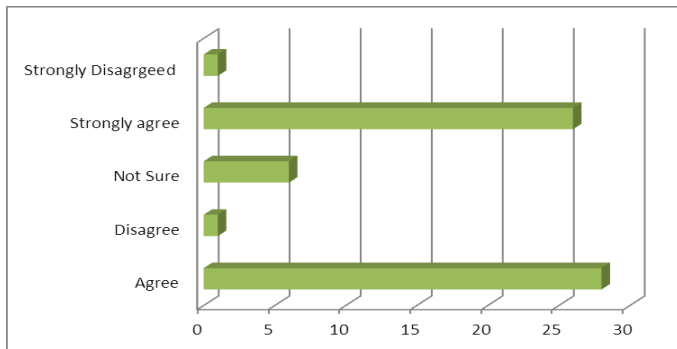


Figure 13 institutional repository would enhance global visibility of institutional intellectual output of in CBIFI's

On whether the implementation of a citation and reference management system would prevent incidences of plagiarism and copyright infringement in CBIFI's ( $M=2.69$ ,  $SD=.8429$ ): 28 (44.4%) participants agreed, 5 (7.9%) participants disagreed, and 1 (1.6%) participant strongly disagreed. The result also indicated that 19 (30.2%) participants were not sure while 10 (15.9%) participants strongly agreed that incidences of plagiarism and copyright would be prevented if citation managers are used in CIBIF's.

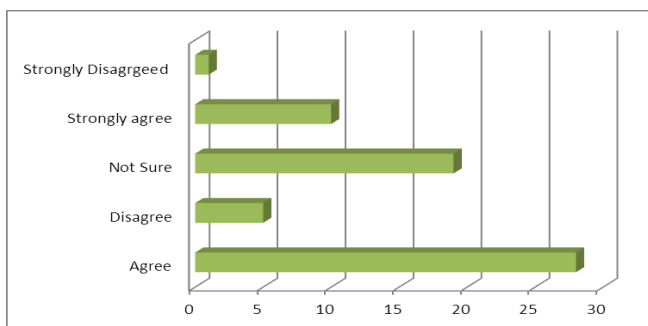


Figure 14 Implementation of a citation and reference management system would prevent incidences of plagiarism and copyright infringement in CBIFI's

On whether the provision of copyright advisory services like ISBN, ISSN by the library enhancing the quality of research and publication in CBIFI ( $M=3.02$   $SD=.888$ ). 19 (30.2%) participants agreed, 2 (3.2%) participants disagreed. The result also indicated that 17 (27.0%) participants were not sure. 1 (1.6%) participant strongly disagreed. 24 (38.1%) participants strongly agreed.

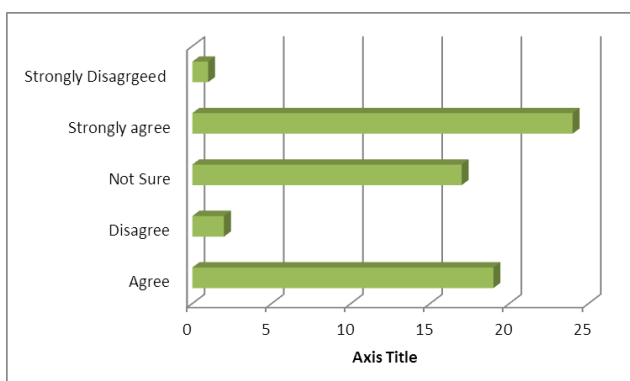


Figure 15 the provision of copyright advisory services like ISBN, ISSN by the library enhancing the quality of research and publication in CBIFI

The provision of back-of the book indexing services would information retrieval in CBIFI publication ( $M=2.95, SD=.694$ ). 31 (49.2%) participants agreed, 1 (1.6%) participant disagreed, and 14 participants representing (22.2%) were not sure. 16 (25.4%) participants strongly agreed and 1 (1.6%) participant strongly disagreed.

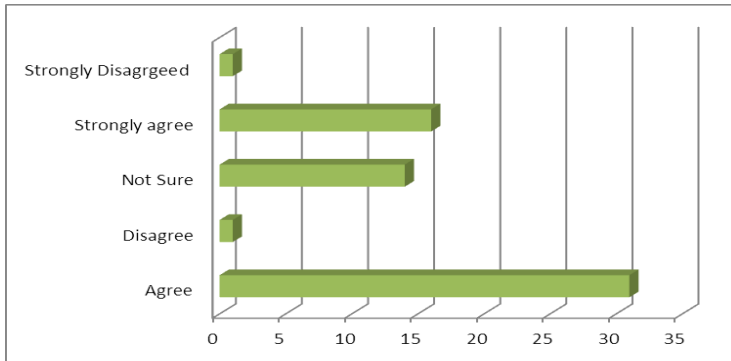


Figure 16 the provision of back-of the book indexing services would information retrieval in CBIFI publication

Providing digital object identifier DOI) would enhance persistent access to your CBIFI research ( $M=2.98, SD=.900$ ). 29 (46.0%) participants agreed, 3 (4.8%) participants disagreed. The result also indicated that 9 (14.3%) participants were not sure. 1 (1.6%) participant strongly disagreed. 20 (31.7%) participants strongly agreed.

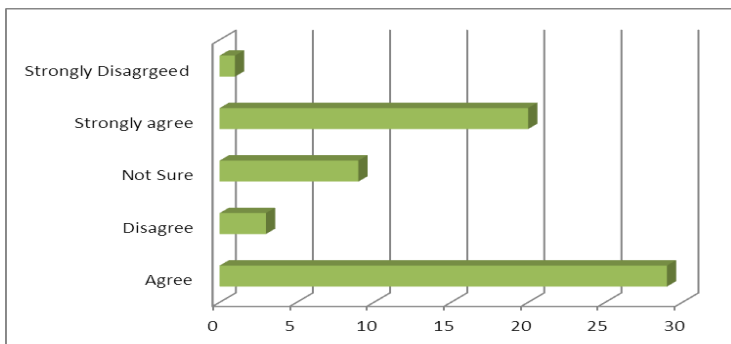


Figure 17 Digital object identifier DOI) would enhance persistent access to your CBIFI research

On whether using the Library management system/integrated library system via the OPAC would enhance access to institutional intellectual output ( $M=3.03, SD=.928$ ). 24 (38.1%) participants agreed, 2 (3.2%) participants disagreed, and the result also indicated that 19 participants representing (30.2%) were not sure. 1 (1.6%) participant strongly disagreed. 24 (38.19%) participants strongly agreed.

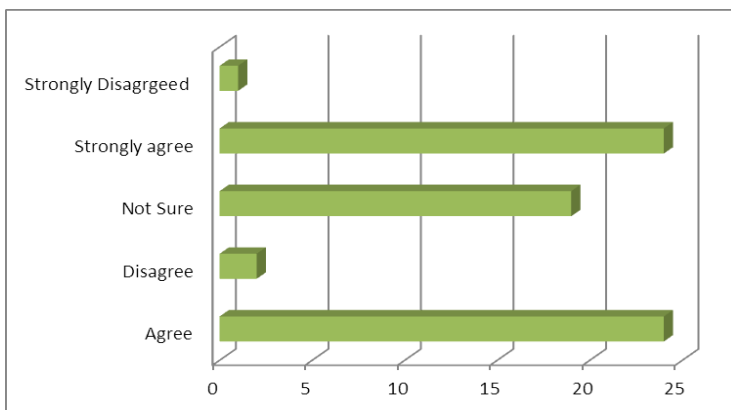


Figure 18 Library management system/integrated library system via the OPAC would enhance access to institutional intellectual output

On the likelihood of discovery services enhancing global visibility CBIFI research ( $M=3.07, SD=.934$ ). 19 (30.2%) participants agreed, 2 (3.2%) participants disagreed, and the result also indicated that 15 (23.8%) participants were not sure. 1 (1.6%) participant strongly disagreed. 26 (41.3%) participants strongly agreed.

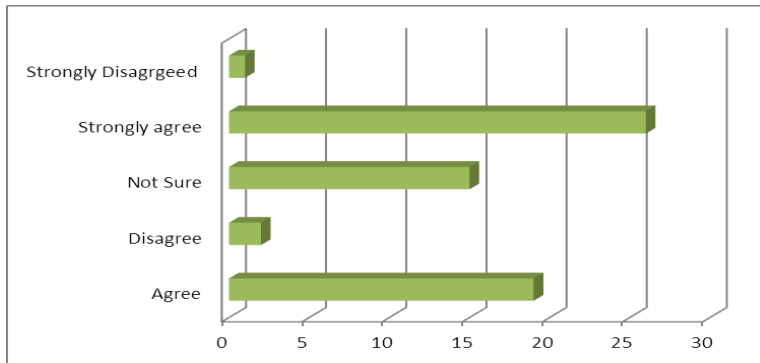


Figure 19 discovery services enhancing global visibility CBIFI research

On whether subject guides would enhance access to electronic resources during research and publications ( $M=3.10, SD=.923$ ). 21 (33.3%) participants agreed, 3 (4.8%) participants disagreed, and 10 (15.9%) participants were not sure. 1 (1.6%) participant strongly disagreed. 28 (44.4%) participants strongly agreed.

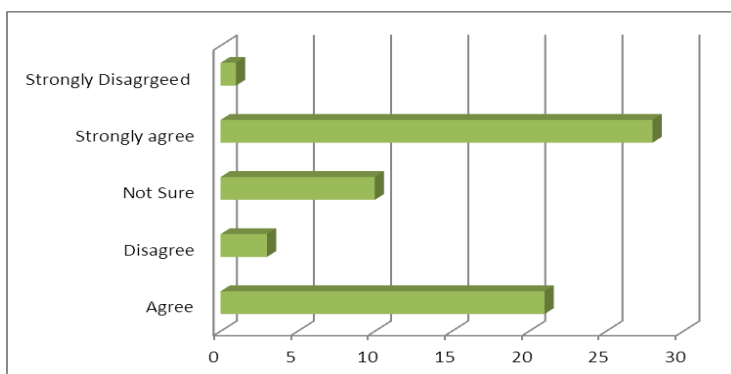


Figure 20 subject guides would enhance access to electronic resources during research and publications

On possibility of online journals and book hosting's enhancing research and publication activity ( $M=3.14, SD=.819$ ). 26 (41.3%) participants agreed, 2 (3.2%) participants disagreed, and the result also indicated that 9 (14.3%) participants were not sure. 1 (1.6%) participant strongly disagreed. 25 (39.7%) participants strongly agreed.

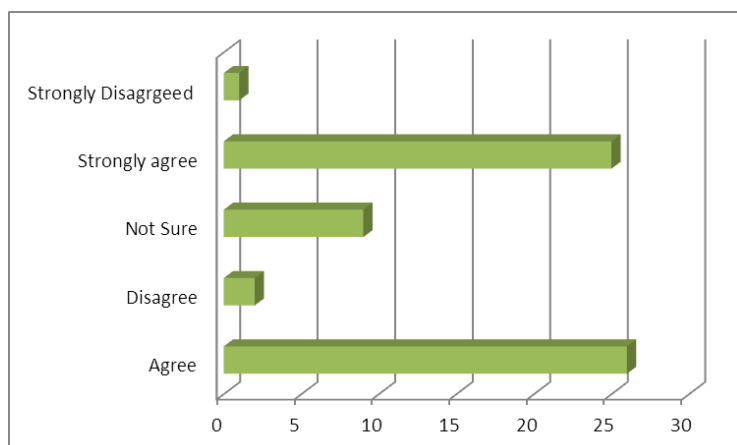


Figure 21 online journals and book hosting's enhancing research and publication activity

## Importance of library support for the creation and management of intellectual output in CBIFI's

Participants rated the importance of services and technologies in the realisation of institutional objectives ( $M=3.59, SD=.710$ ): 19 (30.2%) participants thought they were extremely important while 9 (14.3%) participants thought they were moderately important. 1 (1.6%) participant thought the services were not at all important. However, 3 (4.8%) participants thought the services were slightly important and 30 (47.6%) participants thought the services were very important.

Participants also rated the importance of services and technologies in the management of intellectual output for your institutions Institutional repository ( $M=3.59, SD=.710$ ): 44 (69.8%) participants thought they were extremely important while 1 (1.6%) participant thought they were moderately important. 2 (11.6%) participants thought the services were not at all important. However, 2 (3.2%) participants thought the services were slightly important and 15 (23.8%) participants thought the services were very important.

Citation manager ( $M=2.54, SD=1.060$ ): 11 (17.5%) participants thought they were extremely important while 14 (22.2%) participants thought they were moderately important. 3 (4.8%) participants thought the services were not at all important. However, 8 (12.7%) participants thought the services were slightly important and 27 (42.9%) participants thought the services were very important.

Online journal hosting ( $M=2.56, SD=1.161$ ): 14 (22.2%) participants thought they were extremely important while 10 (19.9%) participants thought they were moderately important. 4 (6.3%) participants thought the services were not at all important. However, 9 (14.3%) participants thought the services were slightly important and 26 (41.3%) participants thought the services were very important.

Online book hosting ( $M=2.51, SD=1.176$ ): 15 (23.8%) participants thought they were extremely important while 12 (19.0%) participants thought they were moderately important. 3 (4.8%) participants thought the services were not at all important. However, 12 (19.0%) participants thought the services were slightly important and 21 participants (33.3%) thought the services were very important.

Library management system/integrated library system ( $M=3.14, SD=.981$ ): 30 (47.6%) participants thought they were extremely important while 12 (19.0%) participants thought they were moderately important. 1 (11.6%) participant thought the services were not at all important. However, 2 (3.2%) participants thought the services were slightly important and 18 participants (28.6%) thought the services were very important.

Subject guides ( $M=2.90, SD=.946$ ): 17 (27.0%) participants thought they were extremely important while 11 (17.5%) participants thought they were moderately important. 1 (11.6%) participant thought the services were not at all important. However, 3 (4.8%) participants thought the services were slightly important and 31 (49.2%) participants thought the services were very important.

Discovery service ( $M=3.11, SD=1.049$ ): 30 (47.2%) participants thought they were extremely important while 8 (12.12%) participants thought they were moderately important. 1 (11.6%) participant thought the services were not at all important. However, 5 (7.9%) participants thought the services were slightly important and 19 (30.2%) participants thought the services were very important.



Figure 22 importance of services and technologies in the realisation of institutional objectives



## Issues

The participants' replies have highlighted that the use of library services and technology to support research and publication activities in CBIFI is filled with Challenges/problems.

### Challenges of implementing library service and technology

Lack of budget ( $M=2.81, SD=.680$ ): 23 (36.5%) agreed, 1 (1.6%) disagreed, and 1 participant representing (1.6%) participants strongly disagreed. The result also indicated that 6 (9.5%) participants were not sure while 29 (46.0%) participants strongly agreed.

High cost ( $M=2.89, SD=.3154$ ): 30 (47.6%) participants agreed, 4 (6.3%) participants disagreed. 19 (30.2%) participants were not sure while 10 (15.9%) participants strongly agreed. 1 (1.6%) participants strongly disagreed.

Inadequate skills of Library staff ( $M=2.37, SD=1.079$ ): 22 (34.9%) participants agreed, 18 (28.6%) participants disagreed. 7(11.1%) were not sure while 9 (14.3%) participants strongly agreed. 4 (6.4%) participants strongly disagreed.

Technological constraints 2.49 .854 ( $M=2.49, SD=.854$ ): 29(46.6%) participants agreed, 13 (20.6%) participants disagreed. 15 (23.8%) participants were not sure while 3 (4.8%) participants strongly agreed. 1(1.6%) participants strongly disagreed.

Copyright and intellectual property issue ( $M=2.19, SD=1.076$ ): 24 (38.1%) agreed, 9 (14.3%) participants disagreed. 15 (23.9%) participants were not sure while 9 (14.3%) participants strongly agreed. 6 (9.5%) participants strongly disagreed.

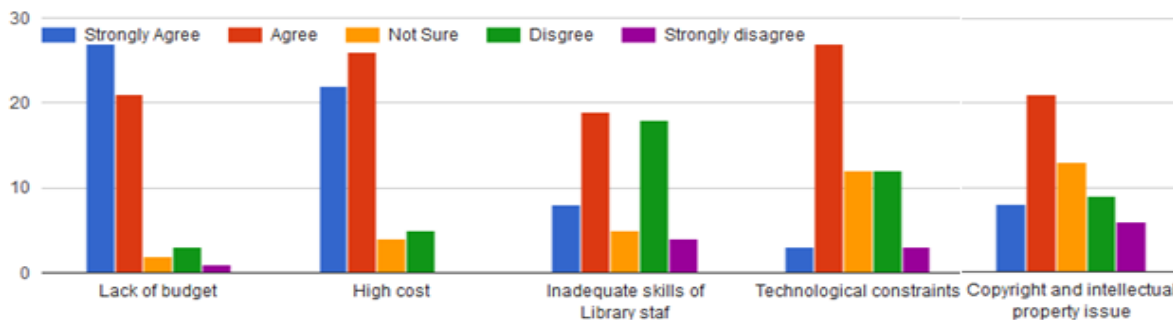


Figure 23 Challenges of implementing library service and technology

### Prospects of library services and technologies to support the research and publication

The relative reduction in the cost of computing has enhanced the implementation of library services/technologies ( $M=2.53, SD=.757$ ): 33 (52.4%) participants agreed, 3 (4.8%) participants disagreed. 10 (15.9%) were not sure while 16 (25.4%) participants strongly agreed. 1 (1.6%) participants strongly disagreed.

The proliferation of locally produced information has created the need for institutional repositories for long-term preservation and persistent access ( $M=3.22, SD=1.016$ ): 25 (39.7%) agreed, 2 (3.2%) participants disagreed. 19 (30.2%) participants were not sure while 24 (38.1%) participants strongly agreed. 2 (3.2%) participants strongly disagreed.

The Library can provide more sustainable framework than existing frameworks for creation and managing intellectual output in my institution ( $M=2.91, SD=.940$ ): 24 (38.1%) participants agreed, 4 (6.4%) participants disagreed. 18 (28.6%) participants were not sure while 10 (15.9%) participants strongly agreed. 1 participant representing (1.6%) participants strongly disagreed.

Advances in digitisation and the need for remote access to print-publications have enhanced library support for research and publications in my institutions ( $M=3.02, SD=1.093$ ): 27 (42.8%) participants, agreed, 3 (4.8%) participants, disagreed. 15 (23.8%) were not sure while 16 (25.4%) strongly agreed. 2 (3.2%) strongly disagreed.

Ubiquity of computing devices (personal computers, tablets, mobile phones) has enhanced the implementation of library services/technologies to support research and publication in my institution ( $M=2.34, SD=.914$ ): 28 (46.0%) participants, agreed, 7 (11.1%) participants, disagreed. 11 (16.5%) participants, were not sure while 15 (23.8%) participants, strongly agreed. 1 (1.6%) participant, strongly disagreed.

### Determination of impact of research output

Result on measure of the usage of institutions intellectual output that are hosted (institutional repository, OPAC, Discovery) .63 .487 .237 ( $M=.487, SD=.237$ ) indicated the following: 39 (61.7%) participants measure the impact of their institutions intellectual output while 24 (38.1%) participants, do not.

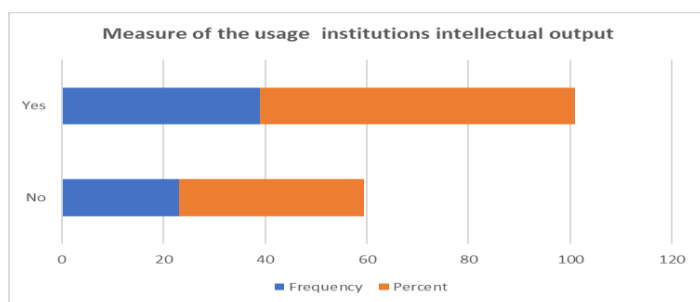


Figure 24 Measure of the usage of CBIFI intellectual output

### Metrics used evaluate usage institutions intellectual output

( $M=.97, SD=.724$ ): The result indicates that 24 (38.1%) participants use none of the metrics. The result indicates that libraries of 5 (7.9%) participants use citation analysis. Libraries of 7 (11.1%) participants use repository statistics and libraries of 15 (23.6%) participants use web analytics. Libraries of 3 (4.8%) participants use web analytics, citation analysis, and journal impact factor and repository statistics. Libraries of 2 (3.2%) participants use web analytics; citation analysis; and repository statistics. Similarly, libraries of 2 (3.2%) participants use web analytics; and repository statistics. The result also indicates that libraries of 1(1.6%) participant each use: citation analysis and journal impact factor; citation analysis, journal impact factor and repository statistics; web analytics; journal impact factor; repository statistics; web analytics, citation analysis and journal impact factor. 1 (1.6%) participant use Internally innovated excel sheet.

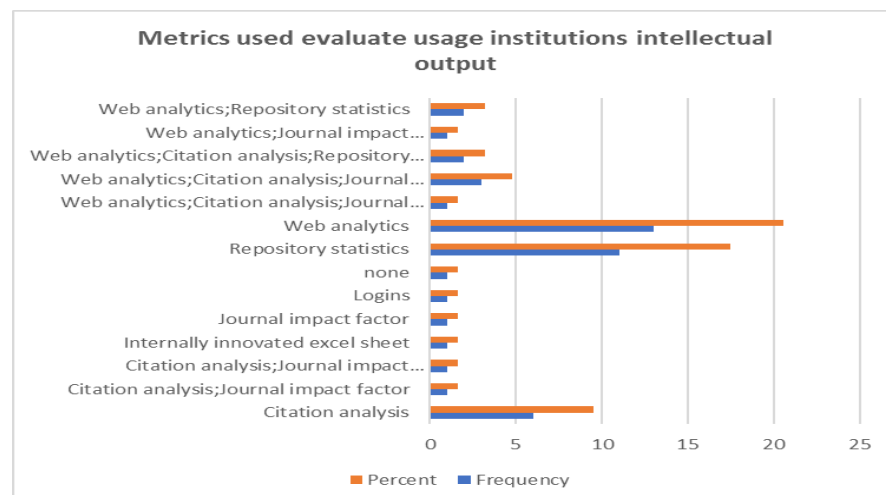


Figure 26 Metrics used evaluate usage institutions intellectual output

### Use of altmetric as a measure research output usage

The results  $M=2.67, SD=1.041$  indicate that the libraries of 30 participants' representing (47.6%) participants do not use altmetrics but plan to do so. libraries of 17 (27.0%) participants do participants not use altmetrics but plan to do so. Libraries of 16 (24.4%) participants use altmetrics as a measure of research impact.

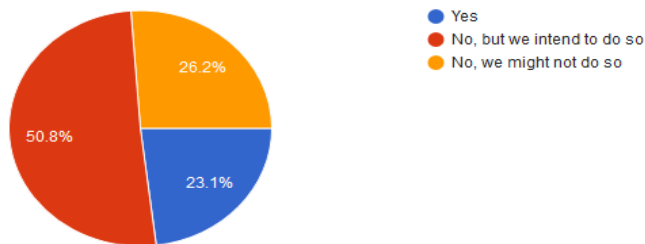


Figure 27 use of altmetric as a measure research output usage

### Benefits of altmetrics as a measure of research impact

The results indicate that 9(14.3%) participants thought that altmetrics were beneficial while 13 (20.6%) participants thought that altmetrics were moderately beneficial. 3 (4.8%) participants thought that altmetrics were not beneficial. 7 (11.1%) participants thought that altmetrics were slightly beneficial. 31 (49.2%) participants thought that altmetrics were very beneficial.

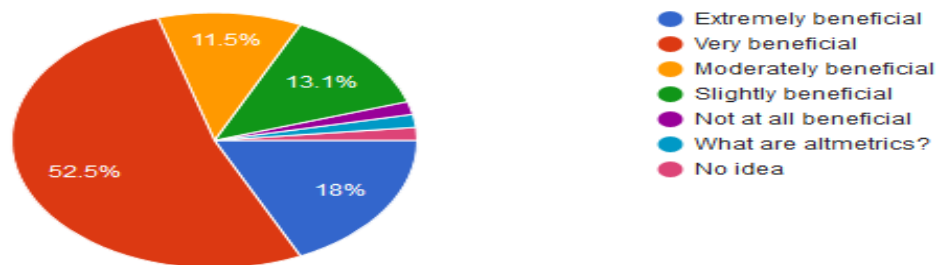


Figure 28 Benefits of altmetrics as a measure of research impact

### Central Bank libraries and knowledge management

The result that sought to ascertain the placement and location of library and related services within the institutional organisation structure of CIBIFI's found out that: libraries of 8 (12.8%) participants were located within the research department/unit. Libraries of 1(1.6%) participant international relations and information dissemination. libraries of 4 (6.3%) libraries of 11 (17.5%) Library + IT Department/section+ others, libraries of 17 (27.0%) Library and others, libraries of 11 (17.5%) Library+ Archives+ Records libraries of 10 (15.9%).

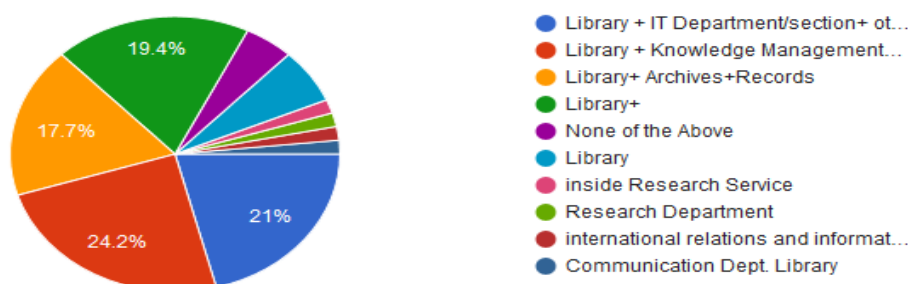


Figure 29 Library locations within CIBIFI's

The result for library involvement in the organisation and storage of tacit knowledge in CBIFI's ( $M=2.37$ ,  $SD=1.097$ ): 25 (39.7%) indicate that: participants agreed, 10 (15.9%) participants disagreed. 14 (22.2%) participants were not sure while 9 (14.3%) participants strongly agreed. 3 (4.8%) participants strongly disagreed. To varying degrees, we work with various units on an ad hoc basis, not systematically 1 (1.6%)

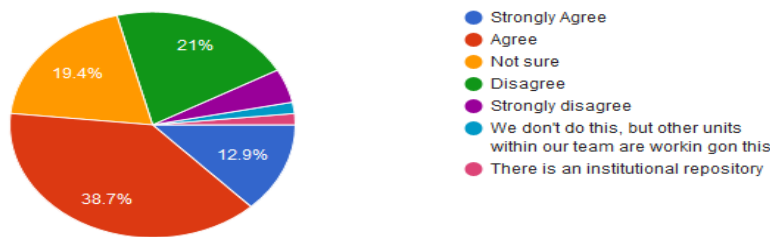


Figure 30 library involvements in the organisation and storage of tacit knowledge in CBIFI's

The result for Library involvement in the acquisition and organisation and archival of materials from learning events (workshops, seminars, training, conference) ( $M=2.08$ ,  $SD=.978$ ) indicates that: 25 (39.7%) participants agreed, 13 (20.6%) participants disagreed. 14 (22.2%) participants were not sure while 6 (9.5%) participants strongly agreed. 3 (4.8%) participants strongly disagreed. There is an institutional repository 1 (1.6%) and We don't do this, but other units within our team are working on this 1 (1.6%)

## DISCUSSION OF RESULTS AND FINDINGS

Both results are discussed with a view to determine if qualitative results corroborated the quantitative findings.

### Role of CIBIFIs

The results for the qualitative data analysis indicates that apart from their traditional roles of acquisition and management to ensure equitable access of print and electronic resources, libraries also performed some emerging roles. These emerging roles include: electronic reference services (chat, services); data management services; news monitoring; knowledge management support; decision support. The result also revealed that more of electronic versions and less of print are being acquired. It also revealed that libraries were adopting the embedded or liaison library services and were consequently deploying subject guides to provide business focused services. The result also indicated that more CBIFI Libraries were deploying institutional repositories for long term digital preservation and persistent access.

Studies from Polomino, Williams, & McKenzie-Burton, (2011); Beberweil (2015); Nadali, (2015); Semertzaki (2015); Walusimbi, & Kiyaga (2015) corroborate these findings. The Central bank librarians survey (BIS Library, 2015) for instance noted that there were fewer primarily traditional libraries and more digital and traditional ones with an increase of 86% digital/traditional library services. Also, Polomino, Williams, & McKenzie-Burton (2011) discussed emerging trends in a CBIFI library. These included the use of embedded/liaison library services model supported by the maintenance of subject guides (InfoGuides) to provide department/business-centered services. According to Semertzaki (2015) embedded embedded/liaison library services model is a distinctive innovation that moves librarians out of libraries to departments or strategic business unit (SBU) in the process forming relationships with the people who need information.

Molina (2013) also identified reference, citation management and impact factor/bibliometric analysis as services that should be rendered by CBIFI Libraries. Bibliometric evaluation involves design and implementation of a measuring system that evaluates of the impact of institutional research and publications. Beberweil (2015) and BIS Library (2015) also identified digitisation and digital archive or institutional repositories high-level tools to organize, retrieve, publish, preserve, show, and use information thereby transforming the CBIFI library into a modern information provider. Walusimbi, Nsiimoomw, & Kiyaga (2015) discussed efforts at the Bank of Uganda to transform it to knowledge management centre (KMC) and the transformation of librarians to knowledge resource managers has been.

Because this study was focused on library support for the creation and management of intellectual output in CBIFI, it was essential to examine services within the context of the various stages spanning the research processes to the management of the published output.

### **Research and publication life cycle**

Qualitative findings identified four categories of research and publication activities lifecycles in CIBIFI's namely:

- research, publication, dissemination and preservation;
- research, editorial, publication, dissemination, and preservation;
- research idea, literature review, research planning, research implementation, publication, preservation; and
- approval from relevant authorities, appraisal/assessment of the topic, implementation, support, publication, completion, evaluation.

Studies by Wallis, Pepe, Mayernik, & Borgman, (2008); Patel (2011); Jeffreys (2012); Corti, Van den Eynden, Bishop, & Woollard, (2014) and Brown, (2016). Wallis, *et al.* (2008) identified nine stages namely: design, calibration and setup, capture or generation, cleaning, integration, derivation, analysis, publication. Vaughan, *et al.* (2013) life cycle comprise of idea development, funding, proposal, conducting and disseminating. Corti, *et al.* (2014) model consist of data discovery, Discovery and planning, Data collection, Data processing and analysis, Publishing and sharing, long term management, and reuse of data. Brown, (2016) life cycle include ideas; partners; proposal writing; research process (simulate, experiment, observe, manage the data, analyse data, share data-repositories and good resource discovery tools); virtual research environments; publication.

### **Level of Library support across the research life cycle**

Four categories of the research and publication life cycle were identified during the qualitative phase. One of them (research, editorial, publication, dissemination and preservation) was selected to cover the various aspects of research and publication activities that may require library support. The quantitative results revealed that high level of involvement of CBIFI Libraries at the research stage with 71.4% of participant's libraries providing full support. This was contrasted with support CBIFI Libraries at the editorial Stawith only 28.6% of participants. The result for CBIFI Library support at the publication indicated less degree of involvement (with only 9.5% of participants provided full support and only 27.0% of participants are planning to provide support for activities at this stage. At the dissemination stage the result indicated an increase in the level of library support with 28.6% of participants providing full support, while 39.7%) of participants provide partial support. Results for library support at the preservation stage (the results indicated a higher level of library support 47.6% of participants.

### **Library support at various life cycle stages**

To provide a unified framework to discuss the findings on the library services provided at the various stages of the research and publication life cycle, this study adopted the life cycle. This comprised research; editorial; publication; dissemination, and preservation. This was to enable appropriate categorisation of results within a framework that would be more encompassing.

Based on the qualitative findings, library support at the research stage (which includes activities like literature review, methodology, analysis) identified by the participants included provision access to online resources, literature search, references services and provision of citation managers. This finding was corroborated in part by the quantitative findings which indicated that Libraries of 27 (42.9%) participants use a combination of online access to electronic resource and secondary data sources. However, the use of citation or reference manager was insignificant with 9 (14.3%) participants.

This finding particularly, access to electronic resources has been corroborated by Liu (2006:586) whose study found out that majority of researchers studied 73% prefer electronic journals over print journals. This was

attributed largely, to convenience, timeliness, and the ability to search text. Similarly, Waldman (2003) found out that researchers who frequent the library website more often are more likely to use the library's electronic resources. Aside from providing access to electronic resources to support research, Visca (2009) also identified remote services like e-mail reference services, document delivery service. Though not described within the context of the research and publication life cycle, access to electronic resources at CIBIFI's has been identified as major service at the research stage (de la Fuente, 2009; Njoku & Longshak, 2011; Molina, 2013; Debreczeni, 2015).

The findings revealed that at the editorial stage copyright advisory library support services provided by CIBIFI's include provision of back of the book indexing, providing online journal and book hosting. The quantitative findings however revealed that only 21 (33.3%) participants provide support for book indexing, online book hosting and online journal hosting. There was however little evidence from available literature (except for Molina (2013) of indexing, copyright advisory, online book and online journal hosting library support in CIBIFI's. Molina (2013) specifically identified open journals system as ideal library service at this stage. Existing literature however indicate increasing involvement of academic libraries are increasingly providing hosting services to support the publication of both online and print journals and books. According to Lake (2012) libraries are playing critical role in the digital knowledge creation and sharing process by acting not only as custodians of 'downstream' but also contributing through less visible but critical 'upstream' interventions like preservation (Lake, 2012). These interventions according to Gold (2007) could leverage on libraries experience with institutional repositories, to create more dynamic repositories that support pre-publication workflows, including collaboration environments supporting data integration, analysis, and visualization.

Similarly, Keller (2015) noted that libraries were increasingly moving from content collection to content creation. Consequently, activities and services, such as digitization of existing collections, institutional repositories, data and journal hosting services, research data management and e-publishing, all fall into this broad category of 'library-as-publisher'. Borbinha, & Baker (2000) in the same vein, identified back of the book indexing as an exercise that enhance information retrieval and saves the time of the user.

Qualitative findings had equally identified that at the publication stage of the research and publication life cycle, CIBIFI provide support services like Digital Object Identifier (DOI) services, copy editing, journal and book hosting. The quantitative findings however indicated that libraries of only 19 (30.2%) participants provide only ISBN service, copyright information and guidance, DOI for publications, online book hosting; online journal hosting.

According to Vajs (2015) DOIs are technologies that enable libraries register alphanumeric identifiers that uniquely distinguish a research product and assure its permanent accessibility. According to Paskin, (2010:1587) digital objective identifier are managed over time and do not change even if an item is moved or renamed. This means that an item can be reliably referenced for future access by humans and software.

The qualitative earlier indicated that at the dissemination stage participants identified access to online catalogue, institutional repository services as support CIBIFI libraries provide. The quantitative results also indicated that: libraries of 19 (30.2%) participants provide online public access catalogue (OPAC) services to support activities at the dissemination stage; and libraries of 5 (17.9%) participants provide discovery services, subject guides. This finding is corroborated by Visca (2009) identified online catalogue as well as federated search engine as services provided by CIBIFI libraries to support. Craft, (2016:1) observed that though the primary role of libraries had been collection and preservation of content created by others, this had been extended to digital preservation of this content for persistent access.

Qualitative results earlier identified digitisation and institutional repository management as library services that support the management of intellectual output at the preservation stage. This finding was corroborated a largely by the quantitative results which had libraries of 17 (27.0%) participants using a combination of Portal/Website services; and 14 (22.2%) participants using institutional repository system services. Literature provides much corroboration of this result. These findings were also corroborated by available literature. Vajs (2015) for instance identified addition of intellectual resource to institutional repository as a post-publication

or dissemination activity of a CBIFI library. Also, Debreczeni (2015) state that CBIFI's implement institutional repository to meet the need for long-term preservation and dissemination. In addition to this some central banks implemented institutional repositories to manage their intellectual output. These central banks include Sri Lanka, Spain, Greece, Denmark, Finland, Philippines, Sri Lanka, Uganda Federal Reserve Bank (US) as well as the World Bank (Washington DC) and Inter-American Development Bank (IADB) (Washington DC) (Stierholz, 2009; Kumarasinghe, 2013; Molina, 2013; Beberweil, 2015; Debreczeni, 2015; Maata, 2015; Stierholz, 2015; Semertzaki, 2015;). Vajs, (2015) also suggests that post-publication involvement of the library could include: listing the research product on research-oriented internet sites like RePEc, SSRN, Google Scholar. In addition, libraries could also provide citation analysis of the use of institutional research.

To provide a clearer perspective of the results for the library support across the research and publication life cycle in CBIFI's, a visual representation became necessary (Figure 31). It should be noted that some services are provided at more than one stage of the research and publication life cycle. For instance, online publishing (books and journals) supports editorial, publication and dissemination stages of the life cycle.



Figure 31 library supports across the research and publication life cycle in CBIFI's

### Library technologies used to support library services

Various library technologies had been identified by participants at the qualitative phase of the study. These technologies were discussed within the context of the research and publication life cycle stages:

Similarly, at the publication stage technologies include online journal publishing system, online book publishing system, digital object identifier (DOI). Lastly technologies used at the preservation stage include OCR software and institutional repository system.

Technologies that would support library services at the research stage included: library management system (like Alma, primo) and citation manager (Mendeley, Zotero). Access to electronic resources is one of the most important services provided by CBIFI's. This is evidenced by both qualitative and quantitative (71% use electronic resources) results. To enhance these services, technologies like library management system, citation managers/tools subject guides, and discovery. Quantitative results indicated that 47.6% of participants thought that Library management system/integrated library systems were extremely important. Corroborating this, Visca (2009); Molina (2013); and Vajs (2015) had identified the use of library management systems (also referred to as integrated library system) as library technology used to support library operations CBIFI Libraries. Mentions of specific library management system use in CBIFI libraries include, Joint Bank. Fund Library (2011) Symphony from SirsiDynix; de la Fuente (2009) aleph Ex Libris. The result also indicated that 42.9% of participants thought citation managers were important. Reference and citation managers according to

Molina (2013); Nadali (2015) supports the management citations, referencing by researchers and for enhancing collaborative research in CBIFI's. For subject guides systems 49.2% of participants though the services were very important. Other technologies that support access to electronic resources by some CBIFI Libraries have been identified to include: SFX OpenURL Resolver from which provides links from citations to the full text of the articles (de la Fuente, 2009; EZproxy for authenticating remote users (Joint Bank. Fund Library, 2011). This tool is useful in providing off-network access to resources that are accessed via IP authentication.

At the editorial and publication stages, qualitative results indicated some level of awareness of library services and some support for the publication of journals and books. The quantitative result for online journal hosting which had 41.3% of participants who though the service important. This result was similar to that of online book hosting which 33.3% of participants though was important in the creation and management of intellectual output in CBIFI's. Molina (2013) identifies the use of open journals system as a service that should be provided by CBIFI Library. In addition to this Vajs (2015) identifies CBIFI Library at the publication stage to include review of data use and registration of digital object identifier (DOI). DOIs are alphanumeric identifiers that uniquely distinguish a research product (article, book chapter, book) and assure its permanent accessibility on the web.

The qualitative result indicates that online journal publishing system and online book publishing system, OPAC, institutional repository system are support that is provided at the dissemination stage of the research and publication life cycle. Technology support at the preservation stage include: the use of institutional repository system Vajs (2015); the use of Digital Archive systems like Archivalware to manage CIBIFI publications at the preservation stage (Beberweil, 2015).

Discovery service: 30 (47.2%) participants thought they were extremely important. This result reflects earlier views by Visca (2009); Suárez (2013); Määttä (2015); Walusimbi, & Kiyaga (2015) that the use of federated search engine and discovery systems to support search and retrieval of electronic resources. Walusimbi, & Kiyaga (2015) stressed that discovery is at the heart of the usage of electronic resources. However, library users do not have a clear starting place hence Considerable time spent searching. In view of this the use of the use of discovery technology becomes necessary. Also, Suárez (2013) explains that a discovery system which is a centralised, single access search interface to pre-indexed metadata and/or full text documents support more efficient search and retrieval of library resources. Nadali (2015) sought to differentiate federated search from discovery (which comprise of a unified index). Some of the features of the discovery system/services like *Summon* include speed, relevancy, filters and faceting, and full text search.

Figure 32 provides a visual representation of technology support that CBIFI provide or can provide to support the creation and management of intellectual output in CBIFI's.



Figure 32 technology support for the creation and management of intellectual output for CBIFI's



## **Importance and benefit of technology support for the creation and management of intellectual output in CBIFI's.**

Qualitative results had earlier identified the benefits of technology support for the creation and management of intellectual output in CBIFI's. These benefits included multiple and simultaneous access; greater visibility; currency of information (online first); enhancement of access and information retrieval; greater visibility, long term preservation.

The quantitative results revealed that that 76.2% participant strongly agreed that the presence of an institutional repository would enhance long-term preservation of institutional intellectual output. 44.4% of the participants agreed while 41.3% of the participants strongly agreed that an institutional repository would enhance global visibility of institutional intellectual output of in CBIFI's. On the importance of citation and reference management services as a means of reducing incidences of plagiarism and copyright infringement in CBIFI's 44.4% of participants agreed while 30.2% of the participants were not sure. 38.1% of participants strongly agreed that the provision of copyright advisory services like ISBN, ISSN by the library enhancing the quality of research and publication in CBIFI. 49.2% of participants agreed that back-of the book indexing services would enhance information retrieval in organisational publication. 46.0% of participants agreed that providing digital object identifier (DOI) would enhance persistent access to your organisations research. 38.1% of participants agreed and 38.1% participants strongly agreed that using the OPAC would enhance access to institutional intellectual output. 41.3% of participants strongly agreed that discovery services would enhance global visibility CBIFI research. 44.4% of participants strongly agreed that subject guides would enhance access to electronic resources during research and publications. 41.3% of the participants agreed and 39.7% of the participants strongly agreed that online journals and book hosting's enhancing research and publication activity.

## **Challenges of implementing library service and technology**

The qualitative results identified the challenges of implementing library services and technologies to include: high cost of proprietary library software; competition from search engines and related services (Google); inadequate knowledge and skills; and budgetary constraints. These results were further buttressed by the quantitative findings which revealed the following: budgetary challenges 46.0%; high cost of implementation 47.6 %); inadequate skills of Library staff; technological constraints 46.6%; copyright and intellectual property issue 38.1%.

## **Prospects of library services/technology support for the creation and management of intellectual output in CIBIF's**

On the prospects of the use of Library technologies, qualitative results indicated that participants highlighted factors that enhance the enabling environments for the successful implementation and effective utilisation of the services and technologies that would support the creation of intellectual output in CBIFI's. These issues include: proliferation of print intellectual output (both peer-reviewed and non-peer-reviewed); reduction in the cost computing services (storage, hosting); availability of open source software; inability of existing IT infrastructure to manage intellectual property; advances in digitisation, digital preservation; the need for remote access to local content.

The quantitative results revealed that: relative reduction in the cost of computing has enhanced the implementation of library services/technologies 52.4%; the proliferation of locally produced information has created the need for institutional repositories for long-term preservation and persistent access, 39.7%. the Library can provide more sustainable framework than existing frameworks for creation and managing intellectual output in my institution, 38.1%; advances in digitisation and the need for remote access to print-publications have enhanced library support for research and publications in my institutions 42.8%; and ubiquity of computing devices (personal computers, tablets, mobile phones) has enhanced the implementation of library services/technologies that support research and publication in my institution 46.0%.

Debreczeni (2015), supported this by stressing that the motive for undertaking an institutional repository project was always the need for long-term preservation and dissemination. Stierholz (2009); Kumarasinghe (2013); Maata (2015); Stierholz (2015); Debreczeni (2015); World Bank (2012) and IADB (2014) have identified some central banks that have implemented institutional repositories to manage their intellectual output. These central banks include Sri Lanka, Spain, Greece, Denmark, Finland, Philippines, Sri Lanka, Uganda Federal Reserve Bank (US) as well as the World Bank (Washington DC) and Inter-American Development Bank (IADB) (Washington DC).

### **Importance of determination of impact of CBIFI research output**

The qualitative results indicated that participants' libraries measure the impact of institutional intellectual impact. This was corroborated by the quantitative results which revealed that 61.7% of the participants measure the impact of their institutions intellectual output while 38.1% of the participants do not. The qualitative results also indicated metrics used by libraries of participants in the qualitative phase include: circulation of library materials, impact factor, altmetrics, usage statistics, page views/visits per page, downloads, publication views, citation analysis. The result of the quantitative phase indicates that 11.1% participants use repository statistics while 23.6% of the participants use web analytics. On the use of altmetric as a measure research output usage, the results indicate that 47.6% of the participants do not use altmetrics but plan to do; 49.2% of the participants thought that altmetrics were very beneficial.

Molina (2013) and Määttä (2015) provide evidence of awareness and adoption of methods to measure research output of CBIFI. Molina (2013) for instance identified impact factor/bibliometric analysis, science metrics of economic research, promotion programmes (impact factor h-index), web of science, Scopus as strategies for measurement of research impact by CBIFI library. Similarly, Vajs (2015) suggests providing citation analysis of use. Määttä (2015) that institutional repository services provide statistical tools for measuring impact like downloads, rankings, citations, author information. Also, Molina (2013) stressed the need for the adoption scientometric methods by CIBIFI library. This would involve activities like: design and implementation of a measuring system which allows for evaluation of the impact of production on the researchers and research groups, the banks and their publications in the generation of knowledge, the bringing into effect the bibliometric evaluation of publications and research groups. Strategies could also include formulating guidelines and policies for the registry of authors and the institution in national and international lists, to promotion and broadcasting of research products and tools in specialized networks and communities through different mediums to increase visibility and promote consultancy.

On the involvement of Libraries in the organisation and storage of tacit knowledge in CBIFI's the quantitative results 39.7% involvement. For the acquisition and organisation and archival of materials from learning events (workshops, seminars, training, conference) by CBI Libraries the quantitative results indicated 39.7% partial involvement. Libraries could make journal hosting available to scholars to ease the creation and administration of alternative journals, and could provide them with wide, and sometimes open, accessibility by hosting new journals (Lorimer, 2012:1-18). In 2013, "55% of the 33 respondents studied were already providing hosting services and related support and another 24% were considering the provision of such services" (Morrison & Owen, 2010). Knowledge management is a learning processes associated with exploration, exploitation and sharing of human knowledge (tacit and explicit) that use appropriate technology and cultural environments to enhance an organisation's intellectual capital and performance (Gunjal, 2005; Semertzaki, 2011).

The operations that are automated using the library management system include: Acquisitions; cataloguing and classification of library resources / materials; circulation of materials to users by lending and receiving them back; serials management through the racking magazine, journals, and newspaper holdings; the provision of online catalogue (OPAC) the interface that enables users interact with the library and to browse, search and view the library's collections remotely (Wang, & Dawes, 2012:76).

## SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

### Summary of Findings

CBIFI libraries are at a crossroad regarding the changing information environment and economic realities forcing CBIFI to cut budgets. The need to justify the existence of library service is necessitating the need for proactive, innovative services that would align to specific organisational strategies. This study was conducted to determine role CBIFI Libraries play to support the creation and management of intellectual output across the research life cycle. This section provides a summary of the findings.

The results indicate that apart from traditional roles like acquisition, cataloguing, classification, reference services, CBIFI Libraries embark on emerging roles that include: electronic reference services (chat, services); data management services; news monitoring; knowledge management support; decision support. Other emerging services included: embedded or liaison library services, use of subject guides to provide business focused services and institutional repositories for long term digital preservation and persistent access. The findings also identified four categories of research and publication life cycles in CIBIFI's namely: research, publication, dissemination and preservation; research, editorial, publication, dissemination, and preservation; research idea, literature review, research planning, research implementation, publication, preservation; and approval from relevant authorities, appraisal/assessment of the topic, implementation, support, publication, completion, evaluation.

On the level of Library support across the research life cycle, the results revealed a high (71.4%) level of involvement of CBIFI Libraries at the research stage low level of support at the editorial (28.6%) and the publication (9.5%) stage. There was also a low level of library support at the dissemination stage (28.6%) and moderate level ((47.6%) at the preservation stage. The results also provided specific library support services at various life cycle stages: research stage (provision access to online resources, literature search, references services and provision of citation managers; editorial stage (copyright advisory, back of the book indexing, online journal and book hosting); publication stage (Digital Object Identifier (DOI) services, copy editing, journal and book hosting); The quantitative findings however indicated that libraries of only 19 (30.2%) participants provide only ISBN service, copyright information and guidance, DOI for publications, online book hosting; online journal hosting); dissemination stage (online public access catalogue (OPAC) services, discovery services and subject guides); preservation stage (digitisation and institutional repository management).

On library technologies used to enhance library services aimed at supporting the creation and management of intellectual output in CBIFI's, the results identified specific library technologies used at the various stages of the research and publication life cycle: research stage included (library management system (OPAC), citation manager like Mendeley, Zotero, subject guides (LibGuides), and discovery services like (EBSCO Discovery Services); editorial and publication stages (online journal publishing system, online book publishing system, OPAC and institutional repository system); preservation stage (institutional repository).

The results indicated that benefits of library technology used to enhance library services to support the creation and management of intellectual output in CBIFI's include: multiple and simultaneous access; greater visibility; currency of information (online first); enhancement of access and information retrieval; greater visibility, long term preservation. On the challenges CBIFI Libraries face when implementing library technologies, the result identified: high cost of proprietary library software; competition from search engines and related services (Google); inadequate knowledge and skills; and budgetary constraints. The results indicated that participants' libraries measure the impact of institutional intellectual impact. And that though most participants do not use altmetrics 47.6% most (49.2%) that they would be beneficial for CBIFI libraries. On the involvement of Libraries in the organisation and storage of tacit knowledge in CBIFI's the quantitative results 39.7% involvement. For the acquisition and organisation and archival of materials from learning events (workshops, seminars, training, conference) by CBI Libraries the quantitative results indicated 39.7% partial involvement.

## Conclusion

The findings from the qualitative results identified: services CBIFI provided to support the creation and management of intellectual output across the research and publication life cycle; level of involvement of CBIFI Libraries in the creation and management of intellectual output of their institutions; issues relating to provision of library support for the creation and management of intellectual output; library services and technologies that support the creation and management of intellectual output of central banks. The quantitative results largely corroborated the qualitative findings.

This study found out that libraries apart from traditional roles are innovating new services that seek to realign the library's functions to be in consonance with organisational goals. As a result of this CBIFI Libraries now provide services like media monitoring, decision support, electronic reference (chat, SMS), embedded library services, data services. To provide these services, CBIFI libraries are deploying a range of technologies to support these: Uniform resource management systems (Alma); institutional repository systems (DSpace); discovery systems (Summon, EBSCO EDS), remote authentication systems (EzyProxy); link resolvers (SFX).

## Recommendation

Based on the analysis and discussion of the findings from the qualitative and quantitative data, the following recommendations (which are illustrated in Figure 32, page 76) are necessary:

- There is the need for the development of technology strategic plans
- Embedded librarianship should be implemented in CBN
- Journal hosting and book hosting platforms should be implemented to provide for:
- An enhanced publishing process in the bank;
- Centralised publishing process to prevent the existing scenario in which research and publications production of intellectual output is done in silos;
- Develop a holistic strategy for enhancing global visibility of CBN intellectual output (research, publications, scholarly and non-scholarly information materials) and the measure of research impact. This would involve implementing a visibility strategy built around relevant usability/scholarly metrics (journal, articles, author/researcher):
- journal metrics (Scopus CiteScore metrics, Journal Rank (SJR) for journal impact factor);
- articles Level metrics (Citation count, percentile benchmark, Mendeley readership);
- author metrics: h-index, Citation overview tracker, Analyze author output
- Adoption of other journal other journal metrics apart from the Web of Science Impact Factor, by ensuring the listing of CBN research on other research bibliographic databases like Scopus, and Google Scholar and develop the use of metrics like Altmetrics;
- Listing of CBN research products on research-oriented internet sites and platforms like Fed-in-Print, RePEc, SSRN, Google Scholar a well as provide citation analysis of use as suggested by (Vajs, 2015).
- Research department should liaise with ITD and other relevant department to fast-track the implementation of the big data strategy being developed for the Bank proactive gathering and analysis of structured and unstructured data on the Nigeria economy. This had been done by the Federal Reserve Bank, New York; Bank of England, Bank of Canada, (Ragan, 2011; Canadian Press; 2013; & Conway, 2014).
- Enhance visibility of CBN research
- Enhance the impact of CBN research through
- Research data services should be developed to ensure that datasets are acquired, organised using relevant metadata, and preserved for future retrieval by appropriate users.
- Deployment of citation management system

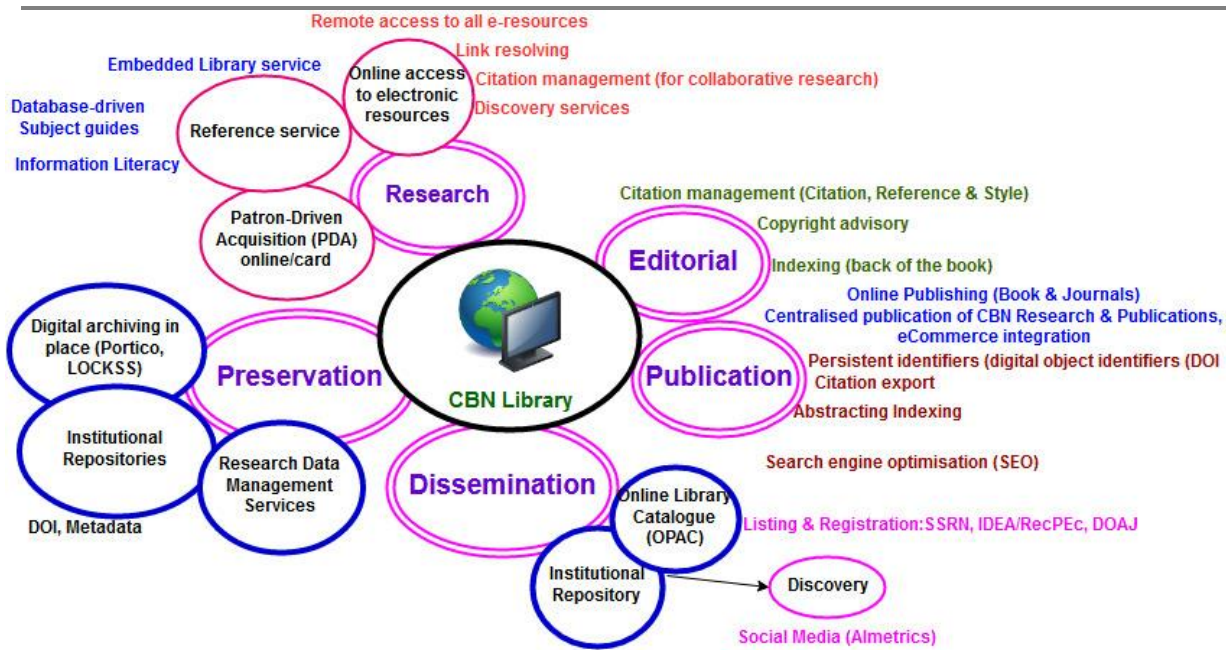


Figure 32 Recommended roles of the library to effectively support the creation and management of intellectual output in the Bank

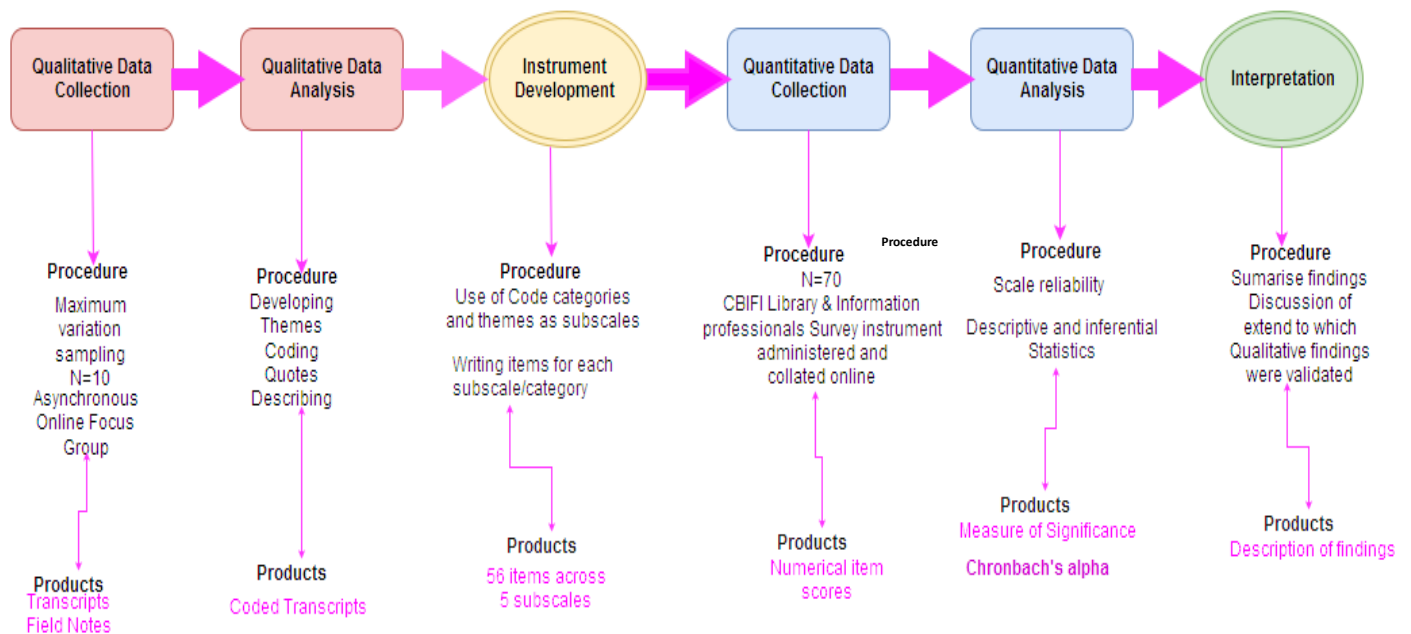


Figure 2: Summary of the Procedure for Qualitative and Quantitative data collection analysis and interpretation

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