

UTILIZATION OF SCHOLARLY COMMUNICATION CHANNELS FOR RESEARCH OUTPUTS BY ENVIRONMENTAL SCIENCE LECTURERS IN HIGHER EDUCATION INSTITUTIONS IN UGANDA.

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ABSTRACT

The study investigated the utilization of scholarly communication channels for research by environmental science lecturers in Ugandan universities. 6 universities comprising of 3 public universities namely: Makerere, Kabale and Kyambogo and 3 private universities namely: Kampala, Kampala International, and Nkumba universities. Population was 152 lecturers from both universities, 87 from public and 65 lecturers from private. Descriptive survey design was adopted. The instrument used for data collection was structured questionnaire. The researchers distributed 152 copies of the questionnaire, 116 copies were retrieved and found useable, having a response rate of 76.03%. Data analyzed using descriptive statistics. Findings revealed that the formal means of scholarly communication channels available were peer-reviewed, authored research work and open sources. Top most productive channel used for research by lecturers were academic journals, conference presentations and seminars, while, top areas covered in environmental science research by lecturers were climate change, global warming, pollution environmental degradation, biochar, agriculture and food supplies, environmental engineering and technology. Based on the findings the study recommended among others: creation of low-cost open access channels within the universities that can provide direct alternatives to highpriced commercial titles and outlets outside; that more research fund and grants should be established on top most research areas in environmental issues and problems.

Keywords: utilization, scholarly communication, communication channels, environmental science, faculty members. (220 words)

Introduction

Research is an organized and systematic way of finding answers to questions surrounding human environment. Leedy (1989) defined research as “the systematic process of collecting and analyzing information (data) in order to increase our understanding of the phenomenon with which we are concerned or interested.” The question is: can any society, or institution develop, grow, improve and better lives without research processes?, the answer is never. Records have it that ever since the beginning of human race, research has been in existence and the abilities of human beings to dominate their environment, ask questions, raise queries and seek clarifications from what is going on around them, have been the precursors of research processes. The need to find out why a particular phenomenon keeps recurring, threatening or existing problems are the concern and characteristic of research. Conducting research in any area amounts to solving problems such as August 2024 when we had ‘ebola and Coronavirus 2019 (Covid-19), in March 2020 and other environmental issues such as climate change, pollution (water, air), degradation, biochar, etc answers to these problems are derived from research processes. Dixit (2018) noted that research is a human activity based on intellectual investigation aimed at discovering, interpreting, and revising human knowledge on different aspects of the world. It can be scientific or non- scientific, scientific research relies on the application of scientific methods based on scientific paradigm.

The goal of any research is achieved when problems are identified, discoveries made, findings revealed for solutions, good decisions taken to that regard. Research involves critical thinking that employs scientific approaches to discover, determine, and way forward in solving the identified problems or needs and knowledge gained from research process is what birthed wisdom and sensual knowledge, (Singh, 2021). Okokpuije et al (2018) observed that

conducting research creates and generates new knowledge, methodologies and understanding of prevailing issues. Results of research studies enhances progress and resolving of conflict situations around the world. Bornmann (2012) observed that society is reaping the benefits of successful research studies, while Okonofu (2010) questioned on how society will be and what the world would look like if there are no research processes. He concluded that without research, teaching and learning would have been monotonous, static and old-fashioned. Research encourages scientific and inductive thinking, besides promoting the development of logical habits of thinking and organization. (Singh 2021). Research is an important component for national development world-wide. As history has shown that most of the discoveries that improved human living conditions originate from research endeavours (Ikuforiji, 2009). Research undeniably opens up new and more efficient ways of exploiting vast resources of raw nature of man’s benefits to ensure national development.

The question one may ask is how much scientific communities connect and what are the common things that hold them together and how do they uphold their common orientations? The answer is on scholarly communication that plays the role of securing the values shared by the community and also endorsing what they share as certified knowledge. Scholarly communication is the basic component of scientific communities and it is birthed from the outcome of research in Higher Education institutions. Collaborative research processes are encouraged in institutions. On various disciplines as Johnston et.al (2020) observed that interdisciplinary collaborative research helps in professional development of academics, helps in collaborations of ideas, sharing and developing of team spirit. Burroughs (2017) revealed that collaborative research provides strategy for publishing good research findings that attracts

recognition to faculty members, rated high in tenure and promotion exercises.

Collaborative research processes supports development of early career academics as well as growth for senior faculty members. Misra et al (2017) viewed the merging of technology and diverse team collaboration in research as an essential aspect of skills development for faculty members in the 21st century in higher education institutions. They also observed that when collaborative research is denied among faculty members they stand to miss the opportunities to develop connections and grow skills among themselves. The formation of networks and grouping of professionals are connected with the emergency of scientific communities and these communities.

The Academics and research processes are experiencing tremendous changes in this modern time which have brought about innovative ways of doing research differently. Research processes provides basic principles on how to manage situations on environmental and societal issues. There are many emerging platforms available for scholarly communication channels among disciplines for research dissemination but the focus of this study is to investigate the utilization of scholarly communication channels for research by lecturers in environmental sciences in universities in Uganda, East Africa.

Statement of the Problem

There is a link between knowledge, production, innovation and economic growth of any nation, the anchor link is knowledge that is transferred through education to the people. Education in formal and informal forms plays a role in the reduction of inequality in the society and it moves on to strengthening the social welfare of people in the society. University education is the highest form and is seen as pivotal center for solutions to societal, economical, and environmental issues in human environment and space through the process of research.

Universities are the prime-intellectual institution of the world, providing solutions to the numerous problems in different continents of the world including Africa. This position has made the role of the universities in national development paramount because of its outcomes that helps to address problems caused by the technological changes affecting environments, political and social-economic orders in the world.

The primary functions of universities worldwide are teaching, conducting research and community services. There are numerous environmental issues confronting society since the environment belongs to all living beings and thus is important for all. It is a duty bestowed on the environmental scientists within the walls of the universities to conduct researches to identify environmental problems and to provide solutions through research. Some of the affected environmental issues are global warming, water and air pollution, depletion of the ozone layer, dwindling forest, energy resources, loss of global biodiversity etc. Scholarly communications has become an integral part of the processes for deliberations and finding solutions to environmental issues in our society.

Research has been done and some are ongoing by these professionals in the universities, however, the findings from this research need to be made public or utilized to solve environmental issues and problems. The unanswered questions are: what are the formal means of scholarly communication channel available for environmental scientists, what are the top most productive scholarly communication channels use in communicating research outputs by lecturers in environmental sciences, and it is still unclear what the top most research areas covered by faculty members in environmental science are?. Against this background is the missing gap that this study is out to fill.

Research Questions

The study has the following research questions:

1. What are the formal means of scholarly communication channels available for research output by environmental science lecturers in higher education, Uganda?
2. What are the top most productive scholarly communication channels used for research outputs by environmental science lecturers in higher education, Uganda?
3. What are the top areas of research covered by environmental science lecturers in higher education institutions, Uganda?

Review of Literature.

Utilization of scholarly communication channels:

We live in a world that is driven by information and knowledge and the result witnessed today in various sectors is predominantly propelled by research outputs in science and technology. The concept of scholarly communication emerged first in a journal publication in the 1665 century and gained popularity in the 1970s. It was driven by learned societies and member of communities around the world, to publish findings of their research enquiries and scientific discoveries. The learned societies were the main promoters and publishers of scholarly journals. The first set of learned societies was established in different European countries in the 17th and 18th centuries around the European Renaissance. These were predominantly named as the Royal Societies as they receive patronage from the monarchies and respective governments. Each learned society launched a periodical outlet for the dissemination of result findings of the society members and other scholars. Many of their members are active researchers who engaged in academic discourses. However, the term gained popularity only in the 1970s.

The Association of College and Research Libraries defined scholarly communication

as " the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use" (ACRL, 2003). Widen (2010) sees scholarly communication as the communication and dissemination of research ideas, initiatives and results shared with others. It is a means whereby academics, scholars and researchers share their research findings with others or publish the same for the benefit of others in the academic community. It refers to exchange of academic writing where researchers used in pushing the boundaries between what they know and what society knows. Scholarly communication can be seen as the system through which research and other scholarly writing are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. Scholarly communication is revealed when the researcher questions an established notion or truth scientifically in a study and then shares the findings with others in a prescribed way. It is a highway upon which knowledge, research paradigms, and ideas are formulated, transported, shared, and disseminated. Scientists use various avenues of scientific communication, formally and informally, directly and indirectly, physically and virtually to talk to each other in similar fields, as well as with others beyond the borders of their disciplines. Scholarly communication is the product out of research processes and services that researchers and scientists render to business, academics, and policymakers in government and private organizations.

Scholarly communication is a unique type of communication, mostly between academics that is used to establish connections between individual scholars and international research groups with shared fields of interest and research. Such communications yield research publications in journals and conference proceedings and enable the exchange of opinions, positions and information regarding conferences. It is the connection among scholars which increases

the awareness of one scholar to the work and ideas of another and it is considered to be a fundamental aspect of scholarly and scientific research. Liat Klain-Gabbay et al (2018). Hill (2016) noted that the scholarly communication system is the primary driver of the culture that shapes research practice within the academic sphere; after all, claims “the insights from research are of little, if any, value until they are shared”.

Closely looking at the term scholarly communication it has a broader meaning than publication, as it includes the processes by which scholars communicate with one another as they create new knowledge and by which they measure its worth with colleagues before making a formal article available to the broader community, which is then purchased and preserved or licensed by academic libraries worldwide. However, in Africa, science and technology are still not visible in our higher education environments. Higher education in Africa has remained at the bottom end of this index of science and technology advancements resulting in poor scholarly communication channels. Africa as a consumer of these science and technology innovative products and in some path a producer of some of the raw materials used for technological innovations is still at its low index compared to the developed countries. Researchers need reliable channels to disseminate their research findings to others in the scholarly community like environmental sciences. Academic outputs of scholars are judged by the number of publications and channels used in their publishing and a positive reputation in publications attracts scholarly credits as funding or grants.

Utilization of scholarly communication channels:

Utilization is a noun and it is an act or instance of making practical or profitable use of something, services, equipment or infrastructure. It is defined by the operational use within its context and in this study utilization is based on the scholarly communication channels used for research in

environmental science by lecturers in Ugandan. Scholarly communication is the study of how researchers in various fields make use of and publish information through informal and formal channels. An arrangement through which research investigation and other scientific works are created, assessed for quality, shared to the communities and preserved for use in the future. (Wolfram, 2019). Scholarly communication is the process of academics, scholars and researchers sharing and publishing their research findings so that they are available to the wider academic community such as university academics and beyond. (Chukwusa, 2015) sees the academic community as major communicator of science along with technological innovation in the world. Utilization of scholarly communication channels is what makes dissemination of research findings possible and it makes performance of research achievable.

A communication channel refers either to a physical transmission medium such as a wire or to a logical connection over a multiplexed medium such as a radio channel in telecommunications and computer networking. In a nutshell, communication channels are mediums through which one can send a message to its intended audience. It is a medium that keeps information flowing efficiently in any setting be it research, academics, company or organization. There are various channels through that communication can take place formally and informally ranging from documentaries, books, and podcasts to mass media, public talk and the modern-day social media platforms. But in an academic and research environment, scholarly communications become a central part of the process of deliberations. Scholarly communications are carried out using certain channels of communication by scholars and academicians. The most important ones are scholarly journals, conference proceedings, research monographs, dissertations, research reports and personal memoirs. The Internet now provides a much easier and more instant

means of connection. Social media is a boon for any type of communication. The learned societies the formal institutions representing scientific and think tank communities – are primarily responsible for initiating scholarly journals in their respective subject areas, where members can communicate their results of scientific research and get valuable feedback from readers of these journals or fellow members of these learned societies. Since the mid-twentieth century and later, learned societies have started collaborating with for-profit publishers – for achieving global outreach, global readership and global authorship. The ICT-enabled environment helps in the global outreach of scholarly literature, more rapidly than in earlier print-only eras. Scholarly communications got enormous impetus when scholarly literature becomes globally and instantly accessible through online mode in globalized societies.

Scholarly communication channels are grouped into two known as primary sources or sources or primary literature which include academic journals, conference proceedings, research monographs, research reports, working papers, patents/standards and thesis and dissertation. There are indexed in global or national indexing and abstracting databases (A&I) which is refers as alerting services for primary sources. The primary sources provide raw information and first-hand evidence on the topic under investigation, it gives direct access to the subject of study or research. Primary sources are used to make discoveries, provide credible evidence for arguments and give authoritative information about anything under investigation. The second type is a secondary source which provides second-hand information and commentary from other researchers, connecting researchers to published literature recently from a primary source. Secondary sources describe, interpret or synthesize primary sources. Secondary sources are used to gain background information on the topic to support or contrast your argument with other researchers' ideas, together with information that the researcher cannot access directly

because the document or information is a private letter or material that is in another location which is not accessible. The science citation index is an example of a secondary source of a secondary source.

Scholarly communication channels benefit research processes and provide an avenue for the creation, distribution and dissemination of information about results, methods, new processes and products. Also allowing findings to be shared and evaluated by other colleagues and students both locally and internationally. Similarly, Kauffer and Carley (1993) pointed out some of the importance of scholarly communication to academic writing: it makes ownership of an idea to be known in any area, brings on board societal recognition for authors, and helps them to claim priority for a discovery, establishing an accredited community of authors and readers. A scholarly communication channel is an important tool of dissemination in any discipline including environmental research because it is the medium to reveal scientific information, news, facts, findings and evidence to institutions, organizations, governments and private that will enhance and induce good public or private decision- makings where necessary possible. It is used to establish connections between individual scholars and international research groups with shared fields of interest and research as observed by Hill, (2016).

While, the most easily recognizable and high-profile form of scholarly communication is the research articles found in peer-reviewed journals, works that do not go through the traditional publication route can still be a part of the scholarly communication process. These informal channels of communication can include student research, the various kinds of grey literature such as technical reports, and bibliographies, as well as listserv discussions. Whether the result is a widely distributed scholarly article or a student paper, research and scholarly communication are closely tied together.

□ Role of scholarly communication in research processes

Research is a process through which information and new knowledge are generated using the existing body of knowledge which has been generated through the study of an individual researcher or a multitude of researchers done previously and communicated through the process of scholarly communication or interaction with others. Its role in higher education institutions are for development and sustainability, it is very important to have a society that is driven by knowledge so that innovations can be viable. The quality of research work directly translates to the quality of teaching and learning in the classroom, thereby benefiting the students, the society and the country.

Scholarly communications have played important roles in research processes by providing answers to specific questions, keeping scientists up to date regarding the recent developments in their fields, helping scientists understand new fields, verifying the reliability of information sources by additional testimony, helping scientists understand the major trends in their fields, providing scientists with feedback on their work and its relative importance within the research field, and redirecting or broadening the span of interest and attention of scientists. Importantly, in the digital era, research articles can be considered not only as representations or manifestations of knowledge but also as social objects that scholars share, cite, and discuss and which enable them to cross the boundaries of time, place, and discipline, interact and establish social connections with other scholars (e.g., through social and research networks), share information, and evaluate their reputations as observed by Ladan (2012).

During the research process, researchers use information as input and generate further information in the form of new ideas (innovations) as output. Singh (2021)

observed that research encourages scientific and inductive thinking, besides promoting the development of logical habits of thinking and organization. Information obtained from literature reviews on the study area through the retrieval of scholarly communication on previous studies by the research helps a lot in the present study. The study of the literature will expose the background to the study, the identified statement of the problem, the questions raised, the methodology adopted and the outcomes. Through that the research can align the study to achievable objectives. The study of literature will ensure that one's work is not duplicated. Scholarly communication is thus essential for the progress of scientific research and doing research without disseminating the findings is a waste of resources. It is therefore not surprising that most research funding agencies demand the evidence of dissemination of research findings from their grants' awardees to account for the funds spent in undertaking research.

The environment is everything that is around, which includes both living and non-living things such as soil, water, animals and plants, which adapt themselves to their surroundings. The environment is a gift from God that helps in nourishing life on earth. Environmental science is an interdisciplinary academic field that draws on ecology, geology, meteorology, biology, chemistry, engineering and physics to study environmental problems and human impacts on the environment. It is a discipline that adopts both theoretical and applied aspects and has been influential in providing information that helps government and private organizations in policy formulation around the world. This discipline plays a role in healthy living and the existence of life on the earth that plays a host and is a home to different living species which depend on it for food, air, water and other needs. Environmental science is a branch of life science that deals mainly with the study of organisms and their interactions among organisms and their environment.

Environmental scientists deal with the problems in our environment, water, air etc through research and analyze a wide variety of environmental problems and provide potential solutions to identified problems including alternative energy systems, pollution control and natural resource management. Environmental science academics communicate their findings in written reports and scientific journal publications and by giving presentations to their colleagues and the public through scientific reports, peer-reviewed journals, conferences, seminars, workshops etc. Through these channels more research can be provoked, and induced, and knowledge gained through such channels can be used to improve the world around us.

The objective scholarly communications is the process of sharing, disseminating and publishing research findings of academics and researchers so that the generated academic contents are made available to the global academic communities.

□ Environmental Sciences

Environmental science is an academic field that combines multiple scientific disciplines to explore and understand better the environment. It is a study that deals majorly with land, air, water, people, and atmospheric conditions with its elements. Its significance lies in the growth, development and sustainability of society, people and the environment. There are five major fields of environmental sciences consisting of the following:

- Atmospheric sciences mostly deal with global warming and its effect. Scientists can create special computer models that depict how the atmosphere circulates, how chemicals react within it, and how animals contribute to carbon dioxide emissions.
- Ecologists research a plethora of things, including how a specific species or a group of living creatures are influenced by their environment or some specific aspects of it.

Environmental chemistry goes into more detail, and it explores things like chemical effects on different plants, the chemical degradation of the environment, and the way chemicals get transported through the environment.

Geosciences are often considered a branch of planetary sciences, and they explore the chemical and physical constitution of our planet, but also its atmosphere.

Social sciences in the context of environmental science are most easily defined as specific fields that deal with the relationship between humans and nature. They are mostly divided into three larger fields, geography, anthropology, and sociology. Geography studies the various ways that the populations of humans can affect many features of our planet; it deals with specific data and is mostly based on quantitative research.

Environmental sciences are aimed at identifying problems on earth, land, water, air, sea, climate, ecosystem, and specific animal or plant species. It provides or proffer solutions or recommendations on how to tackle or deal with important issues such as climate change. It also tries to understand human relationships with nature and its various aspects by integrating social sciences among all of the other disciplines. Environmental sciences is an important subject area that is beneficial to human society, plants, animals, and space and cannot be overlooked. Conducting an in-depth study through empirical work appears to be very useful because it will reveal a greater insight into what is going on with faculty members who are the progress wheel to propel research in environmental sciences and the problems they encountered in scholarly communication channels and the top most used channels for research by environmental scientists (faculty members) in the universities in Ugandan. Ladan (2012) noted that making research in environmental science is relevant to national development in Nigeria and his study supports the fact that research on environmental science and its

lecturers are beneficial to societal development and nations building.

Faculty members in this discipline are lecturers who teach students at all levels in the various courses and subject areas in the environmental sciences. They also conduct studies on the various subject areas of environmental science or studies comprising ecology, geosciences, atmospheric sciences, biogeochemistry, biology, geochemistry, conservation biology, soil science, ecosystem, environmental chemistry, biodiversity, environmental health, renewable energy, hydrology, oceanography, zoology, environmental engineering, toxicology, land use, sustainability science, urban ecology, fire ecology, bioremediation. Research is been conducted by faculty members according to their specializations both in private and public-owned higher education institutions in Uganda and other parts of the world, to better lives, solve environmental issues and maintain human successes in nature, air, water, ecosystem, pollution, etc. Research outcomes from these branches are very crucial and needed by government, public organizations, and private companies and police makers at all levels. Findings from these research outcomes are powerful instruments for innovation, prediction, discoveries and solutions to environmental issues and help policymakers in decision makings on environmental issues whether locally or internationally. The results are communicated through approved channels to the public.

However, for research outcomes to be relevant and useful they must be communicated, disseminated and shared by the researchers (private or corporate) through various scholarly communication formats that are acceptable in the academic space and scholarly communication channels known and approved by the profession or association for publishing research outputs. There are multiple-choice scholarly communication channels for different disciplines and are differently rated. Scholars

in various disciplines have their choice and top most used scholarly communication channels for publishing their research outputs. In Uganda, East Africa the choice of nomenclature of schools or Colleges is preferred to that faculty in higher education centers. So the study adopts School of environmental science and College of environmental science as it is used in the institutions under study.

Methodology

The study adopted descriptive survey design. The population of the study comprised of all public and private universities in Ugandan Higher Education. There are twelve (12) government owned public universities and thirty nine 39, privates universities including individual, corporate, faith-based organizations and Islamic bodies. A purposive sampling technique was employed to select the six (6) universities that run environmental sciences in public and private universities. Public universities used were Makerere University, Makerere, (1922), Kyambogo University, (KYU), Kyambogo, (2003) and Kabale University (KABU), Kabale, (2001). While, the Private universities used were Kampala International University (KIU), Kansanga, (2001), Kampala University, (KU) Gagba, (2005) and Nkumba University (NKU), Nkumba,(1999). The gender group for the study consist of 92 males (60.05%) and 60 females (39.05%). The study employed descriptive design. The instrument used for data collection is the questionnaire.

The questionnaires were subjected to validation by four (4) experts from branches of environmental sciences and one from Measurement and Evaluation all drawn from Kampala International University. A trial testing of the instruments was done using 30 scientists from other related disciplines. A reliability index of 0.87 was obtained using the Correlation Coefficient leading to the acceptance of the instrument.

Results

Research Question One: What are the formal means of scholarly communication

channels available for research outputs for faculty members in environmental science research in Ugandan Higher Education?.

Table 1: Formal means of scholarly communication channels available for research in environmental sciences for faculty members

S/No	Formal means of Scholarly Communication channel available for environmental science research in environmental sciences for faculty members.	Frequency (f)	Percentage (%)
1	Peer-reviewed journals	114	98.03%
2	Books –authored research	110	94.08%
3	Open Source Databases	99	85.03%
4	Thesis/Dissertation	89	76.07%
5	Scientific Conference Proceedings	87	75.00%
6	Chapters in research works	83	71.06%
7	Research Monograph	71	61.02%
8	Working/Technical Papers	65	56.03%
9	Research Report for external body	62	53.04%
10	Patent/ Standards	57	49.01%
11	Computer Files/ Multimedia files	50	43.01%
12	Encyclopedia Articles	49	42.02%
13	Manuscripts	45	38.08%
14	Interactive media	34	29.03%
15	Archival materials	25	21.06%
16	Images	21	18.01%
17	Games	19	16.04%

Field: N=116

Table 1 revealed the formal means of scholarly communication channels available for research in schools of environmental sciences were peer-reviewed journals 114(98.03%), followed by books –authored research 110(94.08%) and Open Source Databases with 99(85.03%). The low points of formal means of scholarly communication were archival materials 25(21.06%), images 21(18.01%) and games 19(16.04%). This means that environmental science

researchers uses the formal scholarly communication channels to publish their research results making it visible to the academic community via formal channels.

Research Question Two: What are the top most productive scholarly communication channels used for research outputs by lecturers (faculty members) in School of Environmental Sciences in Higher Education, Uganda?

Table 2: Top Most productive scholarly communication channels used for research by faculty members in environmental sciences.

S/No	Top most productive scholarly communication channels used for research by faculty members	Frequency (f)	Percentage (%)
1	Academic Journal	102	87.09%
2	Conference Presentation	89	76.07%
3	Seminars	83	71.06%

4	Workshop	78	67.02%
5	Web access to full report	71	61.02%
6	Web access to summary report	69	59.05 %
7	Online/Websites	67	57.08 %
8	Social media	63	54.03%
9	Radio & TVs	61	52.06%
10	Issued press release	52	44.08%
11	Report to funders	41	35.03%
12	Networking	38	32.08%
13	RSS Feeds	36	31.03%
14	Newsletter	30	25.09%
15	Research Register	28	24.01%
16	Target mailings	25	21.06%
17	Email alerts	20	17.02%
18	CD Rom	18	15.05%
19	Training packages	15	12.09%

Field: N=116

Table 2 revealed the result on the top most productive scholarly communication channel used for research dissemination by faculty member in environmental sciences. Academic journal had 102 (87.09%) as the top most productive scholarly communication channel used by faculty members for research, followed by conference proceedings with 89 (76.07%) and seminars 83 (71.06%). The lowest productive scholarly communication channel for research was email alerts 20(17.02%),

seconded by CD Rom 18(15.05%) and training packages 15 (12.09%). This means that environmental science researchers in Ugandan uses the top most productive scholarly communication channels to publish.

Research Question Three: What are the most covered area of research by lecturers (faculty members) in School of Environmental Science domain in Higher Education, Uganda?

Table 3: Most covered areas of research by faculty members in environmental science for research outputs for faculty members in environmental science research domain in Ugandan

Higher Education?.

S/No	Top Most Research Areas Covered in scholarly communications for Research by lecturers	Frequency (f)	Percentage (%)
1	Climate change and Global warming	114	98.07%
2	Pollution and environmental degradation	103	88.08 %
3	Renewable energy and emission	102	87.09 %
4	Bio char	100	86.02%
5	Agriculture and Food Supply	99	85.03%
6	Environmental Engineering & Technology	93	80.02%
7	Ecology and Control of natural disasters	91	78.04%
8	Environmental Law Research	89	76.07%
9	Environmental Health and Safety	87	75.00%

10	Deforestation	82	70.07%
11	Water shortage	79	68.01%
12	Environmental Engineering	76	65.05%
13	Environmental Economic and business	69	59.05%
14	Flood	66	56.09%
15	Environmental Education	61	52.06%
16	Urban- industrial pollution	59	50.09%
17	Environmental Policy	54	46.06%
18	Environmental Issues	49	42.02%
19	Land degradation	45	38.08%
20	Overgrazing	42	36.02%
21	Energy Sources	38	32.08%
22	Loss of biodiversity	35	30.02%
23	Geography and Earth Science	31	26.07%
24	Environmental Protection	29	25.00%
25	Environmental Sociology	27	23.03%
26	Environmental Management	24	20.07%
26	Governmental Documents and policies	20	17.02%
27	Biological Science	18	15.05%
28	Physical Science	15	12.09%

Field: N=116

Table 3 above revealed the top most researched areas covered by faculty members in Scholarly communications in Environmental Science discipline. The table indicated that climate change and global warming had 114 (98.03%) followed by pollution and environmental degradation 103(88.08%) and renewable energy and emission 102 (87.09) agriculture and food supply 99 (85.03%) and environmental engineering and technology 93 (80.02%), while the lowest researched areas were government documents and policies 20(17.03%), biological sciences 18 (15.05%) and physical science with 15 (12.09%). The finding showed that environmental science researchers in Ugandan universities demonstrated that these areas are topmost in their studies.

Discussion

The study revealed that scholarly communication channels has gained worldwide popularity in institutions of higher learning, its adoption among lecturers is growing significantly and it revealed that peer-reviewed journals, authored research

books, open sources databases, thesis & dissertation, and scientific conference proceedings were the formal means of scholarly communication available for researchers. This finding is agreement with Adakawa (2022) study. Chukwusa and Onohwakpor (2023) on scholarly communication channels easily reached by student in LIS, they study confirms the finding.

Going further, the study indicated that the top most used scholarly communication channels for research outputs by lecturers were: academic journals, conference proceedings, and seminars as the top most productive scholarly communication channels used by lecturers in environmental sciences. In line with this finding is the study of Chukwusa and Onohwakpor (2023) This validates the findings of Maxwell et al, (2018) on scholarly communication channels available for university lecturers in tertiary institutions in the North Central Zone, the study listed 25 items of channels available and 20 of them were confirmed for use. Shukla et al. (2019) analyzed a

bibliometric study on the pattern of research publication of faculties in Mizoram University. The survey corroborates with the present study.

The finding revealed the top research areas covered in the environmental sciences by lecturers in Uganda universities school of environmental sciences as biochar, pollution and environmental degradation, climate change and global warming, renewable energy and emission, agriculture and food supply, environmental engineering and technology. This study validates the findings of Abdul (2023), Abbass, K et al (2022); Izaguarre et al (2021), Michel et al (2021), Balsalobre et al (2020) and Mishra et al (2021) and Ortiz et al (2021) on top most covered areas in environmental science research in institutions of higher learning in Africa.

Conclusion

The current research investigated the utilization of scholarly communication channels for research by lecturers in environmental sciences in Ugandan universities (public and private). The study underscores the growing importance of scholarly communication channels among academics in universities and its usage among lecturers for various purposes which cannot be denied. The findings revealed the available formal means of scholarly communication channels used for research,

the top most productive scholarly communication channels used for research by lecturers and top most research areas covered by environmental science lecturers.

The cliché on publish or perish syndrome compelled lecturers to cultivate high level of interest and attitude towards the usage of scholarly communication channels in facilitating research activities and collaboration and the trend of research globally in the 21st century demands the study on the utilization, productive use, and area of coverage, It has become a central part of discourse in universities among lecturers and the choices of where to publish their personal or collaborative research are highly welcomed.

Recommendations

Given the major findings of this study, the following were suggested:

- (i) Creation of low cost open access channels within the universities that can provide direct alternatives to high priced commercial titles and outlets outside,
- (ii) More research fund and grant to be established on top most research areas in environmental issues and problems,
- (iii) To create more awareness of scholarly communication channels impacts to the public through trusted sources.

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