Integration of Cloud Computing into Knowledge Sharing Practices among Nigerian Stored Products Research Institute Researchers

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ABSTRACT
This paper investigates integrating cloud computing into knowledge sharing practices at the Nigerian Stored Products Research Institute. It emphasizes the significance of cloud computing in improving research outcomes and knowledge sharing practices. The objectives of the study are outlined, including investigating current knowledge sharing practices, attitudes toward cloud computing, and potential benefits and challenges associated with integration. The significance of the study is discussed in terms of its impact on NSPRI, the Nigerian agricultural sector, and the broader adoption of cloud computing technologies in research organizations. The study used a qualitative approach, including in-depth interviews with NSPRI researchers, both face-to-face and online, and collected data through audio recordings and verbatim transcriptions, and the data collected from the interviews were analysed using qualitative content analysis. Qualitative content analysis was applied to the collected data. The analysis presents insights into current knowledge-sharing practices, attitudes toward cloud computing, and recommendations for integration improvement.

Keywords: Cloud computing; Knowledge sharing practices, Researchers, NSPRI

1. INTRODUCTION

Cloud computing has transformed work, leisure, and business. Although it is still in its infancy in underdeveloped nations, it allows educators and researchers to stay up with global learning trends through constant knowledge sharing, which has helped us identify new solutions to old challenges. Research institutes and colleges are embracing cloud computing technology worldwide, including in Africa. Akinbola (2023) defines cloud computing as Internet-delivered services. Data storage, servers, databases, networking, and software are examples. New scientific methodologies are crucial. They let people access cloud-based programmes like email, Google educational apps, and others from anywhere, as well as database and social networking apps to exchange knowledge and improve information flow in the organisation.

Data centres benefit and suffer from cloud computing. Security, privacy, and information management must be weighed against cost reductions, productivity increases, accessibility, and flexibility. Cloud computing is a new approach to delivering services and resources, not a new technology (Nodira et al., 2023).

Cloud computing lets customers use Internet-hosted computing resources like storage, processing power, and software applications. Nigeria's Nigerian Stored Products Research Institute (NSPRI) improves agricultural product quality and safety. Cloud computing can improve NSPRI's knowledge exchange, which is crucial in research organisations.

Cloud computing gives researchers access to many computing resources from anywhere to anyone with an internet connection (Hazra et al., 2023). NSPRI researchers can use data storage and analysis tools without buying expensive hardware or software. This reduces research costs and improves knowledge sharing.

Cloud computing can improve NSPRI researcher collaboration. Researchers can cooperate remotely by putting data and applications on the cloud. This can boost research speed, quality, and data security. NSPRI must evaluate its information technology (IT) infrastructure to identify which cloud computing options are suitable for its knowledge sharing practices. NSPRI must also train researchers on cloud computing and secure research data.

Cloud computing can boost NSPRI's knowledge sharing efficiency, cooperation, and security. NSPRI can lead Nigerian agricultural research with cloud computing.

1.1 Statement of the Problem

The Nigerian Stored Products Research Institute (NSPRI) is a research organization that focuses on improving the quality and safety of stored agricultural products in Nigeria. Knowledge sharing is an essential aspect of research organizations, and NSPRI recognizes the need to improve its knowledge sharing practices to enhance the quality and efficiency of its research. However, NSPRI faces several challenges in achieving this objective, including limited access to computing resources, inadequate collaboration among researchers, and inadequate security measures to protect research data. NSPRI researchers currently face challenges in accessing the computing resources needed to conduct their research, including data storage and analysis tools. This limits their ability to conduct research efficiently and effectively, leading to delays and increased costs. Additionally, the lack of collaboration among researchers due to geographic and logistical barriers further hinders efficient knowledge sharing practices. Thus, the problem statement is that NSPRI's current knowledge sharing practices face several challenges that limit the quality, efficiency, and effectiveness of its research. The organization needs to integrate cloud computing into its knowledge sharing practices to address these challenges and improve its research outcomes.

1.2 Objectives of the Study

The main objective of the study is to investigate the integration of cloud computing into knowledge sharing practices among Nigerian Stored Products Research Institute (NSPRI) researchers. The specific objectives were to:

i. investigate the current knowledge sharing practices among NSPRI researchers,
ii. examine the attitudes of researchers towards cloud computing,
iii. examine the potential barriers to adoption among NSPRI researchers,
iv. determine the potential benefits of integrating cloud computing into knowledge sharing practices among NSPRI researchers,
v. establish the challenges associated with integrating cloud computing into existing knowledge sharing practices among NSPRI researchers, and
vi. identify suggestions for improving the integration of cloud computing into knowledge sharing practices in NSPRI.

1.3 Significance of the Study

The study on integrating cloud computing into knowledge sharing practices among Nigerian Stored Products Research Institute (NSPRI) researchers benefits NSPRI, the Nigerian agriculture economy, and others. First, the study can assist NSPRI researchers in accessing computing resources, cooperating on research, and securing data. Cloud computing can improve data security, collaboration, and computer resource access for knowledge sharing. Second, improving NSPRI researchers' quality, efficiency, and efficacy in knowledge sharing can boost Nigerian agricultural research. Cloud computing can improve Nigerian agricultural research by making knowledge sharing possible among researchers. This may inspire new strategies to improve Nigeria's stored agricultural products quality and safety. Thirdly, Nigerian, and international research institutions may adopt cloud computing after the study. The study can encourage other research institutions to adopt cloud computing for knowledge exchange, leading to more creative solutions for collaborative research. The study on integrating cloud computing into knowledge sharing practices among NSPRI researchers can advance agricultural research in Nigeria, improve NSPRI's research efficiency and effectiveness, and influence cloud computing adoption in research organisations in Nigeria and beyond.

2. LITERATURE REVIEW

Das and Inuwa (2021) define cloud computing as the creation and dynamic scaling of services over the Internet. Akinbola (2023) defines cloud computing as Internet-delivered services. Data storage, servers, databases, networking, and software are examples. This has facilitated stakeholders in leveraging cloud-based applications, such as email, Google educational tools, and similar platforms, irrespective of

temporal or geographical constraints. Additionally, it has enabled the utilization of databases and social networking applications to foster knowledge dissemination and enhance information circulation within the organizational framework.

The use of cloud computing promises to alter data and information management. Therefore, many organisations are researching cloud computing to improve knowledge-sharing. Cloud computing can help NSPRI researchers interact, exchange information, and access data from any internet-connected location. According to several studies, cloud computing may help researchers share knowledge. Hayat et al. (2023) discovered that cloud-based knowledge-sharing systems could improve researcher knowledge-sharing and research outputs. Hedayati and Schniederjans (2023) found that cloud computing could improve healthcare researchers' information exchange and efficiency.

Cloud computing also offers a safe, scalable knowledge sharing platform. Telo (2023observed that cloud computing could safeguard researcher information exchange and reduce data breaches and cyberattacks. Cloud computing also allows academics to access and exchange enormous amounts of data without expensive gear and infrastructure (Telo, 2023). Cloud computing in knowledge sharing poses numerous issues. Ojo (2023) observed that researchers may have trouble integrating cloud-based knowledge-sharing platforms into their processes. Data privacy and security issues may potentially deter cloud-based knowledge-sharing systems.

NSPRI research on cloud computing and knowledge exchange is scarce. Hu et al. (2023) indicated that researchers needed better knowledge-sharing practices and that cloud-based platforms could help. Researchers need training and awareness-raising to utilise cloud-based knowledge-sharing systems, the study found. The use of cloud computing may improve information sharing among NSPRI researchers, according to the literature. However, researchers need training and awareness-raising to integrate cloud computing into their workflows and practices.

3. METHODOLOGY

This research adopted a qualitative approach, using in-depth interviews to gain a deeper understanding of the current knowledge sharing practices among NSPRI researchers, their attitudes toward cloud computing, and the potential benefits and challenges associated with integrating cloud computing into their existing practices. The study used purposive sampling to select participants. Participants were selected based on their role as researchers at NSPRI, their experience with knowledge sharing practices, and their level of familiarity with cloud computing tools. A total of 15 participants were recruited for the study. Data was collected through in-depth interviews with NSPRI researchers. The interviews were conducted face-to-face and online. The interview instrument was semi-structured, allowing for flexibility in the questions asked while still ensuring that the research question is addressed. The interviews were audio-recorded and transcribed verbatim for analysis. Field notes were also taken during the interviews to capture nonverbal cues and other contextual information. The data collected from the interviews were analysed using qualitative content analysis. The research adhered to ethical guidelines for research involving human subjects, including obtaining informed consent from participants, ensuring confidentiality and anonymity of participants, and ensuring that the research does not cause harm to participants. The study's limitations included the potential for response bias and the limited generalizability of the findings to other organisations outside NSPRI. Additionally, the study's findings may be limited by the availability of data on cloud-based knowledge-sharing platform usage among NSPRI researchers.

Table 1: Participants and their Departments

NSPRI Research Departments	Code Assigned to Participant
Post-harvest Engineering Research h Department	R1, R2, R3,
Research operations	R4, R5, R6,
Perishable Crop Research Department	R7, R8, R9,
Durable Crop Research Department	R10, R11, R12,
Agric Outreach and Extension	R13, R14, R15,

4. RESEARCH FINDING PRESENTATION AND INTERPRETATION

4.1 Knowledge Sharing Practices among NSPRI researchers

On knowledge sharing practices among NSPRI researchers, R2 submitted that:

> "Researchers mainly share knowledge through email and in-person meetings, he further stated that knowledge is also shared using professional conferences and workshops to learn about the latest research and developments in their field".

Another participant submitted that:

> "R7 also submitted that: "Sometimes researchers also share documents through a shared drive or file sharing service, publications of research articles in academic journals and social media and online communities*".*

These responses highlight the current methods of knowledge sharing that are in use at NSPRI. The use of email and in-person meetings, professional conferences, and workshops suggests that there may be some limitations to knowledge sharing due to geographic or time constraints. Additionally, the use of a shared drive or file sharing service and social media suggests that there may be some recognition of the benefits of cloud computing for knowledge sharing.

4.2 Attitudes Towards Cloud Computing and Potential Barriers to Adoption

The respondents expressed their thoughts about how cloud computing could be a game-changer for our knowledge sharing practices. R1 asserted that:

> "Cloud computing enables faster deployment of new research and fosters innovation," while acknowledging potential barriers such as privacy issues in its adoption".

Participant R3 said:

> "One of the major attractions of cloud computing is its potential to reduce costs. Cloud services often operate on a pay-as-you-go model, eliminating the need for significant upfront investments in hardware and infrastructure." Security concerns were expressed, stating, "Security concerns are a top concern for many organizations considering cloud adoption. Issues such as data breaches, unauthorized access, and compliance with data protection regulations can deter some from moving their sensitive data to the cloud."

Others expressed worries about security and privacy, specifically in handling sensitive research data.

> "Issues such as data breaches, unauthorized access, and compliance with data protection regulations can deter some from moving their sensitive data to the cloud," said R4.

R10 and R9 voiced skepticism regarding cloud computing, emphasizing that:

> "We have concerns about remote access to data and applications. However, we acknowledge its potential for promoting collaboration among researchers."

Lastly, R12 conveyed interest in using cloud computing, stating that:

> "It is interesting as long as it's easy to use and doesn't require a lot of technical knowledge."

These responses highlight differing attitudes towards cloud computing among NSPRI researchers. While some researchers see potential benefits, such as improved knowledge sharing practices or increased efficiency, cost effective to use, and helping to increase research output others have concerns about security and privacy or potential technical barriers.

4.3 Benefits and Challenges of Integrating Cloud Computing into Existing Knowledge Sharing Practices Among NSPRI Researchers.

R14 stated that:

> *"*Cloud computing makes it easier for researchers to access and share information across different locations and devices".

R2, R5, and R6 also had similar views stating that:

> "Cloud computing help in bridging the gap between researchers working on similar projects and improve collaboration*".*

Furthermore, R11, R13, R15 said that:

> "Cloud computing has a lot of benefits such as cost savings and scalability, Innovation and Agility, Accessibility and Collaboration which can aid knowledge sharing practices".

R7, R8, R12, R13 observed that:

> "Security and privacy issues are the challenges in cloud computing especially when it comes to sensitive research data. R1, R3, and R4 echoed their uncertainty on how easy it would be for everyone to learn how to use cloud computing, similarly R2, and R9 share the same thought on how cloud computing could be a big change from our current practices, so it might take some time to adjust".

These responses highlight potential benefits and challenges associated with integrating cloud computing into existing knowledge sharing practices at NSPRI. Benefits may include improved collaboration and increased efficiency, while challenges may include ensuring the security and privacy of sensitive data and developing clear policies for using cloud computing. The ability to access and share information across different locations and devices could improve efficiency and collaboration while saving on costs and therefore scalability could be an important consideration for the institute's budget and resources. These responses also highlight some of the potential challenges or concerns associated with integrating cloud computing into knowledge sharing practices at the Nigerian Stored Products Research Institute. Security and privacy issues, as well as concerns around user-friendliness, could be important considerations when implementing cloud computing. The adjustment period required for such a change may also be a challenge to consider.

4.4 Improving the Integration of Cloud Computing into Knowledge Sharing Practices

R3, R6, R10 emphasized that:

> "Researchers require training and support to comprehend the effective utilization of cloud computing." This sentiment was reiterated by R2, R4, and R7, who suggested, "There should be a designated person or team responsible for overseeing the implementation of cloud computing," underscoring the need for researchers to have a dedicated contact for cloud computing issues. R9, R11, and R12 highlighted the significance of, "Piloting the adoption of cloud computing with a small group of researchers before scaling up".

These responses suggest potential ways to improve the integration of cloud computing into knowledge sharing practices at NSPRI. Providing training and support, designating responsibility for management, and piloting the use of cloud computing before scaling up may all be important considerations for the successful adoption of new technology.

4.5 DISCUSSION OF FINDINGS

The findings suggest that there is a positive perception of the integration of cloud computing into knowledge sharing practices among Nigerian Stored Products Research Institute (NSPRI) researchers

which can yield numerous benefits such as improved collaboration and efficiency. This is consistent with previous studies by Hayat et al. (2023) corroborating how cloud computing can facilitate collaboration among researchers by allowing them to share data and resources in real time, regardless of their physical location.

The studies furthermore emphasized how it can lead to better knowledge sharing and help in avoiding duplication of efforts. Cloud computing can improve the efficiency of knowledge sharing practices by providing a centralized location for data storage, making it easier to access and share information. This can help to reduce the time and effort required for knowledge sharing activities. This finding substantiates the findings of Hedayati and Schniederjans, (2023) In the same vein cloud computing can provide enhanced security for research data by offering features such as data encryption and secure access controls. This can help to protect sensitive information and prevent unauthorized access.

Cloud computing can help to reduce the cost of knowledge sharing practices by eliminating the need for physical storage devices and reducing the need for in-house IT support, Telo (2023). However, on the challenges of integrating cloud computing, some of the challenges raised include data breaches and attacks, also the inability to adapt to the use of cloud computing for knowledge sharing practices. (Ojo, 2023). Cloud computing can provide the NSPRI researchers with the flexibility to scale up or down their computing resources as needed. This can help to accommodate changes in research needs and reduce the risk of overprovisioning or underprovisioning resources (Hu et al., 2023).

Overall, integrating cloud computing into knowledge sharing practices among NSPRI researchers can have numerous benefits, including improved collaboration, increased efficiency, enhanced security, cost savings, improved accessibility, and scalability.

5. CONCLUSION AND RECOMMENDATIONS

In conclusion, the integration of cloud computing into knowledge sharing practices among Nigerian Stored Products Research Institute (NSPRI) researchers has the potential to greatly improve research efficiency and collaboration, while also providing enhanced security and cost savings. The findings suggest that cloud computing can help to overcome many of the challenges associated with traditional knowledge sharing practices, such as physical storage limitations and geographic barriers to collaboration. Based on these findings, the following have been recommended for implementation of the management of NSPRI:

i. implement a cloud-based knowledge sharing platform that can be accessed by all researchers.
ii. provide training to researchers on how to use the cloud-based platform effectively.
iii. developing a formal policy on cloud computing and knowledge sharing to ensure that all researchers are aware of the institution's expectations and protocols.

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