(RESEARCH ARTICLE)

Enhancing accreditation transparency and accountability through electronic data interchange: A comparative study

Osemengbe Oyaimare Uddin [1, *], Susan Konyeha [2] and Glory Nosawaru Edegbe [1]

[1] Department of Computer Science, Edo State University, Uzairue, Edo State Nigeria.
[2] Department of Computer Science, University of Benin, Benin City, Nigeria.

Abstract

This paper explores the implementation of an Electronic Data Interchange (EDI) system to enhance accreditation transparency and accountability within the Nigerian Universities Commission (NUC). EDI systems facilitate automated data exchange between university departments, replacing manual data entry with faster, more accurate, and efficient processes. This study highlights the benefits of EDI in quality assurance and audit processes, including error reduction, real-time monitoring, improved data security, and confidentiality. The research also presents current challenges in the NUC's accreditation process, such as inefficiencies, rigidity, and corruption, proposing EDI as a solution to enhance transparency, flexibility, and effectiveness. The study aims to present a comparative analysis of existing literature on EDI and its potential impact on the Nigerian higher education system.

Keywords: Accreditation; Electronic data interchange; Nigerian Universities Commission

1. Introduction

An Electronic Data Interchange (EDI) system is an automated information exchange system that allows for the electronic transfer of data and information between different departments and units within an organization like a university. The system replaces the traditional manual approach of data entry and processing with an automated process that is faster, more accurate, and more efficient.

According to Mushi and Temu (2021), the use of EDI systems in quality assurance and audit processes has many benefits for universities. For one, it eliminates the need for manual data entry and processing, which can be time-consuming and error-prone. By automating the process, the university can reduce the likelihood of errors and improve the accuracy of its data. Additionally, an EDI system provides real-time monitoring and reporting capabilities, which enables the university to quickly identify any issues that may arise and take corrective action as needed. Another key advantage of an EDI system for quality assurance and audit processes is that it enhances the security and confidentiality of the university's data. The system utilizes advanced encryption technology and access controls to ensure that only authorized personnel have access to sensitive information. This protects the privacy and security of students, faculty, and staff, which is of critical importance in today's digital age.

Overall, the use of an EDI system for quality assurance and audit processes is a significant step forward for both the NUC and universities seeking to streamline their operations, improve their efficiency, and enhance the security and confidentiality of their data. As universities continue to face mounting pressure to ensure the quality of their operations and comply with regulatory requirements, the use of EDI systems is likely to become increasingly important (Sahni and Jain, 2021).

∗ Corresponding author: Osemengbe Oyaimare Uddin

The National Universities Commission (NUC) is the regulatory body responsible for ensuring that Nigerian universities adhere to international academic standards. One of the ways that the NUC does this is through regular inspections of university facilities to ensure that they meet minimum requirements for the provision of academic programs (NUC, 2021). Institutional accreditation is a critical aspect of educational auditing and ensuring quality assurance in Nigerian universities. According to the NUC (2021), institutional accreditation is the process of evaluating an entire institution to ensure that it meets specific standards set by the commission. It involves an evaluation of all aspects of the institution, including its academic programs, faculty, infrastructure, research capabilities, and governance. Institutional accreditation is essential for maintaining the quality of academic programs and ensuring that Nigerian universities are globally competitive.

Concerns persist regarding the Nigerian Universities Commission (NUC) and its effectiveness in overseeing quality assurance within Nigerian universities. Yaqub (2017) underscores the necessity for more thorough inspections, signaling a gap in the current inspection procedures. Moreover, Yaqub (2017) sheds light on allegations of corruption related to institutional accreditation, which has repercussions on the quality of academic programs.

Yaqub (2017) further casts doubt on the efficacy of the NUC's program accreditation process, citing instances where substandard programs secured accreditation through unethical means. Similarly, Adeyeye and Adeyemo (2022) draw attention to the rigid and opaque nature of the NUC's inspection process, suggesting room for improvement in terms of flexibility and transparency.

Addressing these challenges requires a comprehensive overhaul of the accreditation process, as advocated by Yaqub (2017). This involves aligning accreditation procedures with contemporary developments across various fields and implementing transparent guidelines.

Hence the motivation for this work which is proposing an innovative solution such as an electronic data interchange, which will offer avenues for enhancing transparency and efficiency in the university system. Integration of such technology into the NUC's quality assurance framework could bolster oversight and combat issues of corruption and inefficiency, as supported by Smith (2021) and Jones (2023). By embracing these strategies, the NUC can work towards ensuring the integrity and quality of higher education in Nigeria.

The core aim of this research work therefore is to present a number of studies that have discussed and attempted to address this problem, addressing their strengths and weaknesses.

2. Related Works

The discussion on related works presents various insights into electronic data interchange for quality assurance and audit in the university system highlighting the current challenges and proposed solutions. However, gaps remain when considering the project topic of electronic data interchange (EDI) for quality assurance and audit in university systems especially as it relates to university accreditation. In this section, we present a comparative discussion, identifying these gaps in relation to the project topic.

2.1. Quality Assurance Frameworks and Challenges

Tolmachev et al. (2021) and Jami & Muharam (2022) emphasize the need for unified criteria and standard guidelines for quality assurance in higher education. They point out the challenges of inconsistent assessment methods and the need for improved infrastructure and faculty training.

- Kobets et al. (2021) propose a service-oriented architecture that integrates various factors such as student feedback, lecturer ratings, and education programs for better decision-making.
- Baharun et al. (2021) and Sena (2020) focus on the qualitative understanding of quality assurance activities and their benefits.
- Pujiati et al. (2021) suggest using balanced scorecards and ISO standards for performance measurement.
- Kahsay et al. (2012) advocate for a mixed method involving contingency and institutional theories for quality assurance.

These works primarily discuss frameworks and methods for quality assurance without delving deeply into the automation and integration aspects of EDI. There is a lack of focus on how automated EDI can address the inconsistencies in assessment methods and provide real-time, standardized data for quality assurance.

2.2. Data Exchange and EDI

Abdellatif et al. (2021) highlight the use of blockchain technology for secure medical data exchange, emphasizing privacy and security concerns.

Oleiwi (2023) discusses the benefits of EDI in eliminating paperwork and enhancing information interchange without human intervention, though noting the high computation costs.

Hussien et al. (2023) and Sambetbayeva et al. (2022) propose lightweight cryptographic solutions and AI algorithms for information security and optimization.

While these works discuss EDI and data exchange, they primarily focus on sectors other than education or do not fully address the specific requirements and challenges of university accreditation systems. There is limited exploration of how EDI can be tailored specifically for quality assurance in education, including integration with existing academic information systems and compliance with accreditation standards.

2.3. Accreditation Processes and ICT Integration

Muthmainnah et al. (2022) use COBIT 5 to enhance academic information technology, highlighting the importance of privacy in data interchange.

Paucar-León et al. (2022) propose a digital preservation model for intellectual property quality assurance.

Younus et al. (2022) build a smart education system using AI for efficient data interchange among institutions.

There is a need for more comprehensive models that integrate EDI with existing accreditation processes, addressing the unique data requirements and compliance challenges. The potential of EDI to streamline audit processes, ensure data integrity, and facilitate continuous quality improvement in the context of university accreditation is not fully explored.

2.4. Nigerian Higher Education Context

Several studies focus on the Nigerian context, discussing challenges such as inadequate funding, lack of trained personnel, and infrastructural deficiencies (e.g., Anho (2011), Oladipo (2010), Ajayi et al. (2013)).

Okebukola (2014) and Olayemi (2015) emphasize the role of ICT, including EDI, in improving data management and quality assurance.

While these studies highlight the challenges and potential of ICT in Nigerian universities, they do not provide specific solutions for integrating EDI into accreditation systems to overcome these challenges.

2.5. Summary of Studies on EDAs

Table 1 Summary of Studies on EDAs

Focus On Nigerian Higher Education Context	EDI Frameworks For Quality Assurance	Data Exchange And EDI	Accreditation Process And ICT Integration
Anho (2011), Oladipo (2010) Ajayi et al. (2013)). Okebukola (2014) Olayemi (2015)	Tolmachev et al. (2021) Jami & Muharam (2022) Kobets et al. (2021) Baharun et al. (2021) Sena (2020) Pujiati et al. (2021) Kahsay et al. (2012)	Abdellatif et al. (2021) Oleiwi (2023) Hussien et al. (2023) Sambetbayeva et al. (2022)	Muthmainnah et al. (2022) Paucar-León et al. (2022) Younus et al. (2022)

The focus on traditional quality assurance mechanisms and the role of supervisory authorities often overlooks the transformative potential of automated EDI systems for real-time monitoring and decision-making.

Conclusively, the related works provide valuable insights into various aspects of quality assurance, accreditation, and ICT integration in higher education. However, significant gaps remain in the context of automated EDI for quality assurance and audit in university systems. These gaps include:

Limited focus on the automation and integration of EDI with existing academic and accreditation systems.

Insufficient exploration of EDI's potential to provide standardized, real-time data for quality assurance.

Lack of tailored solutions for the unique requirements and challenges of university accreditation, particularly in developing regions such as Nigeria.

Addressing these gaps involves developing comprehensive EDI models that integrate seamlessly with academic information systems, ensuring data integrity, privacy, and compliance with accreditation standards, and leveraging the full potential of ICT to enhance quality assurance processes.
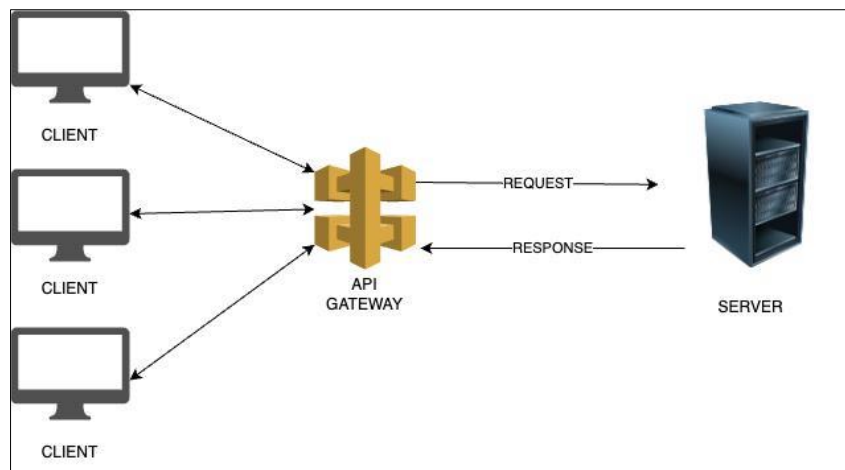
3. An EDI Framework

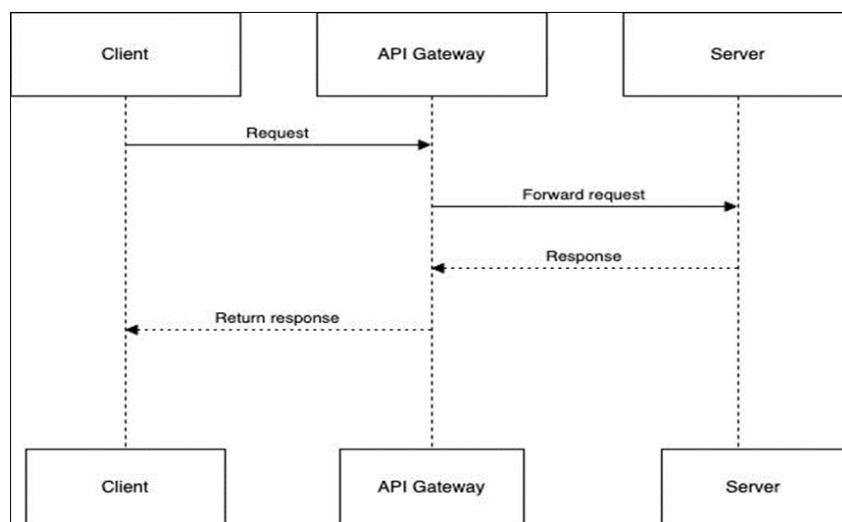**Figure 1** Architecture Diagram

Figure 2 Architecture Sequence Diagram

The architectural design of an EDI framework involves a client-server architecture where the university accreditation system serves as the server, and various stakeholders such as administrators, faculty members, and accreditation bodies

interact with the system through client interfaces. The system is designed to be scalable, secure, and capable of handling large volumes of data exchanges.

3.1. An EDI Schema

The schema diagram illustrate the flow of data within the system, including inputs from stakeholders, processing steps, and outputs. It shows how data moves through different components of the system, such as data collection, validation, analysis, and reporting. The diagram also highlight any external systems or data sources that interact with the accreditation system.

3.2. Use Case Model for an EDI

The use case model describe the different interactions between users (actors) and the system, focusing on the functionalities and features that each user role requires. Use cases include tasks such as submitting accreditation documentation, reviewing accreditation criteria, generating reports, and conducting audits. Each use case is documented with detailed descriptions, preconditions, postconditions, and possible alternative scenarios.
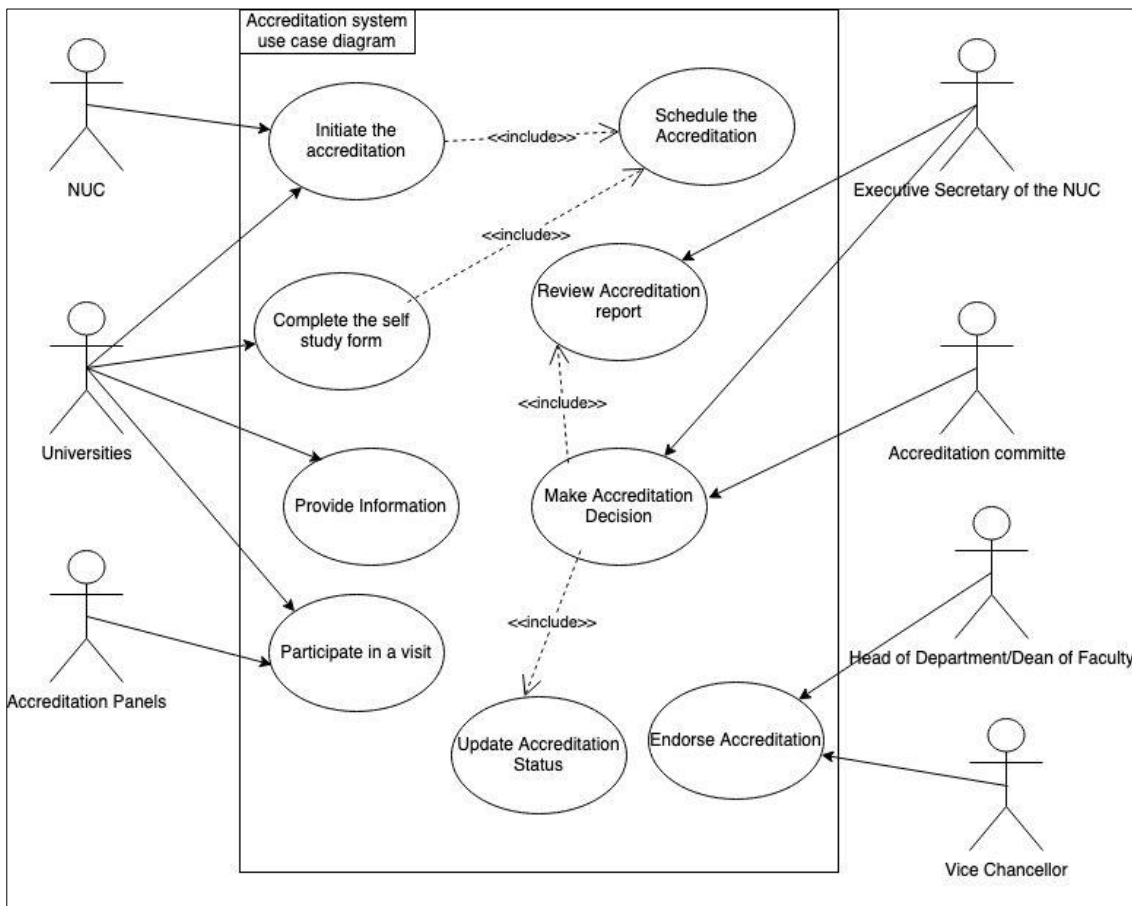

Figure 3 Use Case Diagram for the New System

3.3. Database Design for an EDI

The database design specifies the structure and organization of the database used to store accreditation-related data. It include tables for storing information about universities, accreditation criteria, documentation submissions, audit findings, and other relevant entities. The design ensures data integrity, consistency, and security, with appropriate indexing and normalization techniques applied to optimize performance.
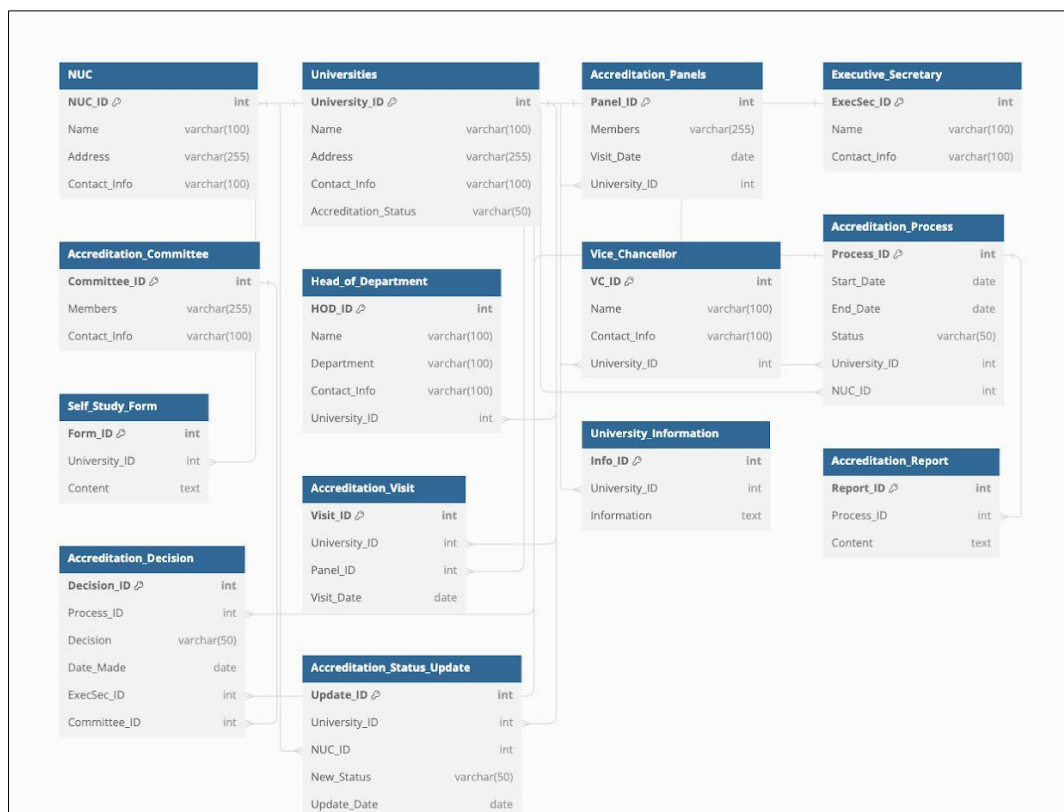
Figure 4 Database Schema for the New System

4. Conclusion

This study has highlighted a number of related works that proposes the use of EDI in NUC operations. The utilization of EDI has the potential to make NUC oversight function transparent, flexible and efficient thereby improving academic standards and global competitiveness of Nigerian universities. Moreover, the EDI system has real-time monitoring/reporting capabilities for quicker issue identification/resolution thus reducing downtime and maintaining regulatory compliance at all times. This approach can be beneficial in terms of increased efficiency as well as improved accountability. EDI systems, when implemented could incorporate advanced encryption technologies and user access controls that ensure the protection of sensitive information such as student's records from unauthorized intrusion or hacking by safeguarding their privacy rights. This higher level of network security is critical in modern digital age where data breaches are rampant along with cyber threats. Also, taking up EDI is synonymous with international education norms. This is necessary to promote the interrelationship, attract foreign students and market Nigerian universities on world stage.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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