
Towards the Development of An Enhanced Certificate Verification System for West African Institutions

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ABSTRACT

The current approach adopted for certificate verification in Nigeria and most West African countries rely on paper-based documentation, which makes the process extremely unreliable and clumsy, as employers need to contact the issuer of a certificate to confirm that the award is legitimate and up to date. Several researchers and vendors have come up with different approaches to using blockchain technology. However, preliminary surveys reveal that the adoption of blockchain technology could be hindered by an inadequate power supply, poor ICT infrastructure as well as poor funding. Therefore, this research explores the enhancement of the current solution to guarantee credibility and sustainability. Thus, this research seeks to propose an enhanced certificate verification system for higher educational institutions in West Africa.

Keywords: Certificate, Verification, System, West Africa, Institutions, Nigeria

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I. INTRODUCTION

Credential fraud, particularly, the forgery of academic certificates has become a huge challenge and can go undetected without proper checks. In a study carried out by the ADP, across 2-6 million background checks, it was discovered that 23% of the candidates had falsified their credentials, while 43% of resumes contained embellished education history (Rajiv, 2015). Currently, the global demand for university education exceeds the capacity of the existing universities. This shortfall causes higher educational institutions to raise their cut-off marks to admit a limited number of students. Consequently, students who do not meet the cut-off mark, get frustrated and choose to purchase fraudulent certificates to gain admission into Higher Institutions or to gain employment. Academic certificates are highly valued as they serve as an indicator of the human capital capacity of their bearers (Hyun, 2010).

Hence the challenge of fake academic certificates is a special global challenge in today's digital age (Mugo,2022). Furthermore, due to the existence of advanced and economical scanning and printing technologies, the forgery of certificates has increased. Presently in most West African countries, academic certificates are issued in a printed-paper format. However, the paper-based academic certificate is prone to damage and loss, it leaves the student looking for the same copies at a cost and time consumed to process the same.

The disease of forging academic certificates has infected every sphere of the public globally. Unfortunately, in underdeveloped countries, particularly in Africa, society attaches as much value to educational certificates as to the skills one has (Unah, 2017). This obsession with certificates has led to a culture in which school leavers and graduates are more concerned about attaining good grades rather than acquiring the relevant skills and competencies which they require to practice as professionals on graduation. This craze for certificates has infiltrated every sphere of life in West Africa, particularly in Nigeria, where several politicians have been embroiled in scandals involving the presentation of fake certificates before their appointment into office. The issue of fake academic certificates is not a Nigerian issue alone but has spread across Africa.

This is evidenced by the sack of nearly 10,000 civil servants by the Tanzanian President in 2017. The report from the Tanzanian government revealed that most of those in public service had been using the certificates of their relatives, while others had fake certificates that were not issued by the authorised institution's records. A critical question that one needs to ask is what impact does this scandal have on the integrity of the academic system in Africa and elsewhere? For academic institutions, fake degrees are associated with reputational risk (Barrie, 2022). It damages the reputations of such universities and affects the productivity of students and graduates who falsify their credentials.

For a country, fake academic qualifications can lead to a lack of accountability, insufficient regulatory checks, increased bureaucratic interferences, and promote systemic corruption, as Bakshi revealed (Bakshi, 2021). For employers, hiring individuals with fake qualifications poses reputational damage and could lead to loss of revenue and corruption. The most perturbing implication for the issuance of fake academic qualifications is that it destroys the quality of education.

The current approach adopted for certificate verification in Nigeria and most West African countries rely on paper-based documentation, which makes the process extremely unreliable and clumsy, as employers need to contact the issuer of a certificate to confirm that the award is legitimate and up to date. This usually takes days and sometimes is never responded to. Institutional verification is handled by the records office of the applicant's university or sometimes it is outsourced to a third-party company. This makes the process last for a longer time and expensive without trained and academically qualified staff to provide quality service delivery. There are cases where the issuer may even shut down or lose the records, making the verification of the credential almost impossible. Several researchers and vendors have come up with different approaches to using blockchain technology. However, preliminary surveys reveal that the adoption of blockchain technology could be hindered by an inadequate power supply, poor ICT infrastructure as well as poor funding.

Other initiatives provide extensive code repositories and documentation publicly online, allowing third parties to adapt the solution to their own needs which is not very safe. Therefore, this research explores the enhancement of the current solution to guarantee credibility and sustainability

Hence, there is an urgent need for institutions and employers to verify the academic certificates of their prospective students or employees to ascertain their validity. Therefore, this research aligns with research focus of the Open Distance Learning Institutions and seeks a more secure means of managing academic certificates, where forgery, damages and losses are minimal. Motivated by the desire to safeguard education providers against possible lock-in effects from such open- models as well as to ensure sustainability, this research explores the enhancement of the existing solutions, with a view to guarantee credibility and sustainability. Thus, this research seeks to propose an enhanced certificate verification system for higher educational institutions.

I.1 Statement of the Problem

Higher education institutions lack a reliable means of verifying the authenticity of academic certificates. Certificates issued in the Universities in the West African sub-region are predominantly paper-based and thus can be easily cloned and their integrity is difficult to verify. Several universities and blockchain companies are experimenting with blockchain-based education credentials for their students and employees. In practice, for two credentialing solutions, core building blocks have been open-sourced. Both initiatives provide extensive code repositories and documentation publicly online, allowing third parties to adapt the solution to their needs which is not very safe. Motivated by the desire to safeguard education providers against possible lock-in effects from such open- models as well as to ensure sustainability, this research explores the enhancement of the current solution to guarantee credibility and sustainability.

I.2 Objectives of the Research

This research work is the first phase and seeks to review existing certificate verification systems with a view to proposing an enhanced academic certificate verification system for improving the authentication of academic certificates, particularly in Universities within the West African sub-region. Specifically, the study seeks to:

- i. Analyze the existing academic certificate verification system to identify factors that prevent it from being effective.
- ii. Formulate effective smart contracts to address the identified research gap

I.3 Research Questions

The research questions to guide this study are:

- i. What are the existing systems for academic certificate verification?
- ii. What are the factors preventing the effective authentication of academic certificates?
- iii. How can the performance of the existing certificate verification systems be improved?

2. REVIEW OF RELATED WORKS

Globally, the blockchain technology has been employed in the educational space. A good number of the blockchain-enabled systems developed till date are for verifying certificates and minimizing the cases of fake certificate. University of Nicosia (UNIC) provides the bitcoin blockchain-enabled platform (Blockcert) for owners to validate the authenticity of their certificates. However, they rely on the issuing institution as they are unable to authorize their potential employers from viewing their certificates. (Perez. Y. 2015 - Bond. F et al, 2015).

The Knowledge Media Institute (KMI) of the Open University UK (OUK), collaborates with the University of Ghent and the University of Texas and employs blockchain-enabled platform that stores and protects certificates. However, this system is complex and users require the support of a third party, who serves as a middle person (Domingue, J 2017). Another blockchain-enabled certificate verification system is the SmartCert. This system employs cryptographic marking of instructive authentication. However, it is prone to assault by gatecrashers. (Tarek ,K et al, 2017)

The RecordKeeper is another blockchain-based system for checking the authenticity of certificates. Although it functions admirably as a private blockchain and is secure, yet when made accessible as a public blockchain, this is not guaranteed (Recordskeeper 2018). MIT Media lab utilizes BlockCerts to provide advanced certificate authentication. Although this is accessible and provides good user experience, however it is susceptible to counterfeiting. (MIT Media Lab., 2016)

Several researchers and vendors have come up with different approaches to using blockchain technology. However, preliminary surveys reveal that the adoption of blockchain technology could be hindered by an inadequate power supply, attack from hackers poor ICT infrastructure as well as poor funding. Other initiatives provide extensive code repositories and documentation publicly online, allowing third parties to adapt the solution to their own needs which is not very safe. Consequently, this study explores the enhancement of the current solution to guarantee credibility and sustainability.

A good number of the blockchain-enabled systems existing in the West African higher institutions are still at the exploratory phase and are not scalable. All the exiting systems proposed have their benefits and drawbacks. These systems had issues of scalability, privacy and increased storage capacity. For this reason, this research will adopt a contextualized approach which takes into cognizance the diversity of learners from different backgrounds, thus building a cost-effective and sustainable solution. On the other hand, a good number of the existing blockchain-enabled certificate verification system studies have been too expensive and inaccessible to the educational institutions and examination bodies. The proposed system is more scalable and has increased storage capacity. It enhances the security of the academic certificates and builds credibility.

Therefore, there is an urgent need for institutions and employers to verify the academic certificates of their prospective students or employees to ascertain their validity. Therefore, this research aligns with research focus of the Open Distance Learning Institutions and seeks a more secure means of managing academic certificates, where forgery, damages and losses are minimal.

Motivated by the desire to safeguard education providers against possible lock-in effects from such open-models as well as to ensure sustainability, this research explores the enhancement of the existing solutions, with a view to guarantee credibility and sustainability. Thus, it seeks to develop an enhanced certificate verification system for higher educational institutions.

3. PROPOSED RESEARCH METHODOLOGY

Research Method

The Agile research method which is most suited for iterative development would be employed in this research.

Research Design

This research will employ a survey research design which will consist of both qualitative and quantitative approaches to research in order to obtain in-depth data that would give credence to the study.

Scope of the Study

The study will focus on validating the authenticity of academic certificates issued within the universities in the Nigeria and one other Francophone university in the West African sub-region.

Instrument for Data Collection

There would be questionnaires for all categories of participants in the study – the students, the academic staff and the administrative staff while the interview would be for a focus group to be identified from the questionnaire responses. The instruments (questionnaires) would consist of semi-structured open-ended and close-ended questionnaires. The semi-structured open-ended questionnaire will be followed by interview sessions.

Validation of Instrument for Data Collection

The instruments would be validated before use to ensure that they align with the research questions using data collected from a pilot study. The reliability of the questionnaires will be evaluated by subjecting the data to internal consistency/reliability measures.

Data Collection Procedure

The questionnaires would be administered by the research assistants using Google forms drawn from the target population and their responses would be harvested .

Data Analyses Procedures

The semi-structured open-ended questionnaires as well as the interview sessions will be analyzed qualitatively, while the close-ended questionnaires would be analyzed quantitatively. The quantitative data to be obtained in the study will be tabulated, analyzed and interpreted using the descriptive statistics like rank, and weighted mean for presentation and demonstration of the results for the various participants.

4. EXPECTED RESULTS

The result of developing an enhanced certificate verification system are as follows:

- i. This application will be used by institutions for the efficient design, processing issuance, storage and verification of academic certificates
- ii. The application will resolve the standardization issue and provide a reliable platform where institutions can easily verify the authenticity of candidates for admission or employers
- iii. It will strengthen the collaboration between national and international institutions
- iv. It will reduce the time and cost of academic certificate authentication.
- v. It will facilitate the task of the Examination bodies such as West African Examination Council (WAEC), National Business and Technical Examinations Board (NABTEB) as well as the National Universities Commission (NUC).

5. INNOVATION: HOW DIFFERENT IT IS FROM OTHER OR EARLIER PROJECTS?

This is ground-breaking research, that will adopt a user-friendly contextualized approach which takes into cognizance the diversity of learners from different backgrounds, thus building a cost-effective and sustainable solution. On the other hand, a good number of the existing blockchain-enabled certificate verification systems have been too expensive and inaccessible to the educational institutions and examination bodies. The proposed system is more scalable and has increased storage capacity. It enhances the security of the academic certificates and builds credibility.

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