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PITFALLS BEDEVILING ADMINISTRATION AND MAINTENANCE OF ELECTRONIC RECORDS IN KENYAN UNIVERSITIES

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Abstract: *In higher education institutions such as universities, educational records are important assets and must be managed appropriately. The purpose of this study was to understand the pitfalls bedeviling the administration and maintenance of electronic records in Kenyan state universities perspective with a specific objective to determine the problems encountered in the existing electronic academic records management systems in public universities in Kenya, The study was anchored on The Big Bucket Theory. The study adopted descriptive statistics design method. The target population was drawn from; Registrar Academic Affairs, Deans of students' affairs, Deans of schools/Faculties, Chairmen of Departments, Librarian, Departmental Examination Officers and Lecturers from Masinde Muliro University of Science and Technology-Kakamega. The sample population size for this study was obtained using Slovin's formula n=N/ (1+Ne^2). The researcher sampled at least 150 respondents using purposive sampling technique. Data collection was done through questionnaires and interviews. The primary analysis of the collected data was done using descriptive statistics. Respondents cited challenges such as a lack of documented manuals, archiving policies, inadequate computer terminals, difficulties in locating records and retention options, inadequate manual classification, and lack of security. Blockchain is one of the emerging trends in records management and should be prioritized and practiced to make electronic records management easier.*

Keywords: *blockchain, digital records, data security, single point of failure*

INTRODUCTION

In the age of the fourth industrial revolution (Industry 4.0), various information technologies such as artificial intelligence (A.I), machine learning (M.L), augmented reality (AR), big data analysis and blockchain technology plays an important role. It plays a key role in fostering a diverse economy. The knowledge-based economy (education sector) is no exception. It is considered part of the Fourth Industrial Revolution since the invention of the steam engine, electricity and information technology (Chung and Kim 2016) and (Schwab 2017). This disruptive technology age could have profound implications for the governance of nations, the functioning of institutions, the operation of commercial enterprises, education and our daily lives in the 21st century. It has the potential to change the current Internet from "the Internet of information exchange" to "the Internet of value exchange.

Blockchain is the core technology used to create the cryptocurrency Bitcoin by maintaining an immutable distributed ledger across thousands of nodes, proposed by Satoshi Nakamoto in 2008 (Nakamoto, 2008). Blockchain technology is also known as distributed ledger technology. Blockchain technology is expected to revolutionize the way commerce, industry, and education work, facilitating the rapid development of a knowledge-based economy on a global scale. Blockchain is an interesting technology that promises to transform contracts, processes, business and financial models into digital codes that are stored and shared on immutable distributed ledgers and identified and verified by cryptographic signatures (Beck et al. 2016).

Blockchain design components and business outcomes differ from traditional technologies and business models because the infrastructure is decentralized and relies on peer-to-peer information sharing. Business value is generated collectively by nodes and collaboration within and between organizations should be a technology. (Beck and Müller-Bloch, 2017). Implementing blockchain into existing ecosystems requires simultaneous consideration of many factors: IT infrastructure, inter-organizational governance, and social interaction (Glaser, 2017). For example, applying blockchains requires consideration of technical blockchain limitations (such as transaction recording delays) and performance metrics of various blockchain designs (Walsh et al., 2016; Xu et al., 2017).At the same time, requirements for blockchain interoperability with other systems, user behavior and regulations can influence the outcome of blockchain projects (Zavolokina and Schwabe 2018). Furthermore, blockchain integration and connectivity between nodes is not limited to one organization and requires collaboration between organizations (Fridgen, Schweizer, Regner and Urbach, 2018; Oliveira et al., 2018). The basis of blockchain technology is a distributed ledger that acts as a database and stores data on the history of transactions involving different agents. It is continuously examined by a team of agents (chosen according to different policies depending on the application domain). The results of each check are passed to the network for storage in blocks. One block is added to the ledger at a time, creating a chain that is cryptographically linked. Block manipulations and order changes are quickly detected. A blockchain is a type of block technology that is described as a collection of links, with each link carrying a sequence of transactions. With the help of this technology, your network can take advantage of decentralized, immutable data storage. As a common ledger, it keeps track of all transactions. (Yli-Huumo et al., 2016) and can be applied to provide distinguishing features. Blockchain is basically a distributed database of records that can contain any type of data. Data such as deals, contracts and events. All information processing occurs in a peer-to-peer network managed in chronological order in digital blocks.

Kim et al., (2021) propagates every transaction to every node in the network. A node checks transactions before dividing them into blocks. A hash is used to identify each block. A value that is cryptographically unique and calculated from the contents of the blocks. Blocks are linked because they contain a reference to the previous block's hash. This blockchain is thus a record of transactions or a public ledger shared by all nodes in the network. Areas where this technology can now be applied in today's society include governance, institutional functions, commerce, industry, gaming and gambling, food industry, supply chain management, real estate, media and content distribution, and marketing. We cover forecasts, the labor market and the Internet of Things. , e-voting and agriculture, digital identity and authentication and more. In Canada, blockchain was implemented at the Royal Bank to decentralize the management of capital markets and healthcare data. In February 2016, Nasdaq and the Republic of Estonia developed the e-Residency platform, a blockchain-based electronic voting service that allows shareholders of companies listed on the Nasdaq Tallinn Stock Exchange to vote at shareholder meetings. In the US, the UBITQUITY SaaS blockchain platform offers a simple user experience for security recording, tracking and transmission. The company helps real estate, real estate and mortgage companies benefit from cleaner property records, faster searches for future properties, and greater

reliability and transparency. In African countries, blockchain technology was implemented by Bitland Company in Ghana, which created Africa's first blockchain-based land registry system. The project was piloted in 28 communities in Kumasi, a metropolitan area in southern Ghana. This system uses a public blockchain network. In February 2018, the International Criminal Police Force (Interpol) partnered with online payment provider VoguePay to develop a blockchain-based crime-fighting information portal called InterPort in Nigeria. Here in Kenya, an early blockchain-based education system was developed by its IBM researcher and launched in Mombasa in 2015-2016. The system used blockchain technology to biometrically identify students and track their educational progress. In January 2018, IBM and Maersk announced the formation of a global joint venture to apply blockchain to shipping logistics, focusing on shipping routes from Mombasa, Kenya to Rotterdam, Netherlands. IBM Research Africa Lab is partnering with its Watson Health business unit to build a blockchain-based digital health exchange where patients become owners of their health data. For example, at the end of August 2018, the first pilots of this technology took place at the Lwala Community Alliance Tier 3 Health Unit and its referral hospital and Tier 4 Health Facility at a Migori Hospital in Migori County. Gresch, Rodrigues, Scheid, Kanhere and Stiller presented UZHBC, a blockchain system at the University of Zurich that manages diplomas taking into account multiple stakeholder requirements. Additionally, efficiency and transparency can be achieved between educational institutions, students, and employment agencies by sharing student records through the blockchain system for counseling recommendations. According to Makwae, E. N. (2021) a record can be defined as information created, obtained and retained by an organization or person as evidence, pursuant to a legal obligation, or as part of a transaction. A student research project or a transcript is therefore the official presentation of all the results achieved in a course of study. The proof of learning includes, among other things, a complete list of all courses, the credit points achieved in the courses and the average grade (GPA). For example, every student enrolled at a university has performance data in the university database. The official proof of these achievements is referred to as an academic certificate or transcript and covers the entire academic career at the university. Most colleges and universities today use manual systems with many pitfalls to develop and maintain academic performance. These include the lack of a positive records management policy, negative employee attitudes towards records management, lack of retention and disposal plans, and inadequate training of personnel responsible for records. There are reports of missing student records at universities in Africa and around the world. The university's computerized records system suffers from unavailability, inaccurate and incomplete fraudulent records, lack of recordkeeping and filing policies, inadequate computer terminals, difficulty in retrieving records, and lack of recognition from top management. You face various problems like shortage and single point of failure is enough. Because they are mostly centralized. According to Pregon et al., (2021), several web-based student information management systems are also currently used by universities to manage records. However, it more often happens that the service is unavailable because all memory and processes are taken from the same place. This makes your server vulnerable to unforeseen circumstances such as power outages, loss of network connection, vulnerability to cybercrime, hackers and system glitches. This revolutionary technology has many potential applications due to the immutability, transparency and trustworthiness of all transactions conducted on the blockchain network. (Underwood 2016). Currently, some universities and research institutes have adopted blockchain technology in education, and most of them use blockchain technology to support degree management and summative assessment of learning outcomes. (Sharples and Domingue 2016). Mansfield-Devine (2017) also argues that blockchain technology has broad applications well beyond alternative currencies and finance. Yli-Huumo et al., (2016) he identified several applications using blockchain in non-cryptocurrency environments. This improves fraud prevention and data security.

Problem statement

Educational records are used all over the world and, from a user perspective, are important assets for people seeking scholarships, jobs, professional and academic recognition in general. Currently, educational records management systems are primarily physically localized. In many cases, we need a specific and important way to access information. It is unreliable and ultimately does not follow or have educational standards.

Academic records are valuable assets in higher education institutions such as universities and need to be properly managed. Academic achievement has been shown to be an important benefit in facilitating university educational activities. Various systems have been used and maintained in universities to manage academic performance. Paper-based/manual, web-based and computer-based systems of record, commonly referred to as electronic or digital records. Fraud, forgery, printing of fake degrees and diploma certificates are the issues and challenges that pose significant risks for students, faculty members and potential employers.

According to the literature, blockchain technology is used in various fields such as business, healthcare, crime detection and Internet of Things (IoT). The researcher believes that universities and institutes can integrate blockchain technology into document management, especially academic records and holistic assessment of learning achievements. Universities here in Kenya there is very little evidence pertaining the use of blockchain technology in managing educational activities rather than academic achievement. With this in mind, researcher developed a framework to integrate blockchain technology into academic records management to prevent fraud in the field of digital records maintenance and data security at public universities in Kenya.

Research objectives

Pitfalls bedeviling administration and maintenance of electronic records in Kenyan higher institutions of learning such as universities with a specific objective to determine the problems encountered in the existing electronic academic records management systems in public universities in Kenya.

Research question

- What are the problems encountered in the existing electronic academic records management systems in public universities in Kenya?

Scope of the study

This study aimed to explore an integrated model for blockchain technology in academic performance management at public universities in Kenya. In particular, the study addressed the identification of problems that have arisen in the existing educational records management system in Kenyan public universities, the establishment of the existing electronic academic records management system in Kenyan public universities, and the definition of how to provide a model for it. Integration Blockchain technology could be developed for the electronic academic records management system of public universities in Kenya. The study's target population includes staff such as Registrar academic affairs, deans of students' affairs, deans of schools/faculties, librarians, departmental examination officers and faculty members (Lecturers) of Masinde Muliro University of Science and Technology in Kakamega County. Researcher proposed this population based on their position and responsibilities in processing and maintaining academic performance in the university ecosystem. Researcher deliberately interviewed at least 150 subjects who participated in the study.

RESEARCH METHODOLOGY

The study employed descriptive research design and the population comprised of 150 staff ranging from Registrar Academic Affairs, Deans of students' affairs, Deans of schools/Faculties, Chairmen of Departments, Librarian, Departmental Examination Officers and Lecturers from Masinde Muliro University of Science and Technology, Kakamega County, Kenya. The researcher sampled this population purposively since they are directly involved in the administration and maintenance of academic records in the university set up. Questionnaires and interviews were employed as data collection tools. Data was analyzed quantitatively through the use of Statistical Package for Social Scientists.

RESEARCH FINDINGS AND DISCUSSIONS

Problems encountered with the current records management system

The researcher sought to determine the problems encountered with existing electronic academic records management systems. Some universities have many problems with their existing electronic academic records management system. When asked to what extent they agree or disagree with the following challenges related to existing academic records management systems, these were the answers:

Lack of records manual

The researcher sought to understand the agreement and disagreement levels of the challenge; Lack of records manual. Respondents (13.7%) strongly disagreed, 10.8% disagreed, 3.9% were neutral, 43.1% agreed, and 28.4% strongly agreed. This response shows that the majority agreed to the challenge with a frequency of (73), which is 71.5% as given in Table 1.

Table 1: Lack of record manual

		Frequency	Percent	Cumulative Percent
Valid	Strongly Disagree	14	13.7	13.7
	Disagree	11	10.8	24.5
	Neutral	4	3.9	28.4
	Agree	44	43.1	71.6
	Strongly Agree	29	28.4	100.0
	Total	**102**	**100.0**	

Source: Researcher 2022

Lack of filing guidelines

The finding shows the levels for and against the challenge. There are no submission guidelines. Respondents (1%) totally disagreed, 18.6% disagreed, 24.5% were neutral, 39.2% agreed, and 16.7% strongly agreed. This response indicates that the majority agreed with the challenge 55.9% of the time (57) as given in Table 2.

Table 2: Lack of filing guidelines

		Frequency	Percent	Cumulative Percent
Valid	Strongly Disagree	1	1.0	1.0
	Disagree	19	18.6	19.6
	Neutral	25	24.5	44.1
	Agree	40	39.2	83.3
	Strongly Agree	17	16.7	100.0
	Total	**102**	**100.0**	

Source: Researcher 2022

Inadequate computer terminals

Table 3 shows the agree and disagree levels for the challenge; Inadequate computer terminals. Respondents (7.8%) totally agree, 9.8% disagree, 54.9% and 27.5% agree respectively. This response shows that the majority agreed to the challenge with a frequency of (84), which is 82.4%.

Table 3: Inadequate computer terminals

		Frequency	Percent	Cumulative Percent
Valid	Disagree	8	7.8	7.8
	Neutral	10	9.8	17.6
	Agree	56	54.9	72.5
	Strongly Agree	28	27.5	100.0
	Total	**102**	**100.0**	

Source: Researcher 2022

Difficulty in record retrieval

Table 4 shows the approval and disagreement levels for the challenge. Recordings are hard to come by. Respondents (4.9%) totally disagreed, 3.9% disagreed, 8.8% were neutral, 48.0% and 34.3% respectively agreed, and 34.3% strongly agreed. This response shows that the majority agreed to the challenge with a frequency of (84), which is 82.3%.

Table 4: Difficulty in record retrieval

		Frequency	Percent	Cumulative Percent
Valid	Strongly Disagree	5	4.9	4.9
	Disagree	4	3.9	8.8
	Neutral	9	8.8	17.6
	Agree	49	48.0	65.7
	Strongly Agree	35	34.3	100.0
	Total	**102**	**100.0**	

Source: Researcher 2022

Lack of storage facilities

Table 5 shows the approval and disagreement levels for the challenge. Lack of storage facilities. Respondents (3.9%) totally disagreed, 1.0% disagreed, 4.9% were neutral, 54.9% and 35.3% respectively agreed, and 35.3% strongly agreed. This response shows that the majority agreed to the challenge with a frequency of (92), which is 90.2%.

Table 5: Lack of storage facilities

		Frequency	Percent	Cumulative Percent
Valid	Strongly Disagree	4	3.9	3.9
	Disagree	1	1.0	4.9
	Neutral	5	4.9	9.8
	Agree	56	54.9	64.7
	Strongly Agree	36	35.3	100.0
	Total	**102**	**100.0**	

Source: Researcher 2022

Inadequate manual classification

Table 6 shows the agreement and disagreement levels for the challenge. Poor manual classification. Respondents (6.9%) totally disagreed, 7.8% disagreed, 10.8% were neutral, 46.1% agreed, and 28.4% strongly agreed. This response shows that the majority agreed to the challenge with a frequency of (76), which is 74.5%.

Table 6: Inadequate Manual Classification

		Frequency	Percent	Cumulative Percent
Valid	Strongly Disagree	7	6.9	6.9
	Disagree	8	7.8	14.7
	Neutral	11	10.8	25.5
	Agree	47	46.1	71.6
	Strongly Agree	29	28.4	100.0
	Total	**102**	**100.0**	

Source: Researcher 2022

Lack of security

Table 7 illustrates the level of agreement and disagreement with the challenge; lack of security. Respondents (12.7%) totally disagree, 4.9% disagree and 12.7% neutrally, while 39.2% and 30.4% agree and strongly agree, respectively. This response showed that the majority agreed to the challenge with a frequency of (71), which corresponds to 69.6%.

Table 7: Lack of security

		Frequency	Percent	Cumulative Percent
Valid	Strongly Disagree	13	12.7	12.7
	Disagree	5	4.9	17.6
	Neutral	13	12.7	30.4
	Agree	40	39.2	69.6
	Strongly Agree	31	30.4	100.0
	Total	**102**	**100.0**	

Source: Researcher 2022

DISCUSSIONS OF THE FINDINGS

When asked about the challenges of the current records management system that public universities use to manage electronic records, respondents cited a lack of documentation manuals, a lack of submission guidelines, inadequate computer terminals, and difficulties in locating records. , citing challenges like the lack of manual classification of storage options and lack of security. This finding agrees with Ezeh et al., (2021) who says that most universities today electronic and web-based systems to keep and maintain academic records that have many pitfalls including but not limited to: Record retention policies, Negative employee attitudes towards record retention, Lack of professionalism Excessive accumulation of records, Record security, Lack of commitment from top management, insufficient funding, insufficient planning of equipment disposal, technological advances, integrity issues, outdated technology and low acceptance of ICT skills among employees.

SUMMARY OF THE FINDINGS

The researcher sought to identify challenges in the current system used by public universities to manage electronic records. Respondents cited challenges such as a lack of documented manuals, archiving policies, inadequate computer terminals, difficulties in locating records and retention options, inadequate manual classification, and lack of security among others.

Recommendations of the study

When asked for recommendations to improve the management of electronic academic records at public universities, respondents made a variety of suggestions. Proposals include using a watertight system that ensures credibility and incorporating blockchain technology at all levels. Blockchain is one of the emerging trends in records management and should be prioritized and practiced to make electronic records management easier. They also recommended that all records be managed digitally, with careful consideration of modern technologies. They suggested using a digital and electronic records management system. Records should be synchronized for security and management reasons. Management can also use cloud computing and leverage decentralized databases and distributed ledgers for record keeping.

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