LEVERAGING DIGITAL TECHNOLOGIES FOR ENHANCED PART-TIME LECTURER PAYMENT TRACKING IN HIGHER EDUCATION

Roy Obiero Awiti[1*], Charles Ochieng' Oguk[2]

[1]Rongo University – Kenya, robiero@rongovarsity.ac.ke
[2]Rongo University – Kenya, coguk@rongovarsity.ac.ke, drcoguk@gmail.com

Corresponding Author:

Abstract

This study addresses the critical issue of inefficient payment management for part-time lecturers in higher education institutions, leading to significant financial distress and potential negative impacts on educational quality. Drawing on the findings from a mixed-methods study involving descriptive and experimental research designs, the paper focuses specifically on the modeling and testing of a digital tracking system for part-time lecturer payments. Current manual and fragmented systems used in universities often lack transparency, remote tracking capabilities, and efficient processing mechanisms, resulting in delayed or non-payments and administrative challenges like double payments and lost documents. User and functional requirements for a digital tracking system were established, highlighting the need for a user-friendly, accessible (web-based/mobile), secure, and integrated platform with features such as payment tracking, automated processing, payment approval, notifications, and comprehensive reporting. Based on these requirements, a digital system model utilizing modern web technologies (Bootstrap, PHP, HTML5, CSS3, JavaScript) and an MVC framework was developed and subsequently tested. The model incorporates a centralized database, a web application interface, a QR code generator for unique claim identification, and a workflow tracking mechanism to monitor claims from submission to payment. Testing revealed the system's potential to improve efficiency, transparency, and accuracy in managing payments, providing lecturers with the ability to track their claims remotely and enhancing institutional financial management and reputation. The findings demonstrate the feasibility and necessity of adopting digital solutions to address longstanding payment issues, contributing to financial stability for part-time academic staff and supporting the quality of education.

Keywords: *debt, insolvency, bankruptcy, AI, digital, payment tracking, higher education, university administration, part-time lecturers, information technology.*

INTRODUCTION

Higher education institutions globally rely significantly on part-time lecturers to meet staffing needs and impart practical skills to students.[1] However, this reliance is often accompanied by systemic issues related to the timely and accurate payment of these educators.[2] Reports from various regions, including Kenya, indicate pervasive problems of delayed payments, partial payments, and even non-payment for services rendered over extended periods.[3] These issues not only cause financial hardship and demoralization among part-time lecturers, but also negatively impact their motivation and the quality of education provided to students. Furthermore, universities themselves face challenges, including damage to their reputation, administrative burdens related to manual processes, and potential financial losses due to errors like double payments resulting from poor documentation.

While information technology has been increasingly applied to automate various administrative and academic functions within universities, the specific area of tracking part-time lecturer payments has not received commensurate attention. Existing systems, often manual or fragmented digital solutions like spreadsheets or basic ERP modules, lack the necessary features for effective payment tracking and management. This gap highlights the urgent need for the development and implementation of dedicated digital tracking systems to address these widespread payment inefficiencies.

Research Problem Statement

Ideally, part-time lecturers in higher education should receive timely and accurate payment for their services through efficient and transparent administrative processes. In reality, despite the availability of funds and the critical role played by these educators, many face persistent challenges including delayed payments, partial payments, misplaced claim documents, and outright non-payment, sometimes extending over several years. University administrations, while acknowledging the existence of funds, often attribute these issues to late or incomplete claim submissions, while lecturers report submitting claims well in advance only to face delays or loss of documentation. These disconnect stem from poorly managed payment processes characterized by manual systems, bureaucratic procedures, and a lack of proper documentation and tracking. The fundamental problem is the absence of an effective, transparent, and accessible tracking system that provides real-time visibility of the payment process for both lecturers and administrators, leading to financial insecurity for educators, potential negative impacts on educational quality, and administrative and reputational challenges for universities. Therefore, there is a critical need to develop, model, and implement a digital tracking system tailored to the specific requirements of part-time lecturer payments in universities.

Objectives

The overarching goal of this research was to develop and test a functional digital tracking system for part-time lecturer payments in public universities.

Specifically, the study aimed:

1. To model and test the viability and efficiency of a digital tracking system for part-time lecturer payments that incorporates identified user and functional requirements.

Scope and Significance

This study focused on the modeling and testing of a digital tracking system specifically designed for managing payments to part-time lecturers in public universities. The scope included establishing the system requirements based on the experiences and needs of part-time lecturers and university administrative staff involved in the payment process, developing a digital model incorporating these requirements, and conducting testing to evaluate its effectiveness.

The significance of this research lay in its potential to provide a viable digital solution to address the persistent challenges of delayed and non-payments faced by part-time lecturers. Implementing such a system could lead to improved financial security and motivation for part-time staff, potentially enhancing the quality of education they provide. For universities, the system offers benefits such as streamlined administrative tasks, reduced financial losses from errors like double payments, and an improved institutional reputation regarding payment practices. The findings contribute to the growing body of literature on leveraging information technology to enhance efficiency and transparency in higher education administration.

LITERATURE REVIEW

A comprehensive literature review is fundamental to understanding the existing knowledge base, identifying research gaps, and contextualizing the current study. This review synthesized scholarly work related to payment tracking systems, higher education administration, and the challenges faced by part-time academic staff.

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[1] Saroyan, Alenoush, and Mariane Frenay, eds. *Building teaching capacities in higher education: A comprehensive international model*. Taylor & Francis, 2023.

[2] Jameson, Jill, and Yvonne Hillier. "'Nothing will prevent me from doing a good job'. The professionalisation of part-time teaching staff in further and adult education." *Professionalism in Post-Compulsory Education and Training*. Routledge, 2020. 125-139.

[3] Cabello, Cyril A. "Part-time instructors in the higher education institutions: The less, the limited, the left-over, and the survivors." *Journal of Positive School Psychology* 6.3 (2022): 6202-6214

Existing payment management systems in universities, particularly concerning part-time lecturers, are often characterized by inefficiency and a lack of transparency. Studies indicate that manual processes, fragmented databases, and reliance on physical documentation are prevalent.[4] For instance, some institutions still primarily use spreadsheets or stand-alone systems that lack integration and remote accessibility. Enterprise Resource Planning (ERP) systems with part-time lecturer modules exist, but these often focus on course allocation and mark entry rather than comprehensive payment tracking.[5] The lack of automation and centralization in these systems contributes significantly to delays, lost documents, and difficulties in budgeting and auditing.

The challenges experienced by part-time lecturers are well-documented. Delayed and insufficient payments lead to financial distress and can impact performance.[6] The inability to track the status of payment claims in a timely manner requires lecturers to undertake burdensome physical follow-ups, traveling long distances and spending considerable time to inquire at various administrative offices. This highlights a critical need for systems that offer transparency and remote access to claim status information.

Tracking systems in other domains demonstrate the potential of digital technologies to enhance efficiency and transparency.[7] Applications range from logistics and asset management to healthcare and e-commerce. These systems leverage technologies like GPS, QR codes, and web/mobile platforms to provide real-time information and streamline processes. The successful implementation of such systems in diverse sectors suggests their applicability to addressing payment tracking challenges in higher education.

Developing effective digital solutions requires a clear understanding of user needs and system requirements.[8] Functional requirements for a payment tracking system include robust record-keeping, payment processing and reconciliation, reporting, notifications, and integration capabilities. Non-functional requirements emphasize usability, reliability, performance, security, and accessibility. Addressing these requirements is crucial for developing a system that is not only technically sound but also practical and acceptable to its users.

Existing literature reviews on research methodologies and thesis writing emphasize the importance of clearly defining research questions, selecting appropriate methods, and presenting findings and discussions in a structured manner. Different types of reviews, such as narrative, descriptive, scoping, systematic, and critical reviews, serve distinct purposes. This study, focusing on modeling and testing a specific digital solution, aligned with an applied research approach grounded in identified real-world problems aforementioned.

Theoretical Analysis / Framework

This study wass guided by a conceptual framework that posits that the implementation of a digital tracking system for part-time lecturer payments can significantly improve the current payment process. The framework identifies three key elements influencing the proposed system: Current Systems, Tracking System Requirements, and Institutional Policies and Procedures as intervening variables, all contributing to the development of the Tracking System Model for Part Time Lecturers' Payment (the dependent variable).

Technology Acceptance Model (TAM).

The theoretical underpinning for the adoption and use of such a digital system can be informed by the **Technology Acceptance Model (TAM)**. TAM suggests that the likelihood of users adopting a new information system is influenced by their behavioral intention to use it, which in turn is determined by two primary factors: Perceived Usefulness and Perceived Ease of Use.[9] Perceived Usefulness refers to the degree to which a user believes that using the system will enhance their job performance.[10] In the context of part-time lecturer payments, this relates to the system's ability to

[4] Oguk, Charles, and Herbert Imboga. "The Influence of Part-Time Lecturers' Payment Management on the Dons' Performance." (2021).

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[10] Tahar, Afrizal, et al. "Perceived ease of use, perceived usefulness, perceived security and intention to use e-filing: The role of technology readiness." *The Journal of Asian Finance, Economics and Business* 7.9 (2020): 537-547.

ensure timely and accurate payments, provide transparency, and reduce the burden of manual follow-ups. Perceived Ease of Use refers to the degree to which a user believes that using the system will be effortless.[11] A user-friendly interface, intuitive navigation, and minimal required effort for tasks like submitting claims or checking status are crucial for adoption. According to TAM, even if users initially resist a new system, they are likely to adopt it if they perceive it as highly useful for improving their work performance.[12] The framework also acknowledges that external variables and institutional policies and procedures can influence these perceptions and the eventual adoption and effectiveness of the system.

METHODOLOGY

This research employed a mixed-methods approach, combining descriptive and experimental research designs to examine the current part-time lecturer payment processes, establish system requirements, and model and test a digital tracking system.

The descriptive component involved collecting data on the current systems and challenges faced by part-time lecturers and administrative staff in selected public universities in Kenya. Semi-structured questionnaires were used as the primary data collection instrument, administered to a purposive sample of part-time lecturers and relevant administrative staff. The questionnaire included both closed-ended and open-ended questions to gather insights into existing practices, challenges, and initial perceptions regarding a potential tracking system. Ethical considerations, such as informed consent and maintaining confidentiality, were adhered to during data collection.

The experimental component focused on the modeling and testing of the digital tracking system. Based on the data gathered during the descriptive phase, user, functional, and non-functional requirements for the system were clearly defined. The digital tracking system model was developed using agile methodology and the Model View Controller (MVC) framework. Specific technologies employed included Bootstrap, PHP, HTML5, CSS3, and JavaScript for the web application interface and MySQL for the centralized database. The system architecture includes a web-based application accessible via various devices, a QR code generator for unique claim identification, a centralized database, and a backend server. The workflow tracks claims from submission through various administrative approval stages to final payment. The system was tested through a mock usage scenario, involving a complete prototype, followed by a focus group discussion with sampled part-time lecturers and administrative staff to gather feedback on its performance and usability. Descriptive statistics were used to summarize the quantitative data, and inferential statistics (simple and multiple regression) were employed to test hypotheses related to the impact of valuation methods. Validity and reliability of the research instruments were considered.

RESEARCH FINDINGS

The study revealed that the majority of the institutions surveyed rely on manual or inefficient automated systems for managing part-time lecturer payments. Over half of the institutions were found to be using manual systems (57.14%), while the remainder used automated systems, often limited to spreadsheets (33% of total systems used) or paper-based methods (33% of total systems used). Only a small percentage had online portals, and these primarily facilitated mark entry and claim initiation rather than comprehensive tracking. A significant finding was the widespread lack of dedicated tracking technology; 93% of respondents indicated no tracking technology was used, necessitating physical follow-ups across multiple offices. Consequently, the duration to track a claim was often unknown (67% of respondents).

Table 1 Types of Systems Used for Managing Part-Time Lecturer Payments in Public Universities

System Type	Percentage (%)
Manual Systems	57.14%
Spreadsheets (Inefficient Auto)	33%
Paper-Based Methods	33%
Online Portals (Limited Use)	10 %

Table 2 Use of Tracking Technology in Payment Systems

Tracking Technology Usage	Percentage (%)
No Tracking Technology	93%
Some Tracking Technology Used	7%

[11] Al-Adwan, Ahmad Samed, et al. "Extending the technology acceptance model (TAM) to Predict University Students' intentions to use metaverse-based learning platforms." *Education and Information Technologies* 28.11 (2023): 15381-15413.

[12] Tao, Da, et al. "Key characteristics in designing massive open online courses (MOOCs) for user acceptance: An application of the extended technology acceptance model." *Interactive Learning Environments* 30.5 (2022): 882-895.

Key challenges identified with the current systems included the inability to track claims (a primary administrative challenge), delayed payment (30.95% of respondents), double payments (59.52% of respondents, attributed to submitting claims multiple times), and the loss of claim documents. There is a strong preference for an online system, with 35 respondents preferring a web-based portal and 25 desiring a mobile application.

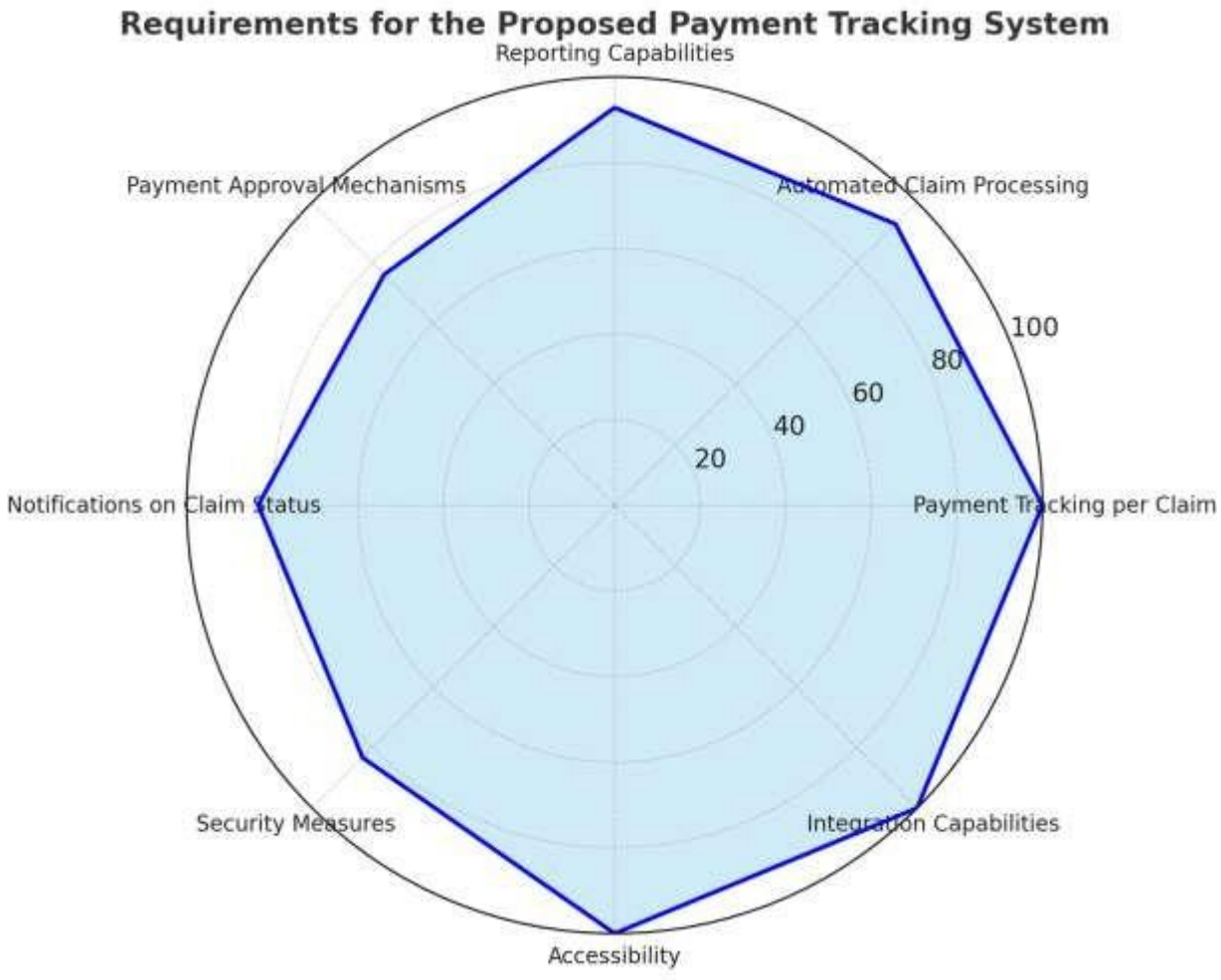
Table 3 Key Challenges in Current Part-Time Lecturer Payment Systems

Challenge	**Percentage (%)**
Inability to Track Claims	100%*
Delayed Payments	30.95%
Double Payments	59.52%
Loss of Claim Documents	*Reported but % not specified*

Table 4 Preferred Features for System Acces

Preferred Access Method	**Number of Respondents**
Web-Based Portal	35
Mobile Application	25

Requirements for the proposed tracking system were identified, emphasizing features such as payment tracking for each claim (desired by all respondents), automated claim processing (92.85%), payment approval mechanisms (76.19%), reporting (92.85%), notifications on claim status (83.33%), accessibility (24/7, on various devices), security measures (83.33%), and integration capabilities. The system should be user-friendly with a clear login interface (user profile) and the ability to view claim status including activity, time, and location. The system model incorporated these requirements, including user case scenarios for lecturers (claim initiation, status view, notifications, complaints, generating letters), heads of department (receiving/processing claims, approvals), audit, and finance (receiving/processing payments), and a system flowchart illustrating the workflow. A key technical feature modeled was the use of QR codes for unique claim identification to facilitate tracking at each stage.



DISCUSSION OF FINDINGS

The research findings underscore the critical need for a digital transformation in how universities manage part-time lecturer payments. The prevalence of manual and fragmented systems directly correlates with the identified challenges of delayed/non-payments, lost documents, and administrative inefficiencies. These manual approaches, while perhaps perceived as simple, are shown to be bureaucratic, slow, and fundamentally lack the transparency and accountability required for effective payment management. The inability of lecturers to track their payment claims remotely is a significant pain point, leading to frustration and the burden of costly physical visits.

The identified requirements for a digital tracking system directly address these shortcomings. The strong preference for web-based and mobile access aligns with the need for remote tracking and accessibility. Features like automated claim processing, payment approval workflows, notifications, and reporting are designed to streamline the administrative burden, reduce errors, and provide real-time information to all stakeholders. The modeling process, incorporating user case scenarios and a detailed workflow, demonstrates how a digital system can map the complex payment process into a transparent, trackable flow. The proposed architecture, including the use of QR codes, specifically tackles the issue of document identification and location tracking, which is severely lacking in current systems.

Testing of the system model provided preliminary evidence that such a digital solution is viable and could significantly improve the current situation. By centralizing information, automating steps, and providing tracking visibility, the system has the potential to reduce delays, minimize lost documents, prevent double payments, and enhance communication between lecturers and the administration. This aligns with the theoretical expectations of the Technology Acceptance Model, suggesting that a system perceived as useful (ensuring timely payment) and easy to use (accessible remotely, streamlined process) is likely to be adopted and positively impact the payment process.

The discussion reinforces that while digital technologies have been applied in other areas of university administration, the specific problem of part-time lecturer payment tracking remains an area ripe for digital intervention. The findings provide a clear roadmap for universities seeking to modernize their payment processes, moving away from outdated manual methods towards efficient, transparent, and accountable digital solutions.

SUMMARY, CONCLUSION AND RECOMMENDATIONS...

Summary

This study investigated the current state of part-time lecturer payment management in public universities, focusing on the processes and challenges related to tracking payments. The findings revealed a heavy reliance on manual and fragmented digital systems that contribute to significant inefficiencies, such as delayed or non-payments, lost documents, and administrative errors. A critical gap identified was the absence of robust tracking mechanisms, preventing both lecturers and administrators from easily monitoring the status of payment claims. Based on detailed requirements gathered from stakeholders, a digital tracking system model was developed using web technologies and the MVC framework. The model incorporated key features such as remote access, payment tracking, automated processing, notifications, and QR code identification. Preliminary testing indicated that the modeled digital system holds significant promise in addressing the identified challenges by enhancing transparency, efficiency, and accountability in the payment process.

Conclusion

Based on the findings from the modeling and testing of the digital tracking system, it can be concluded that *the developed system model offers a viable and efficient solution for managing part-time lecturer payments in higher education institutions.* Aided by a centralized, accessible, and transparent platform, the digital system directly addresses the core problems stemming from manual and fragmented processes, particularly the lack of effective payment tracking. The model's design, incorporating features like QR code identification and workflow automation, demonstrates a practical approach to improving accuracy, reducing delays, and enhancing communication. The testing phase supports the assertion that implementing such a system can significantly improve the payment experience for part-time lecturers and streamline administrative tasks for universities, ultimately contributing to a more positive and efficient operational environment.

Recommendations

Based on the findings and conclusions, the following recommendations are hereby made:

1. **Adoption of the Digital Model:** Universities facing challenges with part-time lecturer payments should consider adopting and implementing the proposed digital tracking system model to modernize their payment processes and enhance transparency and efficiency.
2. **Integration with Existing Systems:** To maximize efficiency and ease of operation, universities should explore integrating the new digital tracking system with their existing Enterprise Resource Planning (ERP) systems and other relevant administrative platforms.
3. **Awareness and Training:** Institutions should invest in creating awareness among part-time lecturers and administrative staff about the benefits of the new system and provide adequate training to ensure its effective utilization.

Recommendations for Further Research

To further enhance the effectiveness and usability of the part-time lecturer payment tracking model, the following areas are recommended for future research:

1. Investigate the **integration of emerging tracking technologies**, such as Near Field Communication (NFC) or Internet of Things (IoT) devices, Artificial intelligence, into the model to explore potential improvements in data collection and tracking accuracy, while also examining their effectiveness, security implications, and user acceptance.
2. Conduct research on the **interoperability and seamless integration** of the system model with diverse existing university infrastructures, including various ERP systems, payment gateways, and campus networks, focusing on technical challenges and best practices for implementation.
3. Examine the **legal and ethical considerations** related to implementing the system model, including privacy concerns, data protection regulations (e.g., GDPR or local equivalents), and ethical guidelines concerning the collection, storage, and use of personal and sensitive payment data.

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