

Human Capital Management Information Systems at the Nelson Mandela African Institution of Science and Technology, Tanzania: Adoption Levels

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ABSTRACT

In 2011, government institutions began using Human Capital Management Information Systems (HCMIS) to reduce the manual workload associated with administrative activities. Specifically, HCMIS maintains complete, accurate, up-to-date employee data and improves Human Resource Management (HRM) functions. Despite the implementation of HCMIS in the public sector, payroll losses continued. Exempla gratia is a loss of Tshs 19.6 billion as payment to 12,697 ghost workers in 2018. The consequences are immense. This study decisively explores the adoption levels and benefits of the Human Capacity Management Information System (HCMIS) in enhancing key HRM functions at the Nelson Mandela-Africa Institution of Science and Technology (NM-AIST). Utilising robust institutional and sociotechnical analytical frameworks, the research reveals significant insights into the effectiveness of HCMIS in this context. Data were collected through interviews with 16 respondents purposively selected from 302 employees. Content analysis was used to analyse qualitative data. Findings revealed that after 14 years of introducing HCMIS at the NM-AIST, the system supported rewards management. However, it partially supported recruitment and selection. It did not support performance management and training, and development plans because some modules and parts of the system were not yet activated. The government of Tanzania had not yet fully utilised the HCMIS as expected. Therefore, there was a need for regular review and to activate inactive parts of the HCMIS to enhance efficiency in the public sector. The advanced HCMIS will empower government service delivery to employees, enhance data accuracy, and remarkably minimise resource wastage in managing human resources on the government payroll.

Keywords: HCMIS, adoption levels, payroll, recruitment and selection, reward management, training and development, HCMIS modules

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1.0 INTRODUCTION

The integration of Information and Communication Technology (ICT) into government operations, commonly referred to as e-government, has emerged as a prominent focus across nearly all nations globally, aimed at enhancing efficiency and effectiveness (United Nations-UN, 2020). E-government not only reduces public sector costs (UN, 2020; 2022) but also fosters good governance (Joseph & Olugbora, 2017) by promoting inclusivity, participation, transparency, and accountability (UN, 2022). Nevertheless, e-government has yet to be fully implemented to realise the intended goals (Pangaribuan, 2019; Tefurukwa, 2019). If the situation persists, it may lead to lower e-government adoption and reduced sustainability.

Governments worldwide have introduced ICT to support human resource management (HRM) functions, thereby improving performance (Akoyo & Muathe, 2017; UN, 2022). In this study, the Human Capital Management Information System (HCMIS) is an integrated and computerised systems that manage human resources by providing operational support for managing personnel data, payroll, benefits, performance management, training and development, and other HR-related tasks (Arpoh-bath, Odoom, Boakye, Okyere, & Boateng, 2020). It is the tool that provides operational support for critical HRM processes and activities (Marcel & Tefurukwa, 2023). However, the system has evolved through various stages, such as the Human Capital Management Information System (HCMIS), the Human Resource Management Information System (HRMIS), and the Computerised Human Resource Management Information System (CHRIS) (ibid). Available evidence shows that, up to the 1980s, 40 per cent of organisations in the United States of America used HRIS (Richard-Carpenter, 2012). To date, anecdotal evidence indicates that worldwide initiatives are adopting HRMIS-supported services, but at varying levels.

Technological advancement has also been part of Africa since the 1980s. The period from the 1980s to the 1990s was characterised by business competition, which accelerated the adoption of HRIS as the best way to support HRM performance in the workplace (Heeks, 2002). Currently, the African Agenda 63 categorically perceives e-government as a factor for economic growth (Africa Commission Union, 2014; 2015; Arpoh-bath et al., 2020). Despite adopting the fast-growing technology, the limited application of HRIS in Africa persists, resulting in serious inefficiencies and ineffectiveness, such as ghost workers and fraud and corruption in e-government services in some countries (Abiodun, 2025; Nyaledzigbor, 2015; Coin, 2024). For instance, in 2007, Ghana reported about 1937 (Nyaledzigbor, 2015); in Kenya

in 2024, Coin (2024) reported 19,467 unauthorised civil servants on the payroll; and in Nigeria, as a recurrent phenomenon since the 1990s, in 2022, about 70,000 federal ghost workers were evicted from payroll (Abiodun, 2025). The consequences of inefficiencies in the application of HRIS, such as the Integrated Payroll and Personnel Information System (IPPIS) in Nigeria, are increased government wage bills above the planned budget, resulting in budget overruns in many African countries (Yanusa, 2013). The overall effect is the failure to achieve the Africa Agenda-63 and the Sustainable Development Goals (SDGs) 2030.

In Tanzania, the New Public Management (NPM) reforms were launched in the 1990s. Among other things, it aimed to incorporate corporate management principles into the delivery of public services and to improve productivity, accountability, and transparency in the public sector (Mgonja & Tundui, 2012). In 2011, the government introduced the Human Capital Management Information System (HCMIS) to all its departments (Marcel & Tefurukwa, 2023). HRM functions typically include recruitment and selection, training and development, performance management, compensation and benefits, and employee relations (Marcel & Tefurukwa, 2023). It was perceived that enhancing electronic HRM would not only automate functions but also transform them to curb fraud, such as ghost workers, and improve decision-making (Bwaki & Tefurukwa, 2022; Marcel & Tefurukwa, 2023; Deogratus & Tefurukwa, 2024). While the perceived advantages include enhancing efficiency and effectiveness in managing human resources, ghost workers, as perennial challenges on the payroll, remained a common feature in the Controller and Auditor General (CAG) reports (URT, 2018; 2021; 2022). For example, the government detected 19,708 ghost employees nationally between 2016 and 2018 (URT, 2018). The socio-economic consequences of ghost workers on the payroll transcend financial fraud to paralysing the provision of public services (Tefurukwa & Tatteh, 2025).

According to the Annual General Report of the Controller and Auditor General on the Audit of Information Systems for the Financial Year 2021/22 and 2022/23 (URT, 2023), using a sample of 40 information systems in Tanzania in 2022 revealed dedicated efforts by the government's investment in information systems in Tanzania. However, the report reveals gaps in control, processes, and systems within public organisations in Tanzania (pp. 17-18). Categorically, the report testifies that, by design, public organisations had a range of modules/functionalities, some of which remained underutilised. In the subsequent year, the report categorically mentioned Human Capital Management Information Systems under the President's Office-

Public Service Management and Good Governance (PO-PSMGG) as one of the nine operating systems that were underutilised (URT, 2024). The reports clearly register significant underutilisation of the information systems in some institutions (URT, 2023; 2024). While the causes may include but not limited to the inadequate top management support and expertise (Marcel & Tefurukwa, 2023), the consequences of underutilisation of information systems result in "inefficiencies in payments, leasing bills, and missed opportunities to improve processes and increase efficiency" (URT, 2023: p. 18) and "impeding the achievement of intended objectives and hindering the realisation of a satisfactory return on investment (URT, 2024:p.61-62). To further examine the level of adoption, this study examines HCMIS adoption in one public organisation, the choice of which is justified below.

Additionally, empirical studies by Mollel and Rutenge (2025), Mathew, Rwela and Mkweizu (2023), Naveed et al. (2021) and Rahman et al. (2018) have evidenced that inefficient human capital management information systems influence the persistence of ghost workers in public service. The consequences of inefficient and ineffective HRIS extend beyond sending funds from the payroll to incapacitating service delivery in schools and hospitals. The net effect is immeasurable in both space and time. While previous studies have identified inefficiencies in HCMIS, this study examines the adoption and use of HCMIS. Specifically, the study examined the level of adoption of HCMIS and its benefits in supporting HRM functions; recruitment and selection, performance management, rewards management and training and development at Nelson Mandela -Africa Institution of Science and Technology (NM-AIST). The choice of NM-AIST is purposive; solely based on its IT capacity, a criterion for supporting better HCMIS adoption. The study contributes to the existing literature on adopting and implementing HCMIS in the Tanzanian context, from which it may inform policymakers and HRM function practitioners and enhance the effectiveness and efficiency of HRM practices in public higher learning institutions.

1.1 Conceptual Framework

Two theories, particularly the Institutional theory and Sociotechnical theory, provide a comprehensive framework for examining the level of adoption in supporting recruitment and selection, performance management, rewards management, and training and development at NM-AIST, as explicated hereunder. The central premise of institutional theory posits that institutions, rather than the individuals operating within them, provide the basis for explaining individual behaviour. As articulated by DiMaggio and Powell (1983), institutions encompass

the rules, regulations, policies, norms, organisational structures, decision-making processes, incentives, and sanctions that govern individual behaviour within these frameworks, ultimately shaping the implementation of policies. Changes in institutional structures are likely to influence actors' behaviour, as the implementation of policies catalyses these transformations (North, 1990). While the rational choice institutional perspective suggests that changes can occur swiftly with shifts in incentives, it is contended that individual behaviour typically adjusts rapidly in response to such modifications immediately (Peters, 2009).

The institutional theory of organisations puts institutions at the central of organisational design and conduct. From this perspective, organisations are local instantiations of broader institutions (Berthod, 2020). Institutions comprise beliefs, rules, and norms that shape the creation and spreading of organisational forms, design features, and practices. Compliance with institutionalised prescriptions is considered a means of gaining legitimacy, reducing uncertainty, and increasing the intelligibility of an organisation's actions and activities. Institutions are beliefs, rules, roles, and symbolic elements that can affect organisational forms independent of resource flows and technical requirements. Those beliefs, rules, roles, and symbolic elements can be different and create a fundamental assumption of Institutional Theory (Scott, 2013): regulative (i.e., required/enforced by law, as is the case with specific accounting standards), normative (i.e., enforced by a shared sense of what is appropriate, e.g., the expectation that elected leadership represents the interest of its constituents), or cognitive (i.e., the mental models of how work should be done in an organisation).

This study assumes that institutions influence the management of HRM functions in the public sector because they guide individual behaviour. The theory relates to the study, as it aimed to examine the application of the Human Capital Management Information System (HCMIS) as a tool, with people whose behaviours can influence or hinder its effectiveness in supporting selected HRM functions. Human resource functions in public institutions are determined by formal and informal institutions (Lameck, 2015), where the formal institutions are the written rules and regulations that guide the implementation of HCMIS, and the informal institutions are the unwritten norms and values that influence the behaviours of HCMIS users in public institutions.

This study examined the level of adoption of HCMIS and its benefits in supporting selected HRM functions at NM-AIST. HCMIS is the ICT system established to enhance HRM functions such as recruitment and selection, performance management, rewards management and training

and development. The establishment of ICT systems in the public sector involves implementing an ICT policy that aims to use technology to enhance service delivery, efficiency, and effectiveness in public expenditure on human resources (URT, 2016). Therefore, formal institutions should guide the use of HCMIS. However, the literature on the management of automated HRM functions shows that informal institutions are practised despite formal institutions; this is where the behavioural aspect is seen to dominate the operations of HCMIS. In this regard, the study assumes that institutional rules, norms, values, structures, and political leaders' decision-making ability influence automated HRM functions in public service. Despite its usefulness, the institution theory does not explain or describe beyond the policies, rules, and regulations that guide and facilitate the operation of HCMIS, nor does it account for the complex interactions, interrelations, and interdependence of the employed technology and the human beings behind it.

The Tavistock Institution of Human Relations in London initially developed the sociotechnical theory in the 1950s and 1960s (Trist et al., 1993). Sociotechnical theory has some fundamental assumptions about how technology and social systems interact. These presumptions include Technical and social factors that are interdependent. The Sociotechnical theory assumes that technical and social factors are interdependent and that altering one aspect of the work system can affect other aspects (Berg & Aarts, 2017). Therefore, it is essential to consider technical and social factors as they are inseparable when designing work systems.

The sociotechnical theory prescribes viewing organisations as complex systems with technical and social elements (Selin, 2017). Technical elements include equipment, technology, and tools, while social elements are the organisation's people, culture, and relationships. Work design affects worker behaviour. How one designs work significantly affects employees' behaviour and performance (Robertson & Scarbrough, 2015). The sociotechnical theory suggests that employees are not passive recipients of work design. Instead, they actively interact with the work system.

In the e-government context, stakeholders must participate and collaborate (Tefurukwa, 2021; 2023). In the sociotechnical context, employees ought to be involved in designing and implementing the promised systems (Kujala & Turkulainen, 2011). Employees' contributions and associations may ensure that work systems meet technical and social requirements (Tefurukwa, 2023; Bwaki & Tefurukwa, 2021). It can also improve employees' gratification and engagement. Similarly, e-government systems such as e-recruitment and selection portals

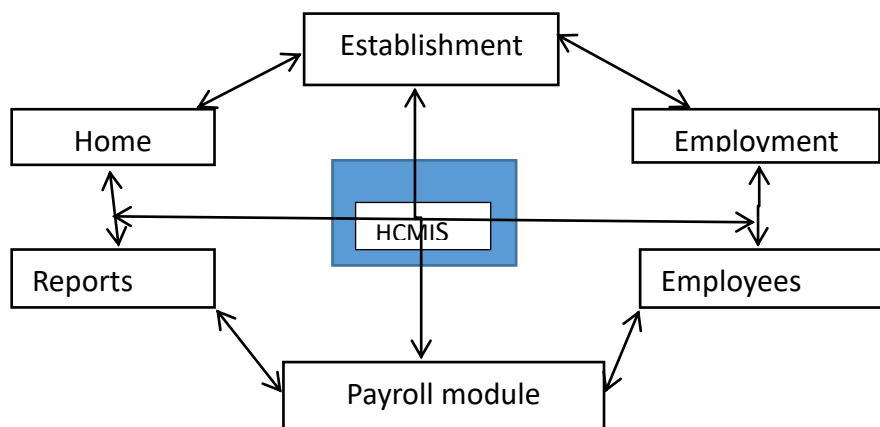
need continuous improvement (Marcel & Tefurukwa, 2023). Sociotechnical theory suggests that a system like HCMIS requires continuous improvement based on employee feedback and changes in organisational factors, such as political, technical, and environmental—legal factors (Clegg, 2015). The primary goal of the ongoing improvement process is to ensure that work systems remain effective, efficient, and relevant over time (Marcel & Tefurukwa, 2023). These are inherent features of e-government systems (i.e., 24/7).

There is a complex interface between the HCMIS and the system's social and organisational background (Liu & Kim, 2018). The sociotechnical theory posits that social and technical elements are extremely interdependent and unified, such that changes to one feature alter another (Berg & Aarts, 2017). Therefore, evaluating a social system such as an HCMIS is only possible with consideration of the social elements, in particular, human factors such as people and their culture (Kumar & Sharma, 2018). In this regard, there are mutual interdependences among people's roles and the technological tools they use to accomplish their work (Marcel & Tefurukwa, 2023). It implies that the application of HCMIS in supporting selected HRM functions from the system users, such as human resource officers at NM-AIST, is inseparable.

1.2 Integration of HCMIS Modules

The HCMIS comprises six (6) modules. All modules are integrated into each other. Changes in one aspect lead to alterations in other sections (URT, 2020). Below is a figure demonstrating the HCMIS modules.

Figure 1: Integration of HCMIS Modules



Source: Adapted from HCMIS User Manual (URT, 2020)

The first module is *Home*. It displays a summary of all employees' data. This module shows the total number of employees by gender within an institution. All expected announcements and circulars to all public institutions, such as personal emolument budget preparation guidelines, promotion permits and certificate verification directives, are sent and displayed through this module. The second module is the *establishment*. It deals with five essential processes: organisation structure, generation of the scheme of service, salary structures, creation of job listings, and preparation of personal emolument budgets. The part is also used to generate job codes for all cadres available in public institutions in Tanzania. The third module is *employment*. The module is used to manage employment processes in the public service. The part is significant for hiring new employees and for retrieving recruit data from the National Identification Authority (NIDA), such as names, place of domicile, employment status, and whether the candidate was previously employed. The education qualifications of new employees are captured through this module. After completing all employment processes in the system, the new employee appears in the organisation's employee list. At the same time, the organisation's total number of employees increases. The *Employees* is the fourth module. The module is used to perform several activities within the system. Some of the functions performed by the employees' module include individual employee data cleaning, employment status changes, promotions, capturing statutory and non-statutory deductions, terminations, transfers, and stop pay removal. Also, the same part handles name changes, designation changes, demotions, contract extensions, and the appointment of employees to managerial positions. The part reports a list of employees eligible for promotion within the financial year. The *payroll module* is the fifth module. It automates the payroll process by pulling key data from employees' modules. The data include check numbers, employees' names, bank account numbers and salary amounts. It calculates taxes and deductions. The same module facilitates payroll verification and approval every month in public institutions. The sixth module is the *reports module*, which generates reports within HCMIS. The reports may include: no NIDA ID reports, deduction reports, employee listing reports, organisation transfer reports, employee allowance reports, and organisation new hire reports. The report module of the HCMIS produces reports of all actions conducted in previous modules. These reports are essential for strategic decision-making by managers and the government.

1.3 Empirical Literature Review

Worldwide, previous studies have shed light on the adoption levels of human capital

management information systems. However, this study focuses on the adoption of human capital management information systems in Tanzania.

Mollel and Rutenge (2025) have explored the adoption of practices, the efforts the government invests in, and the challenges facing e-human resources at the Tanzania Ports Authority. The study employed the Technology Acceptance Model (TAM) and a mixed approach to analyse the findings. Findings revealed improvements in payroll, recruitment, and onboarding processes. Despite the government's funds, policies, and infrastructure supporting the Tanzania Ports Authority, the Tanzania Ports Authority continued to experience hindrances due to limited access to technology, power outages, resistance to change and cost considerations. While this study is very current and informative, it aims to use a socio-technology theory to capture the social dimension of technology adoption. It also extends Mollel and Rutenge's study by examining the adoption levels of HCMIS modules at the NM-AIST.

Mathew, Rwela and Mkweizu (2023) examined the Ghost Worker phenomenon in Ghana, Zimbabwe and Tanzania. The study used Cressey's fraud triangle theory insufficiently to explain the consequences of perennial ghost workers on the payroll. On the contrary, they would have assumed that fraud occurs due to the integrity and ethics of bureaucrats (Diamond Fraud Theory) and the fraud management mechanisms in place (Fraud Management Theory) (Tefurukwa, 2023). Nevertheless, the study underscores that the lack of, or misuse of, HRMIS management is one of the reasons for ghost workers on the payroll in developing countries. The current study established the level of HCMIS adoption and its benefits in supporting HRM functions.

Naveed et al. (2021) determined the adoption of HRIS in Public organisations in Pakistan. The study used the case study approach, and data were collected qualitatively through in-depth interviews at various levels in an organisational hierarchy. The findings evidenced that organisations could not achieve the benefits of HRIS as recognised in the literature. Adopting an HRIS could have been faster for a long time, resulting in the organisation maintaining parallel systems (manual and automated). It was revealed that the adoption rate of HRIS was mainly reduced by a lack of top management support and limited technical knowledge to use the new system. From an institutional logic perspective, the organisation needs help navigating the contradictory pressures from the new HRIS logic and the previous manual HRM system. Naveed used a sample of 11 respondents to generalise about the adoption of HCMIS in Pakistan's public sector, with the Lahore Electricity Supply Company (LESCO) as a case study.

The sample of 11 respondents was insufficient to generalise the findings to the entire public sector in Pakistan. The researcher increased the sample size to 16 respondents to improve the credibility of the generalisation of findings on the adoption of HCMIS in supporting selected HRM functions at NM-AIST, one of the public higher learning institutions in Tanzania.

Rahman et al. (2018) examined the adoption of HRIS in government organisations in Bangladesh using qualitative case study techniques. Findings show that e-HRM, specifically HRIS, has recently been adopted to automate administrative tasks and activities. The reported benefits of HRIS in Bangladesh include online recordkeeping, updating and maintaining employee data, automating the recruitment and selection process, digitalising statutory and non-statutory deductions, eliminating paperwork, and generating HR reports. The same study acknowledges that adopting HRIS is at an early stage, particularly in developing countries such as Bangladesh. The Technological, Organisational and Environmental (TOE) factor theory and the Diffusion of Innovations (DOI) theory underpinned the study by Rahman and others. Neither theory discusses institutional aspects nor the interrelationship between technology and society. There was a need to use Institutional and Sociotechnical theories. Both theories covered institutional aspects and the interrelationship between technology and society, which should have been covered in the study by Rahman and others.

2.0 METHODS

This section explains the research approach and the study area, sampling techniques and sample size, data collection methods, data analysis and ethical considerations.

Research Design and Study Area

The study employed a case study research design to gain an in-depth understanding of how HCMIS supports selected HRM functions at the Nelson Mandela African Institution of Science and Technology (NM-AIST). A case study design was used, in which a researcher analyses the case in depth, whether it is a program, event, activity, process, or individual. Previous reports (i.e., URT, 2023; 2024; Manyerere & Mpambije, 2022; Mathew, Rwela & Mkwizu, 2023; Mollé & Rutenge, 2024) have identified a shortage of ICT experts as a factor in human resource information systems in Tanzania. Hence, the NM-AIST was purposely chosen to offset what extant studies revealed as inadequate ICT experts and resistance to accepting technology. At the Institute of Science and Technology, which conducts research and provides

consultancies on ICT, the study assumed that the top and HRM officers would receive immediate support in fully utilising HCMIS. The study aimed to provide in-depth narratives of the phenomenon; it employed a qualitative approach to capture intensive information on the application of HCMIS in supporting selected HRM functions at NM-AIST.

Population and Sampling

The target population of this study were employees of NM-AIST. The study employed purposive sampling, selecting a sample of 16 employees, both directly and indirectly involved in the use of the HCMIS. Relevant respondents provide sufficient information, as indicated in Table 4.1.

Table 4.1: Distribution of Respondents by Job Position

Job Position	Frequency	Percentage
1. A & HRM Manager	1	6.25
2. Human Resource Officers	5	31.25
3. Accountant	1	6.25
4. ICT Officer	1	6.25
5. Internal Auditors	2	12.5
6. Dean's	4	25.0
7. Director of Academics	1	6.25
8. Planning and Development Manager	1	6.25
Total	16	100

Source: Field data 2023

Data collection

Pilot testing was conducted before the main study. The interview method was selected for this study to allow flexibility and to clarify the research questions. Semi-structured interviews were conducted with Heads of Department, HROs, ICT officers, Accountants, and Internal Auditors to gather in-depth information on the application of the HCMIS in supporting HRM functions. The face-to-face interview was used to collect data. This format enabled the researcher to record respondents' voices and directly observe their gestures and facial expressions, providing insight into their responses. Each interview lasted at least 30 minutes, and an interview guide was used to gather data. The raw interview data were recorded and transcribed. The researcher converted the gathered information from Swahili to an English text presentation. The researcher used straightforward language (Swahili) to convey the intended meaning of relevant questions to the sampled respondents, thereby better communicating the study's purpose.

Data Analysis

The data analysis for this study employed a systematic approach to interpret the information gathered from interviews and documentary reviews. Initially, key thematic areas—such as human resource information systems, payroll, recruitment, and training—were identified. The researcher conducted content analysis to extract and evaluate data using predetermined themes, ensuring an accurate interpretation of respondents' feedback. Information collected from semi-structured interviews with NM-AIST employees was triangulated with insights from reports and journal articles to enhance the validity of the findings. A comprehensive review of abstracts facilitated filtering relevant literature before integrating it into the analysis. This multifaceted approach enabled a thorough understanding of how the Human Capital Management Information System (HCMIS) supports HR functions, offering nuanced insights into its application and challenges within the organisation. Ultimately, the analysis aimed to correlate qualitative findings with existing literature on HCMIS in the context of Tanzanian institutions.

Ethics Considerations

The researcher adhered to professional ethical codes and guidelines to protect the respondents' rights and enhance the credibility of the study's findings. Also, this study adhered to principles of academic integrity by adequately acknowledging the authors to avoid plagiarism. The study involved obtaining written consent from the organisation and the informants, ensuring that participation was voluntary and based on informed consent. The respondents were informed via official data clearance letters sent to their organisation heads. During data collection, respondents were fully informed of their rights and the study's purpose. They were made aware that audio recordings of the interviews were conducted for documentation only. They may participate in or withdraw from this study at any time before publication of the findings. Finally, the authors attempted to observe all presentations of findings and write codes.

3.0 RESULTS

The section presents the results in accordance with the study's motive, which is to examine the level of adoption of HCMIS and its benefits in supporting recruitment and selection, performance management, rewards management and training and development at Nelson

Mandela -Africa Institution of Science and Technology (NM-AIST).

3.1 Adoption of HCMIS in Facilitating HRM Functions

The interview with system users revealed that the HCMIS was implemented a few years after the institution was established. Since 2012, HCMIS has been largely used to support HRM functions at NM-AIST. The introduction of e-government in Tanzania, particularly the application of ICT in government service delivery, prompted NM-AIST to adopt an HCMIS to facilitate daily administrative activities. One respondent (HRO1) had the following to explain;

The Human Capital Management Information System (HCMIS) has been used at the Nelson Mandela African Institution of Science and Technology (NM-AIST) since 2012. This system has been instrumental in addressing various employee issues and supporting human resource management (HRM) functions. For example, the system has facilitated the handling of employees' benefits and operational communication between our institution and the President's Office, Public Service Management and Good Governance (PO-PSMGG). The system enabled quick access to employees' information (HRO1: interviewed 2023).

The study found that HCMIS was adopted at NM-AIST 3 years after the University's establishment in 2009. Since 2012, the HCMIS has been a significant tool for facilitating HRM functions. Employees' benefits, such as promotions and payroll verification, were conducted online within the system. However, another system user (HRO5) presented the adoption of HCMIS from a different perspective as follows;

The established HCMIS by the government has dramatically assisted daily human resource management functions. Unlike paper-based systems, the system performs numerous HRO tasks easily, accurately, and efficiently. The system was implemented in 2012, three years after the University's establishment in 2009. During that time, many institutions were integrated into the system to maintain accurate records and employee information (HRO5: interviewed 2023).

The findings revealed that HCMIS was implemented at NM-AIST and greatly supported HRM activities. The system has increased the accuracy and efficiency of HRM functions, unlike traditional paper-based or manual approaches to HRM. The findings indicate that the HCMIS

was implemented at NM-AIST more than 10 years ago, and that some HRM functions were digitalised.

3.2 Ways HCMIS Supported NM-AIST HRM Functions

In this section, the researcher sought to identify ways in which the HCMIS supports HRM at NM-AIST. The question about whether HCMIS supports HRM functions was asked to all respondents who are system users and to other staff who use the system to perform HRM functions in one way or another. The officer at NM-AIST had the following to explain. The Human Resource Officer 1 said that;

HCMIS largely facilitated and improved HRM performance. In the past, employee matters were handled using traditional (manual) methods, but the system has modernised the process by digitalising many HRM functions. For example, payroll verification, handling leave without pay, various salary deductions, changing employees' bank account numbers and salary payment methods, and employees' data cleaning. The system further enabled the automation of entitlements to all staff acting in leadership positions (HRO1: interviewed 2023).

The results show that HCMIS had primarily supported HRM functions at NM-AIST. The conduct of online HRM functions improved HRM performance and accelerated service delivery to employees. The time spent on service delivery has been shortened through digitalisation and automation of HRM functions. The system simplifies payroll verification and various salary deductions. Also, findings indicated that HCMIS enabled the automatic generation of lists of employees on leave without pay and the payment of entitlements, such as salary differences, to all employees in various leadership positions. Another respondent, who was an ICT Officer, continued to say,

The HCMIS has facilitated HRM functions in the following ways. Many human resource activities are now digitalised and performed within this system. Human resources management activities are completed more quickly. Additionally, the system has enabled more straightforward access to information from the Office of the President, Public Service Management and Good Governance (PO-PSMGG) (ICT Officer: interviewed 2023).

The findings show that HCMIS facilitated online communication between NM-AIST and the President's Office, Public Service Management and Good Governance (PO-PSMGG). Once the information is displayed in the HCMIS module for announcements, government organisations, including NM-AIST, receive it instantly.

3.3 Benefits of HCMIS in Supporting HRM Functions

The researcher emphasised the benefits of HCMIS in supporting HRM functions at NM-AIST. The question about the advantages of utilising HCMIS in facilitating HRM functions was asked of all respondents. One of the system users explained the following;

The benefits of adopting HCMIS include simplifying the hiring process and ensuring the timely receipt of their entitlements, such as salaries, compared to before the system was implemented. Additionally, the system has streamlined the process of handling employee salary arrears. It is now easier to track the entire process through to the point where the employee receives their entitlements, whether regular salary or salary arrears. Acting employees, with the approval of the Permanent Secretary, President's Office, Public Service Management and Good Governance, also receive their entitlements on time, particularly salary differences. The government directly pays the salary difference within the month in which salaries are due (HRO3: interviewed, 2023).

Findings indicate that using an HCMIS to support HRM functions at NM-AIST yields benefits. Notable advantages of using the system include an automated, simplified hiring process, online management of employees' salary arrears, easy tracking of various HCMIS actions, and automated staff entitlements for leadership positions. The use of HCMIS has fastened and quickened most of the administrative activities at the institution, as portrayed by another system user as follows;

As the Human Resource Officer, the HCMIS has many benefits. The system is user-friendly; users can access all modules on a single page. Secondly, centralising employee information in one place makes employees' data easily available. Thirdly, the system can generate various reports, such as budget reports, promotions, retirements, resignations, and transfers. Fourthly, the

system's flexibility. The system offers room for improvement, as the current version does not fully accommodate Tanzania's public service context (HRO1: interviewed 2023).

As shown above, HCMIS is a user system in which all modules are accessible immediately after the system user logs in. Also, the system enabled employees to access their data on a single platform. Findings show that HCMIS enabled the automatic generation of reports on various HRM activities performed within the system. The respondent added the following views;

There is a significant difference between the system being implemented and the one in place now. In the past, many HRM functions were performed traditionally, primarily through manual paperwork. Traditional paperwork makes it difficult to access information, and sometimes employees' important information gets lost. After adopting the HCMIS, retrieving employees' information was easy, and the risk of data loss was eliminated (HRO1: interviewed 2023).

As presented above, the system achieved increased efficiency through accurate data management, recordkeeping, cost reduction, and the elimination of paperwork. On the advantages of applying HCMIS in supporting HRM functions, it was shown that significant benefits of the system include ease of retrieval of employees' data, the system acts as a central repository of employees' data, direct online communication between NM-AIST and the PO-PSMGG, cost reduction, elimination of paperwork, and the system is user-friendly. Other benefits of HCMIS include the automatic generation of various HRM activity reports, such as personal emolument budget reports, promotion reports, retirement reports, transfer reports, and reports on paid salary arrears. The HCMIS has quickened administrative activities performance at the Nelson Mandela African Institution of Science and Technology (NM-AIST). HCMIS has dramatically sped up the process for salary arrears claims: once an employee submits the salary arrears claim form, all approvals are conducted online. Salary arrears are paid within three (3) to six (6) months from the date an employee submits the arrears claim form.

3.4 Levels of adoption of HCMIS in supporting HRM functions

The application of HCMIS was expected to improve HRM functions, as the literature review indicates. Hence, the level of adoption was determined by the HRM functions, supported by the HCMIS, at the NM-AIST. Findings from the interviews reveal convergent responses, as one of them said the following,

The system assists with payroll verification and salary approval. It assists in handling salary arrears, although it does not perform calculations. The system does not automatically capture the start date of salary arrears for employees. It lacks online salary arrears forms. I have not seen the system used to support employee training plans... The system is still not utilised to facilitate training programs at our institution.... The system should be further improved to support various HR functions, such as the implementation of the annual leave cycle and training programs. The system should also be capable of calculating salary arrears and provide employees with a mechanism to claim for periods when they did not receive their salaries (HRO2, Interviewed 2023).

Additionally, one of the respondents had the following concerning the levels of adoption of HCMIS;

The system is mainly used when the employee reports to the University as their workplace on their first appointment. the system does not assist in any way in the overall performance evaluation here at Nelson Mandela. Public Service Recruitment Secretariat primarily handles the recruitment and selection process. The HCMIS role becomes effective once the employee has been selected, after the entire initial process is complete. The system is mainly used when the employee reports to the University as their workplace on first appoint (HRO1, 2023).

The CAG report of the 2022/23 financial year revealed underutilised modules in audited public organisations, as the report below:

“During my evaluation of information system implementation in REA, STAMIGOLD, TFRA, HESLB, TMDA, RFB, NSSF, PO-PSMGG and the Ministry of Water, it became apparent that these entities deploy information

systems customised to meet user requirements. However, the underutilisation of these systems' functionalities is impeding the achievement of intended objectives and hindering a satisfactory return on investment. The functionalities/modules underutilised include PO-PSMG Human Capital Management Information System (HCMIS) in employee replacement, placement, transfer and leave” (URT, 2024, pp. 61-62).

4.0 DISCUSSION

This section connects the findings to the literature assessment, extant empirical studies, and the conceptual framework about the level of adoption of HCMIS in supporting selected HRM functions at NM-AIST and its benefits.

Findings show that HCMIS was adopted mainly three (3) years after the Nelson Mandela African Institution of Science and Technology (NM-AIST) was established in 2009. The HCMIS at NM-AIST was first implemented in 2012 to support HRM activities. The system has operated and facilitated HRM functions for the past ten (10) years. The system has increased the accuracy and efficiency of performance in public institutions compared to the traditional approach to HRM. Public higher learning institutions in Tanzania, including NM-AIST, implemented the National ICT Policy -2016 and adhered to government directives in Section 29 of the e-Government Act No.10 of 2019, which require all public institutions to reduce paperwork and digitalise work processes, including HRM functions. The study further disclosed that HCMIS primarily supported online employees' promotion, leave without pay permissions, and payroll verification.

Therefore, NM-AIST operated HCMIS within the institutional framework provided. The findings align with institutional theory, specifically the regulative pillar, where all public institutions in Tanzania were required to implement e-government service delivery (URT, 2016; 2021). Drawing on sociotechnical theory, the successful performance of HRM functions and administrative activities depends on compliance with and adherence to established laws, rules, and policies (Berg & Aarts, 2017). While laws, by-laws and directives may provide a framework for operationalisation, the actual, efficient and effective implementation highly depends on the will and commitment of public servants, particularly the management and the technocrats (Orlikowski & Scott, 2008). Hence, the interaction of technology and social factors yields robust positive outcomes from e-government services (Selin, 2017). Ultimately, this

results in completing human resource activities within the required performance standards. Similarly, Chen and Huang (2018), who investigated the antecedents of HCMIS adoption in small and medium-sized enterprises (SMEs) in China, revealed that HCMIS adoption positively impacted HRM functions such as recruitment, training and development, and performance appraisal. The system largely supported administrative activities and increased the accuracy and efficiency of HRM functions in SMEs in China. Despite the contextual difference between Tanzania and China, the adoption and functionality of HCMIS were not negatively affected by such disparity between developing and developed countries.

Another parameter examined was the extent to which the HCMIS supported HRM functions at NM-AIST. The findings revealed that HCMIS had assisted in managing compensation and benefits programs by storing salary structures, benefits packages, and other compensation-related data. According to Tefurukwa (2019; 2023), automated processes such as payroll management and benefits administration can yield benefits. After adopting the system, payroll at NM-AIST was verified online each month. The system streamlined the recruitment process by integrating with NIDA, which directly fetched employee information during hiring (Marcel & Tefurukwa, 2023). The system automatically generated a list of employees on leave without pay. Hence, HCMIS ensured accuracy and efficiency in HRM activities performance. The findings align with the e-government strategy, which prioritises the promotion and provision of quality e-government services to public institutions (URT, 2021). However, the CAG's reports reveal gaps in control, processes, and systems within public organisations in Tanzania (URT, 2023, pp. 17-18). Categorically, the URT (2024) report testifies that Human Capital Management Information Systems under the President's Office-Public Service Management and Good Governance (PO-PSMGG), as one of the nine operating systems, was underutilised. The findings on the level of adoption of HCMIS in supporting HRM functions at NM-AIST reveal that recruitment and selection, performance management, rewards management and training and development were at least addressed. Other functions were yet to be attended.

Several advantages were accrued from the application of HCMIS in supporting HRM functions at the NM-AIST and the PO-PSMGG, such as cost reduction, elimination of paperwork, and the systems user-friendly. Similar findings were reported by Rahman et al. (2018), who examined the adoption of HRIS in government organisations in Bangladesh. They reported HRIS benefits, including, but not limited to, online employee record keeping, updating and maintaining employees' data, automation of the recruitment and selection process, digitalisation

of statutory and non-statutory deductions, and elimination of paperwork and the generation of reports. The advantages of HRIS are universal, provided institutions and sociotechnical factors are adhered to in implementing e-government. Additionally, Tursunbayeva et al. (2020) reveal that even in low-income countries like Zambia, the application of HRIS resulted in easy access to staff information, improved data management, and enhanced data input processes. It would result from the top management and technocrats' will and commitment to implement e-government projects in accordance with the stipulated institutions (Scott, 2013). The application of HCMIS reflects the United Nations' anticipation of e-government projects to increase contributions to digital transformation, and digital government accelerates the realisation of the 2030 Agenda for Sustainable Development and ensures that no one is left behind or offline in the digital age (UN, 2022). With the adoption of e-government services, governments and citizens were to enjoy increasingly accurate services at reduced cost and the elimination of resource waste in government service provision.

5.0 CONCLUSION

The study examined the level of adoption of HCMIS and its benefits in supporting recruitment and selection, performance management, rewards management and training and development at Nelson Mandela -Africa Institution of Science and Technology (NM-AIST). The application of Human Capital Management Information Systems has proven to be an asset in supporting recruitment and selection, performance management, rewards management and training and development at Nelson Mandela-Africa Institution of Science and Technology. Currently, the system supports only rewards management. It greatly supports online payroll management, salary arrears, and management of acting allowances, specifically salary differences. It partly supports the recruitment and selection process. The system is used at the hiring stage. In contrast, the initial stages, such as job advertisement, receiving of job applications, and preparation of long list and shortlist, were conducted through another system called '*ajira portal*'.

Recommendations

Based on the study's findings and conclusions, the HCMIS's performance should be periodically reviewed to enhance its efficiency. For all inactive modules, parts, and sections, activation is needed to increase accuracy, effectiveness, and efficiency in the public sector. It will enable the system to successfully accommodate all HRM functions. The improvement of

HCMIS will positively contribute to the application of ICT in government service delivery to the public, including employees. Additionally, there is a need to link the HCMIS with the National Examination Council of Tanzania (NECTA), the Public Service Social Security Fund (PSSSF), the National Social Security Fund (NSSF), hospital systems, and the Registration, Insolvency and Trusteeship Agency (RITA). Interoperability would enable easy communication among government institutions and improve the accuracy of employees' data and information. The implementation of HCMIS in public higher education institutions in Tanzania, specifically at NM-AIST, is guided by laws, policies, administrative circulars, and decrees. Those laws and policies include the Public Service Act (No. 8) R.E 2019 (URT, 2019), the Employment and Labour Relations Act (No.6) R.E 2019 (URT, 2019), the Labour Institutions Act (No.7) R.E 2019 (URT, 2019), the e-Government Act (No.10) R.E 2019 (URT, 2019), the National Information and Communications Technology Policy of 2016 (URT, 2016), Circulars and decrees are used together with the mentioned laws and policies for administrative purposes. All these helped develop the Human Capital Management Information System (HCMIS) user manual, enabling HROs, ICT officers, Accountants, and Internal Auditors to use the system. The President's Office developed the manual. The President's Office developed the manual, Public Service Management and Good Governance (P.O. – PSM & G.G.), in 2020 (URT, 2020). However, the current study's findings revealed that HCMIS is underutilised, as it is currently used primarily for rewards management and partially supports the recruitment and selection process in the public sector. This situation ultimately calls for immediate remedial measures to ensure that the HCMIS supports HRM functions to the fullest extent possible. Therefore, improving ICT skills, enhancing HCMIS users' knowledge, commitment, and education, and addressing these as policy matters are within top management's purview.

Areas for Further Research

Future research should prioritise quantitative validation of Human Capital Management Information Systems (HCMIS) across multiple public higher learning institutions (PHLIs) in Tanzania. By conducting cross-institutional comparisons, researchers can assess the effectiveness of HCMIS in various contexts, particularly in addressing HR and administrative challenges. This approach would enhance understanding of how HCMIS supports human resource management functions and evaluates employee queries and satisfaction. Additionally, incorporating diverse universities will provide a more comprehensive view of gaps in training

and development plans, ultimately contributing to improved HR practices and policy recommendations within the public sector educational framework.

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