

Assessing the effectiveness of integrated information management system for managing land in Tanzania

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ABSTRACT

This study assesses the effectiveness of the Integrated Land Management Information System (ILMIS) in Tanzania, focusing on whether it has achieved its intended objectives based on stakeholders' perceptions. The Unified Theory of Acceptance and Use of Technology is used to assess the effectiveness of the system. A mixed methods approach is employed, using a convergent research design and stratified random sampling. The study is conducted in the Dar es Salaam City Council with the target population of 384. However, the study managed to collect data from 350 respondents, including land officers, surveyors, administrators, and community members. Data collection methods include structured questionnaires, interviews, and document reviews. Quantitative data are analyzed using descriptive and inferential statistics via SPSS, while qualitative data are examined through content analysis using Taguette software. The findings reveal that ILMIS significantly aligns with its intended goals in areas where it is fully implemented. Key achievements include the reduction of land disputes, improved accuracy of ownership records, and enhanced monitoring of illegal encroachments. The system has also improved service delivery by reducing transaction times and bureaucratic delays, thereby helping to curb corruption. Furthermore, ILMIS's integration with other government functions, such as tax administration, reflects adherence to global best practices in land governance. This study concludes that ILMIS has a positive impact on land administration in Tanzania. However, for sustained success, the system requires continuous upgrades, expanded user training, broader inclusivity, and integration with traditional land tenure systems. These measures are essential to ensure equitable and efficient land governance across both urban and rural areas.

Keywords: Assessment, Effectiveness, Information Management System, Land Management, Tanzania

I. INTRODUCTION

Globally, the adoption of digital information systems has significantly improved land administration particularly in developed Countries such as Singapore, Sweden and the United States through technologies such as GIS, Cadastral Systems and Blockchain registries (Coffie et al., 2024; Gong & He 2022). In developing countries, however initiative such as Indonesia's land Office computerization and Indian's DLRMP face persistent challenges including limited technical capacity and uneven implementation (Imanbayeva et al., 2024). Across Africa, digital land systems are promoted as solution to corruption and inefficiencies. Rwanda's Land Administration Information Management System (LAIS) for example has improved transparency and reduced land disputes while countries like Kenya and Nigeria continued to struggle due to poor internet access and governance issues (Coffie et al., 2024).

In Tanzania, the Integrated Land Management Information System was introduced to address the longstanding issues such as poor records keeping, lack of transparency and delays. Despite of improving processes in Urban areas like Dar es salaam, challenges such as low digital literacy, infrastructure gaps and limited staff capacity persist especially in rural regions (Mwaikambo & Hagai, 2023). Based on the theory assumptions, it was adopted to assess the effectiveness of information management system for managing land through ILMIS at Dar es salaam City Council. It is evident that the application of information management systems in land resource management has gained significant global attention. For instance, in Ghana Coffie et al. (2024) highlighted the potential of a well-structured Land Information System to improve land governance and administrative efficiency. Similar, Todorovski et al. (2021) assessed land administration in Ecuador using a fit-for-purpose approach, demonstrating improvements in transparency and data accuracy. On performance expectancy, the study examined whether ILMIS has met its intended objectives in improving land management. Metrics such as time taken for land registration, accuracy in ownership records, and revenue collection efficiency was analyzed. Stakeholder feedback was assessed whether ILMIS has delivered on expectations to reduce bureaucratic inefficiencies and land-related disputes.

Effort expectancy evaluated the ease of use of ILMIS for its users. This includes both technical and non-technical staff at the Dar es Salaam City Council. The assessment involved examining the system's user interface, the level of training provided to staff, and the extent to which users find it intuitive to navigate and operate ILMIS effectively.

Social influence assessed how the attitudes and behaviors of the stakeholders which were Government officials, land management experts, surveyors and IT specialists, impact the adoption and use of the system. So, when influential individuals or groups either within the Ministry or those connected to the land sector actively promote the system that encouraged wider acceptance and usage. Aspects that have strong social support such as ease of use, integration with the existing processes and effectiveness in improving land management are more likely to be successfully implemented. Facilitating conditions assessed the support mechanisms available to sustain ILMIS. This includes evaluating the availability of reliable internet, system maintenance, adequate technical expertise and support, adequate financial support, management support, good governance and leadership practice, Good political will, obedience of ethical practices and stakeholders' honesty. Any gap in facilitating conditions was identified as critical barriers to the system's effectiveness.

This study firstly, will contribute to improving land administration by identifying how ILMIS enhances effectiveness in processes such as land registration, title deed issuance, and dispute resolution. Second, the study's findings will offer insightful information to stakeholders and policymakers in the land management sector, enabling them to improve policies and guarantee accountability and transparency in land transactions. Thirdly the study can draw attention to how ILMIS can help in addressing challenges like corruption, delays and inaccurate land record which are critical for accelerating economic growth and sustainable economic development. Finally, the study adds to the limited empirical research on the effectiveness of digital land management systems in developing countries, particularly in Sub-Saharan Africa and Tanzania specifically.

Based on literature reviewed, the study revealed that while the application of information management system in land resource management has been gaining significant attention globally, for instances with studies from Ghana, Ecuador, Kazakhstan, as well as other countries demonstrating its potential for improving land management efficiency, there still a noticeable gap in the research particularly addressing the efficiency of information management system in land management in Tanzania. In particular, the implementation of land management information systems (LMIS) in Tanzanian contexts, such as the ILMIS at Dar es Salaam City Council, is underexplored.

It was further revealed that, previous studies have been focusing on the applications of information management system, GIS, as well as other digital technologies in improving land governance including agricultural efficiency. These studies in most cases have been often emphasizing performance expectancy, effort expectancy, including facilitating conditions as key factors driving technology adoption. For example, a study in Kazakhstan (Imanbayeva et al., 2024) examined the role of IS in enhancing land resource management and agricultural decision-making, while Gong and He (2022) examined how Internet of Things [IoT] and GIS have been contributing to land resource management efficiency. However, these kinds of studies primarily concentrate on broader applications on specific sectors like agriculture or national governance systems. Thus, there was a need to explore the specific dynamics of information management system adoption in Tanzanian land management systems. Figure 1 presents the conceptual framework of the study.

1.1 Statement of the Problem

Land administration in Tanzania has a long struggled with fragmentation manual process and limited integration of spatial and alphabetic data. Before Integrated Land Management Information System there were Systems such as MOLIS, LRMIS and SRS operated in isolation with cadastral maps managed manual and unlinked to digital records. This segmentation led to inefficient workflows, delayed title issuance often taking up to six months and heightened risks of fraud or tempered documents (Kironde, 2009). In Dar es salaam, rapid urbanization and informal settlements exacerbate these challenges making land disputes and tenure insecurity more common in the absence of timely, transparent and land records. These content underscores the urgent need for a more integrated, reliable and secure land information infrastructure.

Integrated Land Management Information System was introduced in July, 2018 as a pilot initiative in Dar es salaam specifically in Kinondoni and Ubungu Districts to digitalize and consolidate cadastral maps, records, workflows and integrate with national systems like NIDA and GEPG (IGN FI, 2018). While ILMIS has improved access to land information, reduced costs and increased system user satisfaction including over 50% of land landholders in Kinondoni reporting improved services awareness remains incomplete with nearly 40% still unaware of the system's existence (Ntongani, 2024). Implementation obstacles including gaps in ICT infrastructure, insufficient training and institutional inertia continue to undermine ILMIS's full potential (Mollel et al., 2023).

Although government made some initiatives such as staff training programs, investment in digital infrastructure and public awareness campaigns to improve the system. But these initiatives produced inconsistent results. Experience from developed countries demonstrate that information management system solutions can significantly transform land management when implemented effectively (Mollel et al., 2023). This study assessed the effectiveness of Integrated Land Management Information System in managing land in Tanzania using Dar es salaam City Council as a case study.

1.2 Research Objective

This study identified the key objectives that was intended to be addressed and assess the aspects that have been fully met by ILMIS in Tanzania.

1.3 Research Question

The study seeks to answer, what were the key issues that ILMIS was designed to address and which aspect of ILMIS have been successfully implemented.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 The Unified Theory of Acceptance and Use of Technology (UTAUT)

This study applied Unified Theory of Acceptance and Use of Technology (UTAUT) to access the effectiveness of the Integrated Land Management Information System (ILMIS) in Dar es salaam. The theory was developed by Venkatesh et al. (2003) and it is widely recognized model used to explain and predict individuals' acceptance and usage of technology. This model synthesizes elements from the Theory of Reasoned Action (TRA) and the Technology Acceptance Model (TAM) providing a comprehensive framework for analyzing user behavior regarding new technological systems. According to UTAUT four primary constructs influences user acceptance and usage of behavior namely; Performance expectancy, Effort expectancy, social influence and Facilitating conditions. Performance expectancy evaluated whether ILMIS has improved land management, effort expectancy examined ease of use, training and user interface, social influence assessed how key stakeholders shape system adoption and facilitating conditions focused on infrastructure, technological support, governance and ethical practices.

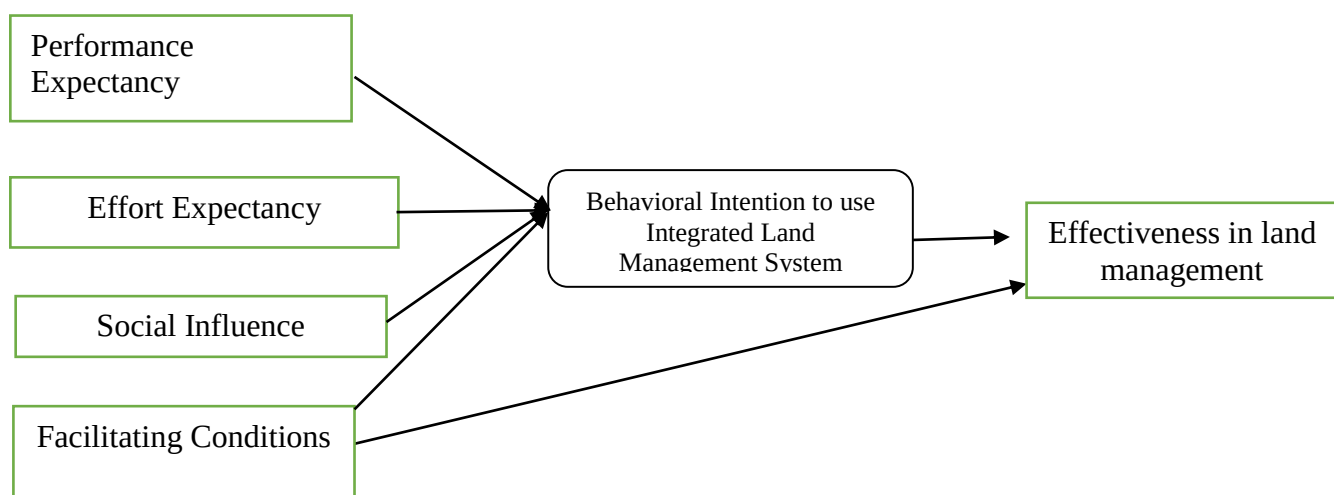


Figure 1

The UTAUT Model

Source: The UTAUT Model (Adapted from Venkatesh et al. (2003))

2.2 Empirical Review

Several studies have explored the role of Information and Communication Technology (ICT) in land management though with varying focus areas and limitations regarding the Tanzanian context. Pacurucu et al. (2022) conducted a study in Ecuador on the role of modern ICT tools in facilitating public participation in land management. The findings emphasized the need for ICT platforms that bridge communication between Citizens and experts to promote participatory decision making. However, the study did not assess how such tools could be adapted for engaging Tanzanian Citizens within frameworks like ILMIS. Recent study by Djawa. (2023) investigated the impact of ICT on land transportation services in Indonesia. While insightful, the study did not explore the application of ICT

in land resource management particularly in the context of developing countries. This highlights a research gap concerning the use of ICT systems like ILMIS in enhancing land resource management and service delivery in Cities like Dar es salaam.

Study by Imanbayeva et al. (2024) in Kazakhstan examined the integration of Information systems into agricultural land resource management. Their study highlighted the importance of collaboration between government and private sectors to overcome implementation challenges. Despite its relevance, the study did not address the unique context and challenges of Tanzania particularly those faced by ILMIS at the Dar es salaam City Council. In similar vein, Coffie et al. (2024) in Ghana studied land governance and underscored the value of strong Land Information Systems in enhancing transparency, decentralization and legal frameworks. Their findings offer valuable insights for Tanzanian authorities on strengthening ILMIS by adopting similar strategies and frameworks.

Lastly, Petrakovska et al. (2024) analyzed the interoperability of state information systems in Ukraine's land management sector. The study emphasized the importance of open data and effective data sharing mechanisms. While informative, it did not address the specific integration challenges of various ICT systems within the environment of ILMIS in Tanzania.

III. METHODOLOGY

3.1 Research Design

In this study pragmatism philosophy was applied. The philosophy is focuses on the practical implications of research and emphasizes the use of mixed methods to address real-world problems effectively (Prasad, 2021). This approach allowed for the combination of qualitative and quantitative data to evaluate ILMIS comprehensively, focusing on its intended objectives, achievements, and areas requiring improvement. By using qualitative methods, data was collected through in-depth interviews with land officers, land developers, city council staff and ILMIS system implementers, the research captured insights into the original objectives of ILMIS and the problems it aimed to address. It reveals user experiences, system usability, and areas of satisfaction.

In addition, the design allowed the application of quantitative analysis so as to identify the strength as well as the significance of relationships (Kothari, 2014) between the key issues that ILMIS was intended to address and the aspect have been fully met. Using insights from both qualitative and quantitative data, the study identified gaps in ILMIS, such as system downtime, limited user training, or challenges in integrating ILMIS with other government systems.

3.2 Population of the Study

Population of this study includes members of the public who use ILMIS for land related services, surveyors, land officers, IT specialists like system administrators and employees of the Ministry of land, Housing and Human Settlements Development who use ILMIS. The study was conducted in Dar es salaam where the demand for efficient land management has been high because of the population growth, rapid urbanization, as well as increased land transactions.

3.3 Sample Size

In order to guarantee the representativeness a combination of purposive and a stratified random sampling techniques was used to choose the study's sample size. Since the sample size was unknown, the study employed Cochran's formula ($n = Z^2 p (1-p)/e^2$) to calculate sample size Where: n = required sample size; Z = Z-score corresponding to the desired confidence level (e.g., 1.96 for 95%); p = Estimated proportion of the population with the characteristic of interest (assume 50% = 0.5 if unknown, as it maximizes sample size); while e = Desired margin of error (e.g., 0.05 for 5%). The required sample size was approximately 384 respondents. However, the study managed to collect data from 350 respondents.

3.4 Sampling Technique

The research included a mix of random and purposive sampling technique. Randomized chance sampling guaranteed that the majority was adequately represented, while purposeful sample focused on the important respondents who had specific expertise and experience in land management processes as well as information systems including surveyors, Town planners, land Officers, IT Personnel managing ILMIS and key decision makers at the Dar es salaam City Council. This strategy reduces selection bias and encourages varied representation, which strengthens the validity of research findings (Saunders et al., 2019).

3.5 Data and Data Collection Methods

Semi structured interviews and structured questionnaires served as the data collection methods to gather primary data and document review for secondary data. Although semi structured interview allowed for a more thorough analysis of important topics and provided insightful qualitative information. Structured questionnaires produced quantitative data on respondents' perceptions. Triangulation data using several approaches improves the study's validity and offers a more thorough grasp of the research goals, as stated by Cresswell and Plano Clark. (2018).

3.6 Data Analysis

The goals of the study were met by generating both descriptive and inferential statistics through the use of SPSS software for data analysis. Both basic and complex datasets can be effectively analyzed through SPSS, which is renowned for its adaptability (Pallant, 2020). Taguette software was used to examine and code interview transcripts in order to find recurrent themes and patterns in qualitative data. This enhanced the content of the qualitative findings.

3.7 Ethical Consideration

All participants were informed about the goals of the study and sign consent forms. In terms of confidentiality, all responses were kept confidential ensuring ethical handling of data.

IV. FINDINGS & DISCUSSION

4.1 Demographic Information of the Respondents

Table 1 Demographic information of the respondents where the sample size of the study was 350 respectively.

Table 1

Demographic Characteristics of the Respondents(N=350)

Gender	Frequency	Percent
Male	180	51.4
Female	170	48.6
Age Group	Frequency	Percent
18-24	50	14.3
25-34	120	34.3
35-44	80	22.9
45-54	70	20.0
55+	30	8.6
Level of Education	Frequency	Percent
Secondary School/Diploma	60	17.1
Bachelor's Degree	200	57.1
Master's Degree	90	25.7

Out of 350 respondents 180 (51.4%) were male and 170 (48.6%). This implies that both genders were fairly represented in the study, allowing for a comprehensive understanding of the research topic across gender lines.

In terms of age group, the highest percentage of respondents (34.3%) is between the ages of 25 and 34, followed by those between the ages of 35 and 44 (22.9%). This age group inclusion suggests that the survey was successful in capturing perspectives from people who are probably in the early to middle stages of their professional or personal development. The 45 to 54 age group had a lower percentage of responders (20.0%), while the 18 to 24 and 55+ age groups had the lowest representation (14.3% and 8.6%) respectively. According to this age distribution younger people and those in the middle career stages are more likely to be interested with the subject matter of the study compared to the older age groups who are underrepresented.

Based on educational background, majority of respondents (57.1%) held a bachelor's degree, (25.7%) master's degree and a lesser percentage (17.1%) had a diploma or completed high school. This implies that people with higher education, especially those with a bachelor's degree make up the majority of the study population. This may indicate that educated people are more aware of or interested in the research topic.

Generally, the demographics of the study sample indicate that the findings are probably representative of a middle aged, somewhat male and reasonably well-educated group of people. These characteristics should be considered when generalizing the findings of the study, as they may not fully capture the views of younger, older, or less-educated populations.

4.2 Key Issues that ILMIS was Intended to Address

To identify the key issues that ILMIS was intended to address, semi-structured interviews were employed to provide in-depth qualitative insights. Key stakeholders, such as senior officials from the Ministry of Lands, IT specialists, land management experts, and selected ILMIS users, were interviewed.

Land Tenure Security and Dispute Reduction: During the interview with Land Officer – Ministry of Lands, Housing and Human Settlements Development, when asked on the key issues that ILMIS intended to address he has this to say;

"One of the biggest key issues that ILMIS was intended to be addressed, overlapping land claims and disputes. This is because people used to come in with overlapping claims, especially in urban and peri-urban areas. Therefore, ILMIS was introduced for improvement in how land ownership is documented".

The interviewee responses suggest that while ILMIS has made important strides in addressing key land issues, particularly tenure security, dispute resolution, and encroachment prevention, its effectiveness is currently limited by coverage, digital infrastructure, and implementation gaps, especially in rural and remote areas. The findings concur with Imanbayeva et al. (2024), who emphasized that computerized land registration systems reduce land conflicts and overlapping claims by enhancing the transparency and clarity of land ownership records. Similarly, Gong and He (2022) observed that secure land tenure and reduced land disputes are among the key benefits realized from implementing digital land information management systems across Sub-Saharan Africa, though these benefits are often uneven due to poor infrastructure and limited coverage. The study also interviewed the District Land Survey Officer on key issues that ILMIS was intended to address. His response was as follows;

"ILMIS was introduced to help in preventing land encroachments, especially in areas where the system is fully functional. However, where the data has not been fully digitized, the risk of illegal occupation remains high."

The findings suggest that users generally agree ILMIS is achieving its intended goals, but not strongly. This implies that expectations have not been fully met due to factors like incomplete digitization, lack of real-time updates, insufficient training for users, and weak integration with environmental and legal enforcement systems. Furthermore, Coffie et al. (2024) argued that systems like that can significantly contribute to improved land governance and conflict resolution.

Data Integration and System Modernization: Moreover, during the interviewee with one of the Land Officer – from the Ministry of Lands, when asked on the key issues that ILMIS intended to address he has this to say; he has this to say.

"Before ILMIS, we relied heavily on paper-based records, which were often incomplete or hard to trace. The system has been introduced to keep land records through digitized, since it was expected to be easier to locate parcel details during service delivery."

These responses suggest that ILMIS has been used to make progress in solving major challenges that once made land management difficult in Tanzania. They indicate that ILMIS is seen as effective especially in joining different functions of land administration which are thought to be important for better planning and coordination. They also show the usefulness of ILMIS in dealing with longstanding problems like inefficiency and difficulty in accessing land records. Additionally, these responses indicate that people generally believe ILMIS is effective in integrating land administration functions. This is inline with the findings of the study by Petrakovska et al., (2024) and Pacurucu et al., (2022) who say that digitizing and integrating land administration systems improves transparency, access to records and how well the system works. During the interview with one among the ICT specialists from the implementation team when asked about what ILMIS aimed to achieve, they said:

"ILMIS has been introduced to make a significant progress in integrating land administration, registration, and surveying. The idea was to enable more cohesive decision-making and better tracking of land parcels."

Their response points out that combining land administration, registration and surveying are the key focus of ILMIS. These tasks previously were handled separately leading to problems in managing land effectively and poor communication. This means by developing a centralized and interoperable system, ILMIS aims to promote coordinated decision making. This could improve the accuracy of records, expedite provision of service and reduce duplication. This is in line with Djawa.(2023), who found that integrated land information systems can enable seamless workflows and reduce redundancies. Moreover, During the interview with Survey Officer when asked about the main objectives that ILMIS was aimed to solve. The interviewee responded as follows:

"ILMIS aimed to address the issue of Integration with other government databases like tax or municipal planning but these functionalities are still minimal"

This response implies that, limited integration with other government databases was a persistent challenge that ILMIS aimed to achieve.

The implication of this response is that limited integration with other government databases, such as tax systems and municipal planning was a persistent challenge that ILMIS intended to address. This implies that, without that integration, land data remains underutilized in critical policy areas such as revenue collection, urban planning and infrastructure development. ILMIS is thus intended to solve as a foundation for cross – sectional data sharing enabling more informed public sector planning and policy implementation. This statement reveals that cross-agency integration remains a challenge, even though it was one of ILMIS's intended goals. This is consistent with findings by Ryazantsev and Belik (2024): and Song (2022), who identified that land information systems in developing countries often face hurdles in integrating with other public sector databases due to institutional silos and lack of interoperability standards. In addition, during the interview with one of the Regional Land Administrators, when asked on the key issues that ILMIS intended to address he has this to say; he has this to say.

"One of the major issues intended to be addressed was the need for improvements and standardizing how land data is recorded. Previously, each region had different formats and codes."

The response suggests that the previous lack of standardized formats and codes across regions implies that ILMIS was designed to harmonize and unify land data recording practices nationwide. The implication is that inconsistencies in data formats and terminologies across regions previously led to confusion, legal ambiguities, and inefficiencies in land transactions. ILMIS is expected to introduce uniform procedures, thereby increasing trust, reducing disputes, and improving data reliability for decision-making at both local and national levels.

The response indicates that ILMIS was designed to harmonize and standardize land data recording practices across regions. Previously, discrepancies in formats and coding led to confusion and legal ambiguities. This concern resonates with Xue (2023), who highlight that lack of standardization in land record systems can create barriers to land transactions and legal enforcement.

Accessibility and Transparency: During the interview with one of the Land Officers, when asked on the key issues that ILMIS intended to address he has this to say; he has this to say.

"Previously, there was a difficultness in accessing land records, the process was manual that made people to travel to find land Offices and sometimes waiting for some days for a response. That was one among the key issues that ILMIS was intended to address. On top of that, ownership data must be swiftly retrieved and shared digitally with clients. The goal was to avoid Office traffic while at the same time increasing internal efficiency."

This provide information on the main issues that ILMIS was designed to address. Before the introduction of ILMIS, one of the biggest challenges was time consuming process of obtaining land records. The Land Officer clarified that people had to visit land Offices physically and wait many days to get information they required. This not only complicated things but also led to busy Offices and poor service provision. ILMIS was introduced to change this situation and make land records digital so that management and clients could get data faster and digitally. These changes improved efficiency in Office operations and also made the experience better for customers by reducing overcrowding and delays. These results concur with what Pacurucu et al. (2021) found that, highlighting how land information systems can improve access and efficiency by replacing old paper-based methods with digital tools especially in sub-Saharan Africa. Also Gong and He. (2022) found that, digitalizing land records helped improve access and transparency in Rwanda. Additionally, during an interview with one among the survey Officer, when asked on the main concerns that ILMIS was aimed to solve, the respondent said:

"Previously, people would file complaints and never heard back. But now the system tracks and logs issues and responses are faster and more traceable. So, requirement for the speed of responses pertaining to land related queries was one among the major issues that intended to be addressed by ILMIS."

Results shows that ILMIS improves responsiveness and accountability. Previously before introduction of ILMIS many complaints remained unsolved because of the absence of effective system. ILMIS enabled complaints to be recorded, tracked and addressed promptly and transparently. This ability improved service provision and enhanced public confidence in the land administration systems. By doing so, ILMIS fosters accountability in land governance bodies. These results match the findings of Imanbayeva et al. (2024), who claims that traceable, digitalized systems enhance transparency and reduce corruption in land management. Also, Coffie et al. (2024), highlight that ICT based land systems greatly boost accountability by facilitating complaint tracking and enabling citizen feedback.

The implication of these results is that, the enhancement of responsiveness and accountability through ILMIS before its implementation, land related complaints and queries were unsolved due to lack of proper tracking systems. Therefore, ILMIS enabled complaints to be logged, monitored and responded in timely and traceable manner. This functionality ensured faster service provision and builds public trust in the land administration system. By simplifying complaint resolution procedures and making service provision transparent, ILMIs promotes accountability within land governance institutions. This is in line with Imanbayeva et al. (2024), who argued that traceable and digitalized system

promote transparency and reduce corruption in land governance. Also, Coffie et al. (2024) noted that ICT based land systems significantly improve accountability by enabling complaint tracking and citizen feedback mechanisms.

Moreover, during the interviewee with one of the District Land Administrators, when asked on the key issues that ILMIS intended to address he has this to say; he has this to say.

"The need for receiving periodic updates through ILMIS including the need for the updates that are communicated more widely especially in rural areas where people may not have regular internet access."

The findings point out the need for regular updates and effective communication, particularly in rural areas where internet connectivity is limited. This indicates that ILMIS was also intended to improve communication channels and ensure that information is disseminated more equitably across different regions. The implication here is that while ILMIS has made significant strides in digitization and service improvement, there is still a pressing need to develop outreach strategies that can bridge the digital divide. This could include using mobile platforms, local media and community engagement to ensure that rural populations are not left behind in the transition to digital land management. This view aligns with Petrakovska et al. (2024), who note that digital land systems must be inclusive, especially in low-connectivity areas.

4.2.1 The aspects that have been fully met through ILMIS

Land tenure security and dispute reduction: Table 2 shows the results from the assessment of the integrated Land Management Information System in Tanzania suggests that the system has been notably effective in achieving its internal goals particularly in the areas of land tenure security and dispute reduction and efficiency and service delivery. The mean scores that range between 3.80 and 3.95 indicate that participants were strongly agree with positive contributions of ILMIS in land tenure security and dispute resolution.

Additionally, the mean score of 3.90 on encroachment prevention demonstrates that ILMIS has proved success in overseeing and protecting land from illegal or unauthorized occupation particularly in areas such as road reserves, wetlands and forests. The mean score for enhanced land tenure security implies a notable advancement in legal recognition and protection of land rights which remains essential for both individual and combined land owners. These findings shows that ILMIS contributed a lot in building trust in the land administration system by reducing conflicts and establishing more secure and systematic land management structure. These reinforce the perspective presented by Djawa (2023), who observed that land information system plays a vital role in regulating unlawful land usage and ensuring the preservation of environmentally vulnerable areas. This aligns with Ryazantsev and Belik (2024): who stressed that secure land tenure is a cornerstone for sustainable development and that modern land administration systems can facilitate such security.

Table 2 An analysis of the study under the theme of Land tenure security and dispute reduction.

Table 2

Land Tenure Security and Dispute Reduction

Statements	Mean	Std. Dev.
To increase land tenure security	3.82	1.139
To reduce land-related disputes by improving data accuracy and transparency	3.95	1.025
To prevent land encroachment	3.90	1.181
To prevent encroachments on wetlands, forests, road reserves and other public land	3.80	1.210

4.2.2.2 Efficiency and Service Delivery

Table 3 shows the results in terms of efficiency and service delivery, the results are even more encouraging with mean scores ranging from 3.83 to 4.10. The highest score (4.10) reflects respondents' strong agreement that ILMIS has reduced the time needed to check, update and transfer land highlighting its role in operational efficiency. Additionally, score of 4.07 and 3.97 for the delivery of secure and reliable land services and for streamlining land ownership verification and responsive public services. The public's confidence in the land administration system, measured at a mean of 3.90, has evidently mean been strengthened through ILMIS likely due to its transparency and consistency in service delivery. These results concur with Song (2022) who assertion that information system has improved efficiency by reducing time in land transaction processes and enhancing transparency aligns with Xue (2023) argument that digitized land administration systems can significantly increase transparency, reduce transaction times, and curb corruption in land governance in African countries.

Table 3*Efficiency and Service Delivery*

Statements	Mean	Std. Dev.
To improve public confidence in the land administration system	3.90	1.045
To reduce the time required to check, update and transfer land	4.10	.861
To provide affordable, secure and reliable land administration services to the customers	4.07	1.083
To streamline land ownership verification and title deed issuance	3.97	1.174
To reduce corruption associated with checks, registration and transfer of titles	3.83	1.094

Moreover, the mean score of 3.83 reflects the impact of the system on reducing corruption. The digitalization and automation have reduced the possibility of human intervention in land transactions there by avoiding chances or opportunities for fraudulent practices. Generally, these results shows that ILMIS has achieved what was expected to be done especially in the area of transparency, timely deliverance of land related services and building trust. The fact is that, stakeholders appreciated the system and agreed that ILMIS is working smoothly in handling land issues in the public sector of Tanzania. These findings match the Papaskiri et al. (2021), who argued about the needing proper and transparent systems to tackle poor and corrupt land transactions that are done behind the scenes.

With the mean scores ranging from 3.83 to 4.10 the efficiency and service delivery results are even more encouraging. The respondents' strong agreed that ILMIS has reduced the time needed to verify, update and transfer land and it is reflected in the highest score (4.10) underscoring the contribution of the system to increased operational efficiency. As evidenced by the mean scores of 4.07 and 3.97, the system has led in more responsive and accessible public services for provision of safe and dependable land related services for simplifying the verification of land ownership and title issue respectively. The public trust in the land administration system has clearly increased as a result of ILMIS, most likely as a result of its consistency and transparency in providing services. These findings match with what Imanbayeva et al. (2024) who argued that strong land governance systems are essential for better service delivery, less corruption and greater public trust.

Additionally, the mean score of 3.83 demonstrate the ability of the system to minimize corruption. This means by digitalizing and automating processes has minimized the requirement for human interaction in land related transactions which therefore reduced the opportunity for fraudulent practices. These results match Imanbayeva et al. (2024) who revealed operational benefits of land management information system.

Data Integration and System Modernization: Results in Table 4 show the results of Data integration and System Modernization. Here the mean scores range from 3.83 to 4.20 indicate that people strongly agree that ILMIS has helped improve the land administration system. The high score of 4.20 means that ILMIS has made land management processes more efficient which increase coordination and improve decision making. The mean score of 4.15 shows that people agree with ILMIS has made data sharing between government agencies complete and more connected. These findings are in line with what Imanbayeva et al. (2024), concluded about how sharing data between agencies is important for reducing duplication and improving services.

The mean score of 3.90 demonstrates the capability of the system to transform land records and maps into digital formats. This shows effectiveness in modernization efforts transitioning from manual to digital processes enhancing efficiency and reducing the risk of tempering or data loss. A mean score of 4.00 highlights the ILMIS's ability to keep data accurate and up to date which is crucial for dependable and timely land administration services. The findings match Gong and He (2022), who emphasized that real time access and data accuracy are crucial for reliable land governance systems. On top of that, indicates that although there is a chance for improvement, the process has been made in fostering consistency and minimizing data fragmentation. This is supported by Coffie et al. (2024), who argued that standardized land information should be fundamental outcome of any effective land governance system.

Table 4*Data Integration and System Modernization*

Statements	Mean	Std. Dev.
To support the process of transforming land records and maps into digital formats	3.90	1.115
To integrate land administration, land registration and surveying for better planning and decision making	4.20	.782
To integrate land records with other government databases for better planning and decision-making	4.15	.990
To ensure real-time updates across digital land systems	4.00	1.142
To standardize land data formats for consistency across agencies	3.83	1.117

Accessibility and Transparency: The mean score of 3.87 in table 5 reflect the agreement by the respondents that ILMIS has improved access to land information for both government agencies and the public. The ability to view

land records online was particularly managed, this is evidenced by a high mean score of 4.03 which shows the successful implementation of services that enable users to get land data without requiring to visit land Offices. This enhances both transparency and convenience for land owners and other stakeholders. These findings align with those of Petrakovska et al. (2024), who highlighted the transformative impact of digital land systems in fostering transparency and simplifying bureaucratic land access.

The mean scores for improving the user interface and language options (3.80) providing timely responses to land related inquiries (3.75) and regularly updating the public on land policy changes (3.77) suggest that ILMIS has made significant progress towards delivering inclusive and responsive services. Although these scores are slightly lower, they still indicate a general consensus that ILMIS has improved communication and public engagement. Overall, these findings suggest that ILMIS has successfully achieved several key objectives especially in digitalizing land data, integrating systems for improved coordination and increasing the accessibility and transparency of land information thereby boosting trust, accountability and efficiency in land management in Tanzania. These results aligns with the recommendations of Pacurucu et al. (2022), who support the use of national electronic land registries to decrease land conflicts, stimulate investment and ensure fair access to land.

Table 5*Accessibility and Transparency*

Statements	Mean	Std. Dev.
To enhance accessibility to land information for both government agencies and the public	3.87	1.101
To enable online access to land ownership records	4.03	.936
To improve user interface and language options for inclusive access	3.80	1.210
To provide timely responses to land-related queries	3.75	1.201
To standardize land data formats for consistency across agencies	3.77	1.108

4.3 Inferential Statistics Analysis Results

The One-Sample t-test was run so as to determine whether there is a significant difference between the key issues that ILMIS was intended to address and the aspects that have actually been fully met. Through comparing the average responses from stakeholders (such as land officers, surveyors, and administrators) to a set benchmark or expected outcome, the test shows if the system's implementation has met expectations or if gaps still exist. The findings are presented in table 4.6 below that shows the results of the one-sample t-test.

Table 6*One-Sample t-test*

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Intended	82.827	359	.000	3.86750	3.7757	3.9593
Fully Met	84.982	359	.000	3.92594	3.8351	4.0168

Table 6 indicates the results of the One-Sample t-test reveal important implications regarding the perception of stakeholders on the effectiveness of the ILMIS. Both sets of variables—key issues that ILMIS was intended to address (mean = 3.8675) and the aspects that have been fully met (mean = 3.9259) have statistically significant t-values (82.827 and 84.982, respectively) with p-values of .000. These results indicate that respondents significantly agreed with the items listed under both categories, meaning they acknowledged the relevance of the issues ILMIS was meant to solve and recognized that several of those issues have indeed been addressed.

Furthermore, the mean value for the aspects fully met (3.93) is slightly higher than that for the intended issues (3.87), suggesting a positive perception toward the performance of ILMIS. This could imply that, from the respondents' perspective, ILMIS may have not only achieved its objectives but potentially exceeded initial expectations in certain areas. However, it is important to note that this slight increase does not necessarily establish a statistically significant difference between the two categories since the One-Sample t-test assesses each mean against a test value (often 0), not against each other.

To determine whether there is a significant difference between the key issues ILMIS was intended to address and the aspects that have been fully met, a Paired Sample t-test would be more appropriate, given that both sets of data likely come from the same respondents. If such a test was conducted and the result showed a p-value less than 0.05, it would indicate a statistically significant difference between perceived intentions and actual achievements. In such a

case, a positive mean difference would suggest ILMIS has outperformed expectations, while a negative one would point to a gap between intended outcomes and what has actually been achieved.

In conclusion, despite of current findings to show high agreement on the intended goals and achievements of ILMIS, the slightly higher mean for the achievements reflects a generally favorable view of impact of the system. However, a direct comparison using a paired sample t-test was needed to determine if this difference is statistically significant and make stronger conclusion about the effectiveness of ILMIS in achieving its goals. This method is in line with the research by Djawa (2023) and matches to statistical principles described by Ryazantsev and Belik. (2024). Still, involving other evaluation criteria from comprehensive system assessment frameworks and conducting effect size analysis would further strengthen the reliability of results.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

Generally, the assessment of Integrated Land Management Information System indicates that the system has significantly enhanced land management thereby increasing efficiency, data management and transparency. Its implementation enabled the digitalization and centralization of land records leading to improved service provision and reduced chances of corruption. Nonetheless, the study also highlighted significant performance issues, such as infrastructure support, limited interoperability with other systems and challenges in technical capacity.

To fully unlock the potential of ILMIS, Ongoing investment in system improvements, capacity development and stakeholder involvement is necessary. Addressing issues of data accuracy, user training and public awareness will be critical to strengthening trust and adoption. Moreover, integrating ILMIS with broader land-use planning and governance frameworks will ensure it becomes a more inclusive and sustainable tool for land management in Tanzania. A more responsive and robust ILMIS can significantly contribute to secure land tenure and long-term socio-economic development.

5.2 Recommendations

The Government should address persistent challenges like poor internet connectivity, limited access to computers in rural offices and frequent power outages that hinder the effective use of the Integrated Land Management Information System. Also, the fully met aspects (e.g., Secure digital land records, quicker processing of land titles, improved transparency) should be maintained and replicated in other regions of Tanzania.

Furthermore, the Government should develop resilient backup and Cybersecurity strategies and implement data redundancy (Offline backups), disaster recovery plans and safeguards against performance issues under load. Additionally, a secure strong institutional frameworks and leadership continuity. i.e., Ensure dedicated budget lines for the Integrated Land Management System; strengthen governance to withstand leadership changes; train project management in change and leadership dynamics as similarly recommended in Kenya's NLIMS caseIPRJBRepository.maseno.ac.ke.

It is advised to bridge formal Integrated Information Management Information Management System with traditional or customary systems, Dialogue with customary landholders, document and include their rights in the system and develop hybrid approaches allowing recognition of informal tenure. Nonetheless, regular performance evaluations and user satisfaction surveys to ensure that the system continue to meet its intended goals should be established.

It is the responsibility of the Government to ensure that, the system is integrated with other systems such as municipal planning tools in order to improve efficiency and data consistency across sectors. Also, the implementation of ILMIS should be expanded from Dar es salaam and Dodoma to additional regions through a phased approach that incorporates technical assistance, infrastructure enhancement and staff training. Lastly, many key issues stem from lack of understanding or awareness among stakeholders (Land Officers, System users etc.) therefore, regular training and awareness campaigns should be conducted to ensure that all users understand the purpose and capabilities of the Integrated Information Management Information System.

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