Research Article

Smart-Access Community Information System

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ABSTRACT

This research study looked into the prospective implementation of the Smart-Access Community Information System (SACIS). The respondents comprised 20 licensed local geodetic engineers who are duly registered with the Geodetic Engineers of the Philippines (GEP), as well as 30 Geodetic Engineering students from Baguio Central School. The study utilized a developmental-descriptive research design in conjunction with a descriptive survey approach to obtain comprehensive insights into stakeholder perceptions. Data were primarily collected through a structured questionnaire, which was carefully adapted and refined to ensure its validity, clarity, and appropriateness for addressing the research objectives. Based on the data collected, the study revealed several key findings: The current level of awareness regarding Smart Access to Land Information was assessed and established. Findings indicate that the Smart-Access platform is highly effective in terms of accessibility, accuracy, efficiency, and transparency. Moreover, the potential challenges that may arise during the future implementation of the Smart Access Community Information System (SACIS) are perceived as very much serious by the respondents, underscoring the need for careful planning and mitigation strategies to ensure successful deployment. The study concludes that the community has moderate awareness of Smart Access Community Information System (SACIS), understanding its objectives and benefits but showing varied knowledge across its purpose, services, and impact. The Smart-Access platform is considered highly effective, improving accessibility, accuracy, efficiency, and transparency compared to traditional methods, and is recognized for enhancing service delivery. However, respondents also perceive potential challenges—such as limited digital infrastructure, low digital literacy, and resistance to change—as highly serious, highlighting the need for proactive planning, capacity building, and

targeted strategies to ensure successful implementation and sustainable use.

Introduction

Globally, access to reliable and updated land information is a major challenge, especially in developing countries where records are often paper-based, fragmented, or outdated. These traditional systems limit transparency, hinder land tenure security, and slow down governance and development processes. To address these issues, several nations and international organizations have adopted Smart-Access or community-based information systems that integrate digital mapping, data management, and participatory land administration. These systems aim to make land information more accessible, transparent, and inclusive through online platforms and mobile applications (USAID, n.d). In many regions, initiatives such as the Mobile Applications to Secure Tenure (MAST) and the Cadasta Foundation's community-driven mapping platform have demonstrated the value of technology in empowering local communities to collect, verify, and manage land data (Cadasta Foundation, 2024).

The integration of Geographic Information Systems (GIS) and smart technologies offers a practical solution to these challenges. GIS enables the collection, analysis and visualization of spatial data, supporting the development of accurate maps and computation tools for land parcels (Huisman & de By, 2009). With the advent of cloud computing, mobile technology, and open-source platforms, it is now possible to build smart access systems that provide real-time geospatial information to both government agencies and community members (Schmandt, 2012). These systems ensure accessibility, accuracy, and participation in improving governance and promoting transparency in land-related transactions.

In the Philippines, the need for efficient access to land information has driven the government to adopt digital and map-based systems. The Land Administration and Management System (LAMS) of the Department of Environment and Natural Resources (DENR) was developed to digitize land records and make cadastral maps and survey data more accessible to the public (Land Management Bureau, n.d.). Similarly, the National Mapping and Resource Information Authority (NAMRIA) launched the Philippine GeoPortal, an online platform that integrates geospatial data for land use planning and environmental management (NAMRIA, n.d.). These national initiatives lay the groundwork for a Smart-Access Community Information System that promotes transparency, efficiency, and inclusivity in land administration across the country. At the local level, several municipalities in the Philippines have begun adopting digital and map-based land information systems to enhance land management and community planning. The Guagua Geographic Information System (GGIS) in Pampanga, for instance, provides a digital platform for mapping land parcels, ownership, and land use data, improving tax collection, zoning, and disaster risk management (Development Academy of the Philippines, n.d.). Similarly, local projects such as the GIS-based Land Use and Land Cover Mapping in Barangay San Miguel, Alaminos, Laguna, have demonstrated how accessible mapping tools can support community decision-making and sustainable development (Enverga, 2024). These initiatives show how local governments can benefit from Smart-Access Community Information Systems that integrate land data and mapping to promote transparency and efficiency in local governance.

This research addresses existing gaps by developing a Smart Access System for Community-Based Information, focusing on lot data computation, lot mapping, and Geodetic Control Point (GCP). It aims to support both

technical users (such as surveyors and geodetic engineers) and non-technical stakeholders (such as property owners and community members), promoting efficient data access, transparency, and informed decision-making within the community. By implementing such a system, local government units can streamline land data management, property owners can access updated lot information and communities can participate actively in land resource management. Ultimately, the proposed system aims to modernize land information systems and bridge gap between technology and community participation.

This study is significant because it addresses the growing need for accessible and accurate land information systems, particularly in developing regions where cadastral mapping and lot computation remain manual and fragmented (Cambell & Shin, 2011*)*. By developing a Smart Access system, the research provides a modernized platform for searching lot data computation and mapping which is essential for land administration, property taxation, infrastructure planning and community development.

This study also emphasizes participatory approaches, allowing local communities to take an active role in verifying land boundaries and sharing spatial information. Government agencies, surveyors and community stakeholders will benefit from streamlined processes, reduced discrepancies and improved trust in land information system.

As the study in Smart Access for Community Based Information (lot data computation & mapping), it will be beneficial to the following people:

For Local Government Units (LGU's), it improves efficiency in lot verification, property taxation, and land using planning. Reduces human error and minimizes disputes by providing accurate geospatial data. Enhances transparency in land transactions supporting anti-corruption initiatives.

Geodetic Engineers rely heavily on timely and accurate land lot information to perform critical tasks such as surveying, land titling, and property boundary verification. However, the traditional methods of accessing this data—through manual records, in-person requests, and fragmented government systems—are often inefficient and time-consuming. These limitations hinder productivity and affect the overall quality of geospatial services. With the advancement of digital technologies, a Smart-Access platform presents a more efficient alternative by enabling real-time, secure, and remote access to land information. This study explores the challenges, awareness and effectiveness of potential implementation of Smart Access to improve accessibility, accuracy, efficiency, and transparency in land data management for Geodetic Engineers. The study sought answers to the following questions:

1.) What is current awareness about Smart-access to land information?
2.) What is the level of effectiveness of the Smart-access platform compared to traditional methods in terms of accessibility, accuracy, efficiency, and transparency?
3.) What is the degree of seriousness of potential challenges that may arise during the future implementation of the Smart Community Access System?

Assumption of the Study

The following are the basic assumptions of the study:

1.) The current awareness about smart-access to land information will be moderate.
2.) The level of effectiveness of the Smart-Access platform compared to traditional methods in terms of accessibility, accuracy, efficiency, and transparency will be moderate.
3.) The degree of seriousness of potential challenges that may arise during the future implementation of the Smart Community Access System will be moderate.

Materials and Methods

The study will anchor on the following theories that provide a foundation for understanding the development and adoption of Smart-Access to land information systems. These theories explain how technology, users, and institutions interact to promote efficiency, transparency, and accessibility in land information management.

The Diffusion of Innovation Theory explains how new technologies, systems, or

practices spread within a social system over time. According to Rogers (2003), the rate of adoption of an innovation is influenced by five key attributes: relative advantage, compatibility, complexity, trialability, and observability. In the context of this study, the Smart-Access system represents an innovation that aims to replace traditional, manual methods of accessing land lot, map and community information. Its adoption by geodetic engineers, residents, and local government officials will depend on how beneficial the system is compared to current practices, how easily it integrates with existing processes, and how user-friendly and accessible it is. By applying this theory, the study will assess the likelihood of community acceptance of the Smart-Access platform as a modern tool for promoting efficiency and transparency in land information management.

Another theory is the Participatory Geographic Information Systems (PGIS) Theory, where in, it merges geospatial technologies with community engagement to improve local decision-making and governance. PGIS moves beyond traditional, expert-driven GIS by involving community members in the mapping, validation, and interpretation of spatial data. This approach ensures that geospatial outputs are not only technically accurate but also socially legitimate and transparent, reflecting the knowledge and priorities of the people directly affected (Sieber, 2006).

For this study, PGIS provides a theoretical foundation for integrating community participation into the Smart-Access platform. By allowing residents and geodetic engineers to contribute to data validation and feedback, the system promotes accuracy and inclusivity in land lot data management. Such participatory mechanisms also foster trust and accountability, helping minimize disputes and empowering communities to play an active role in land governance and local decision-making.

The Information Systems Success Model, developed by DeLone and McLean (2003), provides a comprehensive framework for evaluating the effectiveness of information systems. It identifies six interrelated dimensions: system quality, information quality, service quality, use, user satisfaction, and net benefits. These dimensions emphasize that the success of an information system is not only determined by its technical reliability but also by the quality of the information it delivers, the support services provided, and the overall satisfaction of its users. In the case of the Smart-Access platform, the model highlights the importance of designing a system that is user-friendly, accurate, and dependable, while also ensuring that it delivers meaningful benefits to geodetic engineers, community residents, and local government units. By applying this model, the study evaluates whether the Smart-Access system achieves its intended purpose of improving accessibility, efficiency, transparency, and security in land lot and community information management.

In addition, The Information Systems Success Model has been widely applied in assessing e-government platforms, including in the Philippine context. A study published in the Philippine Management Review, Vol.27, 57-58 (2020) evaluated systems such as the GSIS, SSS, and BIR portals and found that information quality and trust in technology were the most significant factors in establishing trust in e-government services, while system quality was found to have a lesser but still notable influence. This indicates that citizens place the greatest value on the accuracy, reliability, and credibility of information they receive from digital systems, and that building trust is crucial for adoption and sustained use.

The study assumes that introducing a Smart-Access Community Information System platform (independent variable) can lead to better community engagement and more effective information sharing (dependent variables). However, the success of this outcome depends on several factors—such as the platform's features (like GIS integration, centralized data, and feedback system), how accessible it is (whether it works smoothly on both mobile and desktop, and how easy it is to use), and the level of participation from users, particularly residents and geodetic engineers, in adopting the system.

When these factors align together, the platform can deliver outcomes such as quicker access to updated land lot information, greater transparency in local governance, more efficient work for professionals, and stronger trust

within the community. This framework shows how technology, users, and governance interact with one another, making Smart-Access as an essential tool for today's community development.

This chapter presents the approach and methods utilized in conducting the study. It details the research design, data collection methods, respondents, instruments, and procedures applied to ensure the accuracy and credibility of the results. The methodology serves as a guide for systematically achieving the research objectives.

Research Design

The research will utilize a developmental-descriptive research design to address both the creation and evaluation of the Smart Access Community Information System (SACIS). This combined approach, often seen in practical information systems research, leverages two key components: the developmental component will focus on the systematic design, construction, and implementation of the SACIS prototype, particularly the Lot Data Computation (LDC) module. This iterative design process is fundamentally aligned with the principles of Design Science Research (DSR), which seeks to build and evaluate innovative IT artifacts to solve organizational problems (Hevner et al., 2004). The descriptive component will involve initial assessment of the community's current information access practices and challenges, as well as the subsequent collection of evaluative feedback on the developed system. This descriptive phase is crucial for grounding the system in real-world needs and verifying its utility post-development, a concept central to applied research (Creswell, 2014).

The data to be utilized in this study will be sourced from Middle Quirino Hill, Baguio City. This area was chosen because of its diverse land features, residential layout, and ongoing community development projects that make it ideal for evaluating the system's core features—specifically, the search function for lot data computation, lot map, and Ground Control Point (GCP) reference. Using actual data from Middle Quirino Hill ensures that the system operates with realistic and context-based information, allowing for an accurate assessment of

its functionality and performance. The respondents of this study will include Geodetic Engineers and Geodetic Engineering students, as their technical expertise and familiarity with land surveying processes are essential for the future implementation of the system. Their insights will help determine how effectively the system can assist in simplifying access to essential land information and improve data management for both professional and educational applications in the field of geodetic engineering.

Although global and national initiatives have increasingly adopted digital, map-based, and community-oriented land information systems, significant gaps remain in the integration, accessibility, and usability of land data at the local community level, particularly in the Philippines. Existing systems—such as LAMS, the Philippine GeoPortal, and local GIS projects—primarily focus on digitizing records and providing geospatial data, but they often lack features that support real-time lot data computation, community participation, and direct integration of geodetic control points (GCPs). These limitations leave a gap between national digital initiatives and the practical needs of local users, including surveyors and property owners.

Moreover, many current systems are designed mainly for administrative use, resulting in limited accessibility for non-technical users, who often struggle to obtain updated parcel information without relying on manual processes or physical office visits. While previous studies highlight the value of participatory mapping and GIS-based systems, there is little research on how Smart-Access platforms can simultaneously provide accurate computation tools, user-friendly lot mapping, and participatory validation mechanisms in a single centered system.

Another gap lies in the evaluation of technology adoption and system effectiveness. Existing literature has not sufficiently examined how local communities perceive digital land platforms in terms of awareness, usability, and trust, nor how factors identified in theories like the Diffusion of Innovation (Rogers, 2003), PGIS (Sieber, 2006), and the Information Systems Success Model (DeLone & McLean, 2003)

influence successful adoption at the barangay or municipal level.

Finally, although several digital systems exist, few studies focus on the challenges that arise during actual implementation, such as limited digital infrastructure, low digital literacy, funding constraints, and the risk of excluding vulnerable groups. These challenges are rarely examined in the context of Smart-Access systems specifically designed for lot data computation, mapping, and GCP integration.

The study will anchor on the following theories that provide a foundation for understanding the development and adoption of Smart-Access to land information systems. These theories explain how technology, users, and institutions interact to promote efficiency, transparency, and accessibility in land information management.

The Diffusion of Innovation Theory explains how new technologies, systems, or practices spread within a social system over time. According to Rogers (2003), the rate of adoption of an innovation is influenced by five key attributes: relative advantage, compatibility, complexity, trialability, and observability. In the context of this study, the Smart-Access system represents an innovation that aims to replace traditional, manual methods of accessing land lot, map and community information. Its adoption by geodetic engineers, residents, and local government officials will depend on how beneficial the system is compared to current practices, how easily it integrates with existing processes, and how user-friendly and accessible it is. By applying this theory, the study will assess the likelihood of community acceptance of the Smart-Access platform as a modern tool for promoting efficiency and transparency in land information management.

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Result and Discussion
Level of Awareness about Smart-access to land Information

Table 1 Presents the respondents level of awareness regarding Smart Access to Land Information.

Table 1. Level of Awareness of Respondent About Smart-access to Land Information n=50

	INDICATORS	VMA 5	MA 4	MoA 3	SA 2	LA 1	TWP	WM	DE	R
1.	How aware are you of the proposal to implement a Smart Access Community Information System (SACIS)?	7 (35)	8 (32)	6 (18)	14 (28)	15 (15)	128	2.56	SA	1
2.	How aware are you of the purpose of the proposed SACIS in your community?	5 (25)	10 (40)	7 (21)	15 (30)	13 (13)	129	2.58	SA	2
3.	How aware are you of the services that the SACIS is expected to provide (e.g., digital access)?	10 (50)	5 (20)	8 (24)	17 (34)	10 (10)	138	2.76	MoA	3
4.	How aware are you of any community announcements or consultations related to the SACIS?	8 (40)	7 (28)	4 (12)	16 (32)	15 (15)	127	2.54	SA	5
5.	How aware are you of how SACIS might change your access to public services?	7 (35)	7 (28)	9 (27)	15 (30)	12 (12)	132	2.64	MoA	4
	Overall Weighted Mean							2.62	MoA	

The results indicated that the respondents possessed a generally moderate level of awareness regarding the Smart Access Community Information System (SACIS), as reflected in the overall weighted mean of 2.62. Although the respondents exhibited some familiarity with the concept, their understanding remained uneven across different indicators. Awareness of the SACIS proposal ($\bar{x}$ = 2.56) and its purpose ($\bar{x}$ = 2.58) falls within the lower range, suggesting that the system had not been effectively communicated to the public. This aligned with

research showing that citizens' awareness of e-government systems was often limited when outreach strategies were insufficient or not targeted toward community needs (Wickramasinghe, 2025). Similarly, studies emphasized that awareness was a key but often overlooked factor influencing technology acceptance in digital public services, as citizens required clear, consistent information to form favorable attitudes toward new platforms (Hasan et al., 2025)

Respondents demonstrated the highest awareness regarding the services SACIS was expected to provide ($\bar{x}$ = 2.76), which may reflect their understanding of how the system could support practical tasks such as accessing land information, geodetic reference points, and community records. This was consistent with findings that citizens more readily recognized system features that directly related to their daily activities and perceived usefulness (Djatmiko et al., 2025).

Table 2. Level of Effectiveness of the Smart-access Platform Compared to Traditional Methods in

	INDICATORS	VME 5	ME 4	MoE 3	SE 2	LE 1	TWP	WM	DE	R
1.	The SACIS helps surveyors save time and effort.	32 (160)	9 (36)	7 (21)	1 (1)	1 (1)	219	4.38	VME	5
2.	How effective is the system at providing information that is easily accessible anytime and anywhere?	30 (150)	13 (52)	3 (9)	4 (8)	0 (0)	219	4.38	VME	5
3.	How effective is the system at providing accurate lot data computations?	31 (155)	11 (44)	4 (12)	3 (6)	1 (1)	218	4.36	VME	6
4.	How effective is the system at presenting maps that are clear and easy to interpret?	29 (145)	15 (69)	4 (12)	1 (2)	1 (1)	229	4.58	VME	1
5.	The system allows users to access lot data at any time, improving convenience and efficiency.	31 (155)	10 (40)	7 (21)	2 (4)	0 (0)	220	4.40	VME	4
6.	The system provides clear and easy-to-read maps for identifying lot boundaries.	33 (165)	11 (44)	5 (15)	1 (2)	0 (0)	226	4.52	VME	2
7.	Effectiveness of the Smart Access Community Information System compared to traditional manual methods.	31 (155)	13 (52)	5 (15)	1 (2)	0 (0)	224	4.48	VME	3
	Overall Weighted Mean							**4.44**	**VME**	

Terms of Accessibility, Accuracy, Efficiency, and Transparency   n=50

Table 2 Presents the level of effectiveness of the Smart-access platform compared to traditional methods in terms of accessibility, accuracy, efficiency, and transparency.

The findings of the study indicated that the Smart Access Community Information System (SACIS) was collectively perceived by respondents as very much effective in achieving its

intended goals of improving land information management. The consistently high weighted means across all performance indicators—ranging from 4.36 to 4.58—reflect strong user confidence in SACIS's ability to streamline operations, enhance accuracy, and provide reliable access to land data. This overall perception highlights the successful transition from traditional, manual processes to a more efficient, transparent, and user-centered digital system.

According Jiang, Yang, et al. (2024), digital transformation in land administration substantially reduced processing time and minimized operational errors, leading to greater user satisfaction and institutional efficiency. In the same vein, Zachariah (2025) emphasized that ICT-based governance platforms enhanced productivity by removing redundancies and ensuring smooth interdepartmental coordination.

Table 3. Degree of Seriousness of Potential Challenges that may Arise during the future Implementation of the Smart Community Access System n=50

INDICATORS	VMS 5	MS 4	MoS 3	SS 2	LS 1	TWP	WM	DE	R
1. How serious would the lack of internet and digital infrastructure (Server, Network, Software) be as a challenge to implementing the Smart Access Community Information System?	32 (160)	13 (52)	4 (12)	0 (0)	1 (1)	225	4.50	VMS	1
2. How serious would low digital literacy (individual's limited ability to use and understand digital technology) among community members be as a challenge to effective implementation?	16 (80)	26 (104)	5 (15)	3 (6)	0 (0)	205	4.10	MS	3
3. How serious would the lack of funding or resources be in hindering implementation?	28 (149)	16 (64)	5 (15)	1 (2)	0 (0)	230	4.60	VMS	2
4. How serious would the exclusion of vulnerable groups (e.g. remote areas) be as a concern?	24 120	16 64	8 24	2 4	0 0	212	4.24	VMS	4
Overall Weighted Mean							**4.36**	**VMS**	

Similarly, Mutiarin et. al. (2024), emphasized that in developing regions, infrastructural readiness directly determines the scalability and operational stability of digital governance systems. The low digital literacy among community members ($\bar{x}$ = 4.10) was also rated as much serious concern, indicating that many citizens may struggle to use SACIS effectively without adequate training. Saleh et.al. (2024) argued that limited user capability and awareness remained critical barriers to ICT adoption, as citizens must possess both access and understanding to benefit from digital services. This aligned with Yildiz (2007), who stated that e-

government initiatives often failed when citizens lacked the digital competence to interact meaningfully with online platforms.

Conclusion

Based on the results of the study, the following conclusions were drawn.

1. The community had a moderate understanding of the system, with awareness varying across its purpose, services, and benefits. Although information has been disseminated, it lacked clarity and consistency, resulting in limited comprehension and engagement. This moderate

awareness may hindered system adoption, trust, and the overall effectiveness of digital service delivery.

2. The Smart-Access platform significantly improved accessibility, accuracy, efficiency, and transparency compared to traditional methods. It enabled quicker access to information, minimized human error, reduced processing time, and increased public visibility of information. Respondents' positive evaluation highlights its effectiveness and the need for continued education and support to maximize its impact.

2. 3.The challenges identified such as digital infrastructure limitations, insufficient training, low digital literacy, and resistance to change are viewed as highly serious. This recognition underscores the need for proactive planning, capacity building, and resource allocation to ensure successful and sustainable implementation of the Smart-Access Community Information System.

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Dedication

I wholeheartedly dedicate this to my loved ones, especially to my family who always encouraging and supporting me.

MEICHEE

To my family, Thank you.

KEVIN

I dedicate this research to my parents, who have always stood by me with love and strength. To my friends, whose encouragement and understanding made even the toughest days manageable. I am forever grateful for your presence in my life.

SHELLY

This research is dedicated to the unwavering support of my family, whose love, sacrifices, and encouragement provided the foundation for this work; to my mentors, friends, and colleagues, whose guidance and support made challenges more manageable; and to myself, for the perseverance, determination, and resilience that carried me through obstacles and ensured the completion of this journey. Iya-Iyaman for fueling this journey!

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ROMEO

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