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# Integration of Geospatial Data and Information in Margoluwih Village, Yogyakarta and Its Utilization for Multiple Stakeholders

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**ABSTRACT**

As technology develops, geospatial information has been used for policy-making and decision-making. One of the geospatial technologies used is the Geographic Information System, which has been widely built and utilized by related agencies up to the village or district level. This article explains the strategy and parties involved in developing geospatial data and information integration in Margoluwih District and the benefits for these parties. The research method uses descriptive-qualitative data collection through interviews, observation, and documentation. The results of this paper show that geospatial data and information created by various parties can be integrated into an information system. The parties involved in providing data and receiving benefits from the development information system are the National Land Academy, Margoluwih District Government, Land Office of Sleman Regency, Land and Spatial Planning Office of Sleman Regency, Regional Financial and Asset Agency of Sleman Regency, UPTD Agriculture, Food, and Fisheries Extension Center Region III, Margoluwih Village Community Institution, and the Margoluwih Village Community. This indicates that the integration carried out provides benefits for multiple parties. The Margoluwih District Government, as data regent or information system manager, is expected to always maintain and update information independently and sustainably.

## A. Introduction

In support of national development and economic growth, one essential policy is the formulation of geospatial information policy (Hartarto, 2021). Given the critical importance of geospatial information, the Indonesian government, through the Geospatial Information Law, stipulates that activities related to terrestrial space require decisions analyzed based on geospatial data and information. The existence of this regulation aims to facilitate the integration of various geospatial data and information. Geospatial-related policies are implemented through the One Map Policy by the Geospatial Information Agency (Avtar et al., 2020; Mustofa & Wahyuni, 2020; Silviana, 2019). In its execution, the development of this information is supported by other ministries or agencies such as the Ministry of Energy and Mineral Resources (Pakpahan et al., 2019), the Ministry of Agrarian and

Spatial Planning/National Land Agency (Amrin, 2021; Sanjaya, 2023), local governments (Maryuni et al., 2021), and so forth.

Facing the era of the Fourth Industrial Revolution, geospatial technology emerges as a prominent factor (Sugianto et al., 2019). Among these technologies, Geographic Information System (GIS) takes the spotlight. GIS serves to collect geospatial data and information and then translates them into actionable insights, aiding decision-making and policy formulation (Supriadi & Oswari, 2020). With its versatile applicability, GIS finds utility across various scales, ranging from national (Hakim & Lee, 2020), to provincial (Ruiz et al., 2020; Saing et al., 2021), district/city (Munir et al., 2023; Partoyo & Lukito, 2022), sub-district (Bachri et al., 2020; Mujib et al., 2021), down to the smallest administrative units of villages (Afnarius et al., 2020). Indeed, villages/urban wards represent the foundational level for database development (Hamsinar et al., 2017).

The utilization of Geographic Information Systems (GIS) at the village/urban ward level aligns with the implementation of Article 86 of Law Number 6 of 2014 concerning Villages. Villages/urban wards are entitled to access information through information systems developed by the local district/city governments. Moreover, governmental initiatives promote digital village programs to foster development planning, harness village potential, and enhance village information systems (Mahendra & Nugraha, 2021; Supriyanto & Hana, 2020; Suwondo et al., 2020). The availability of integrated data and information is essential for delivering community services effectively. Geospatial data and information integration aims to visually present village data and information tailored to local needs, particularly for governance administration purposes (Hotimah, 2019). Challenges encountered in governance administration at the village/urban ward level, especially in the field of land administration, include inadequate documentation of land administration activities, the absence of initiatives aimed at improving the quality of human resources related to land administration, and the low level of technological literacy among village/urban ward officials and the community (Amanita & Septiansyah, 2020; Redy et al., 2022). Consequently, village/urban ward governments require a systematic approach to ensure the orderly administration of land (Arnanto et al., 2023).

One of the missions of the Government of Margoluwih Village is to realize courteous, professional, and thorough public services by leveraging information technology. Effective public service is manifested through the establishment of good governance characterized by integrity, accountability, transparency, and adherence to regulations (Rustam et al., 2021; Segah, 2020), which aligns with another mission of the Government of Margoluwih Village (Pemerintah Kalurahan Margoluwih, 2017b). However, obstacles persist in achieving these visions and missions. The capacity of the Margoluwih Village apparatus still requires enhancement in serving the community (Pemerintah Kalurahan Margoluwih, 2017a). Land administration in Margoluwih Village is still primarily textual, indicating the absence of a spatial inventory of village land (LKPPKal Kalurahan Margoluwih, 2022). Based on these circumstances, there is a need for the integration of various data and information in Margoluwih Village into an information system. To realize such a system, the involvement of various stakeholders is necessary to support and utilize it effectively.

Numerous studies have extensively discussed the integration of geospatial data and information for land information systems and their practical applications. Geospatial land data derived from the Computerized Land Activities (KKP) application is valuable both internally and externally beyond the Ministry of ATR/BPN (Amrin & Sopyan, 2023; Arnowo, 2020). Previous research by Abinowo et al. (2019) focused on designing and developing the integration of physical and juridical data for the Comprehensive Systematic Land Registration (PTSL) activities. Subsequently, the database resulting from PTSL activities is utilized to compile multifunctional cadasters (Arnanto et al., 2023). Budiyono and Aditya (2022) also highlighted the significance of land geospatial data and information for various stakeholders and in the compilation of multifunctional cadasters. Meidodga et al. (2023) further emphasized that fully digitized geospatial land information at the village/urban ward level facilitates land information access and benefits multiple stakeholders through literature review and depiction of land information from a single village/urban ward, consequently fostering village/urban ward potential (Febriantoro & Suaidah, 2021). Furthermore, to ensure the continuity of multifunctional and multi-stakeholder geospatial information, there is a need for human resource development through dissemination and training initiatives (Hilda & Elly, 2019).

This paper presents a departure from prior research endeavors by centering on the roles played by various stakeholders in the integration of geospatial data and information within Margoluwih Village, Seyegan Sub-District, Sleman Regency. While the involvement of stakeholders in land database development endeavors has been explored previously, this paper delves into their specific roles and strategic approaches concerning the Comprehensive Systematic Land Registration (Cahyono et al., 2020; Harfianty et al., 2020). Moreover, alongside delineating stakeholder roles, this paper expounds upon the resultant benefits and the sustainability of integrating data and information for these stakeholders. The objective is for this paper to contribute significantly to the establishment of a systematic framework for integrating geospatial data and information at the village/urban ward level, with a particular emphasis on stakeholder engagement and strategic methodologies in system development.

## B. Methods

The research methodology employed in this study adopts a qualitative descriptive approach with a case study design. Data collection methods encompassed interviews, observations, and documentation, with the researcher actively involved in the integration of geospatial data and information within Margoluwih Village, Seyegan Sub-District, Sleman Regency. Primary data sources were derived from direct field observations, interviews, and documented activities. The observational phase aimed to elucidate stakeholder involvement in system development, including data provisioning, and to delineate the associated benefits. Key informants in this study were officials from the Margoluwih Village Government, who would utilize the outcomes of geospatial data and information integration activities, thus ensuring that the analysis of information system needs originates from prospective managers. Conversely, documentation of activities, serving as secondary

data, was sourced from Margoluwih Village archives and related institutions requiring land data and information. This included official documents, legislation, and internet resources utilized for literature review purposes. Data analysis entailed processes of data reduction, data display, and drawing conclusions. The ultimate aim is for the obtained data to be seamlessly integrated to offer solutions to existing problems.

**C. Land Information Needs in Margoluwih Village**

As a provider of public services, Margoluwih Village Office is expected to facilitate and serve the community in a transparent, active, professional, and thorough manner. In this era of the Fourth Industrial Revolution, services are increasingly transitioning towards digital technology for improved efficiency and accessibility. For instance, population records are already digitized and stored within the office database (Pemerintah Kalurahan Margoluwih, 2023). Moreover, the village's profile and potential are readily available online through the Margoluwih Village website, while data pertaining to agriculture, health, and social aspects are also digitally cataloged. However, when it comes to land information, the village currently lacks both spatial and textual data available online or stored digitally. Presently, land-related data remains predominantly manual, recorded in archival books, ledgers, and analog maps. Land information services such as sales, transfers, exchanges, and other transactions are documented manually. This reliance on manual record-keeping makes land data vulnerable to loss, misplacement, damage, and retrieval difficulties. The potential adverse consequences include the risk of damage or loss of vital village land records, which hold historical significance in potential legal proceedings. Hence, there is an urgent need to integrate existing data and information to serve as land data within the village office, ensuring systematic organization and accessibility. The digital inventory and integration of geospatial land-based data at the village level represent crucial steps towards achieving effective land information management (Budiyono & Aditya, 2022; Rahman, 2022).

Margoluwih Village, strategically located as a support area for Yogyakarta City, covers an area of approximately 500 hectares and is home to a population of 10,965 individuals (Badan Pusat Statistik Kabupaten Sleman, 2023). Margoluwih Village, strategically located as a support area for Yogyakarta City, covers an area of approximately 500 hectares and is home to a population of 10,965 individuals (Setiawan, 2021). Over time, the land in this area has consistently held high value and continues to attract interest, with many newcomers settling in Margoluwih Village. Given this context, land data at the village level becomes crucial, aligning in importance with demographic, social, and agricultural data. Therefore, the urgency of digitizing land records is evident, especially considering the anticipated increase in demand for land information services at the village level, which may also lead to the emergence of land-related issues in the future.

The results of the data and information digitization efforts are then transformed into a Land Information System (Sistem Informasi Pertanahan) integrated with geographic information. This system goes beyond textual representation and incorporates spatial attributes, providing insights into the direction and location of land parcels through GIS (Geographic Information Systems). Within the

GIS, both textual and spatial land data are consolidated, covering ownership, possession, land use, and other relevant information (P4T), along with historical land ownership records. The GIS is designed to efficiently record and present land information transparently and in real-time. The goal is to ensure that every land-related event and legal transaction, such as sales, inheritances, donations, exchanges, and others, is captured within the GIS. This serves as a repository for sustainable, cost-effective, secure, and low-risk data management. To guarantee the reliability and effective utilization of this system, it is crucial to conduct dissemination and training sessions for stakeholders, particularly human resources in the field of land administration in Margoluwih Village. Through these training initiatives, users, especially village officials, can proficiently operate the GIS and advance land information management towards digitalization(Rahayu et al., 2023; Rahman et al., 2022).

The integration of information technology with effective human management stands as the cornerstone for the successful implementation of any information system. By automating repetitive tasks, the system streamlines operations, resulting in enhanced organizational efficiency and effectiveness (Mukhsin, 2020). The output typically comprises vectors, which are subsequently linked to generate a web-based digital land map. This Information System is meticulously designed to facilitate land administration services in rural areas, ensuring ease, promptness, and efficiency. Notably, it includes a feature enabling land parcel searches based on tax object numbers. Furthermore, it provides spatial location indicators and block identifications in alignment with Land and Building Tax (PBB), thereby facilitating administrative processes for letter C quotation requests (Sahrina et al., 2023). Moreover, the tangible benefits of the implemented information system can be observed across various stakeholders.

**D. Stakeholders Involved**

Stakeholders, whether individuals or groups, wield considerable influence over the execution and outcomes of any given endeavor (Reed et al., 2009). They encompass a broad spectrum, including governmental bodies, communities, organizations, and individuals. The active involvement and roles assumed by all stakeholders, both as beneficiaries of programs and as policy advocates, are pivotal in ensuring the success of land data collection initiatives, subsequent data integration processes, and the development of land information systems.

Data integration is the process of consolidating information from disparate sources to better address user information needs (Darono, 2016). However, integrating data can be hindered by the diverse schemas of databases, posing a notable challenge in system development (Muslih et al., 2015). In the context of integrating geospatial data and information in Margoluwih Village, the key stakeholders include: Sekolah Tinggi Pertanahan Nasional; Margoluwih Village Government; Sleman Regency Land Office; Land and Spatial Planning Agency of Sleman Regency; Regional Financial and Asset Management Agency of Sleman Regency; Regional Technical Implementation Unit of the Agricultural, Food, and Fisheries Extension Center (UPTD) Region III; Community Institutions of Margoluwih Village; and Margoluwih Village Community itself. Given the diverse array of data and

information involved, selecting and consolidating relevant data presents its own set of challenges. Through observation and interviews with various stakeholders, it is evident that those involved stand to benefit from the integration of geospatial data and information, including:

***Sekolah Tinggi Pertanahan Nasional***

In the realm of education, institutions of higher learning are pivotal in nurturing skilled human resources within society (Herlina, 2022). They serve as conduits for the development, dissemination, and practical application of scientific knowledge and technological advancements, often through community engagement initiatives like the Merdeka Belajar Kampus Merdeka (MBKM) program (Sari et al., 2023; Yunus et al., 2023). One such institution actively engaged in these endeavors is Sekolah Tinggi Pertanahan Nasional (STPN). STPN spearheads MBKM activities with the overarching goal of allowing students to bridge the gap between theoretical learning and practical application in the professional realm. Through MBKM, students gain valuable exposure to the realities of the workforce, enabling them to better understand the scope and demands of their future careers.

The graduates of STPN Yogyakarta are not solely earmarked for positions within the Ministry of ATR/BPN or its subsidiary agencies. Rather, the significance of land administration reverberates from the grassroots level, beginning with village-level governance. Therefore, STPN Yogyakarta, through MBKM, provides a unique opportunity for students to engage in resolving land-related issues at the village administrative level, thereby fostering effective governance practices that extend to higher administrative echelons. STPN graduates are equipped with the skills necessary to handle, process, and analyze land data proficiently. Looking ahead, the evolving landscape of development initiatives will necessitate a cadre of skilled professionals adept in the utilization and advancement of Geographic Information Systems (GIS). In light of this, it is imperative for higher education institutions to expand their roles through community engagement efforts, facilitating the transfer of GIS technology proficiency to society at large and empowering individuals to actively contribute to national development endeavors.

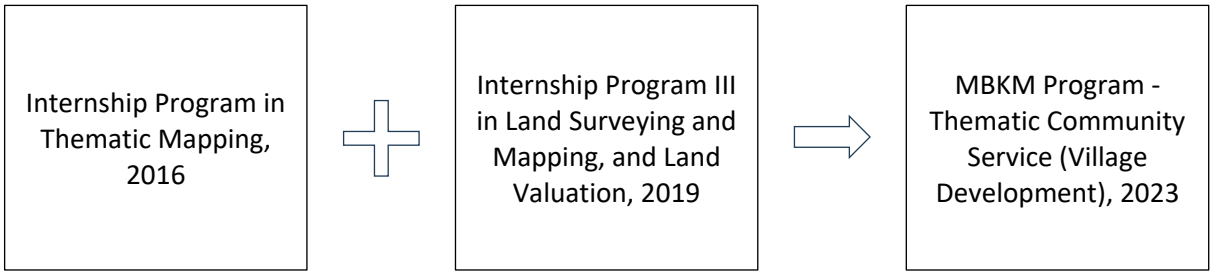


Figure 1. Diagram of Internship Program (PKL) and MBKM Program at STPN Yogyakarta in Margoluwih Village.
Source: Compiled by the author (2023)

Throughout their academic journey, students have frequently engaged in fieldwork and undergone knowledge transfer through Internship Programs (PKL) and Thematic Community Service

(KKN). These experiences involve the practical application of Geographic Information Systems (GIS) and land analysis techniques, such as measurements, mapping, and addressing various land-related issues, including the completion of national strategic programs(Junarto & Suhattanto, 2022). In the context of the MBKM initiative, STPN assumes a pivotal role in facilitating administrative activities. This includes providing instructional materials for community application, preparing and guiding human resources to tackle field-based challenges, and coordinating requests for data from external partners. STPN also contributes secondary data from past PKL programs, which are integrated and updated through the MBKM activities. Furthermore, the institution benefits from the outcomes of these endeavors to inform ongoing academic development. Consequently, STPN seizes the opportunity to apply a wide spectrum of knowledge—ranging from scientific and technological expertise to artistic skills—as a manifestation of the Three Pillars of Higher Education. These efforts not only provide valuable feedback for curriculum enhancement but also contribute to the advancement of various academic disciplines, particularly within the framework of the Independent Learning Free Campus (MBKM) initiative in Semester VII.

***The Margoluwih Village Government***

The Margoluwih Village Government significantly benefits from the MBKM activities, resulting in the establishment of an integrated spatial data and information system within the village. In this capacity, the Margoluwih Village Government serves as the primary source of information to identify the land-related needs of the village. Additionally, it plays a pivotal role in facilitating various activities by providing administrative support, such as issuing assignment letters for field surveys, delineating administrative boundaries, and supplying relevant data and information regarding village land through maps, certificates, and field surveys. Furthermore, the government furnishes data on Land Object Numbers (NOP) through block maps, offers information on surveyed land parcels, including both subjects and objects, provides insights into Land Ownership and Utilization Rights (P4T), delivers historical information and land acquisition records, and shares other geospatial data pertinent to Margoluwih Village.

The village government comprises the Head of Margoluwih Village, whose administration receives support from the Village Apparatus (as per Regulation of the Sleman Regent Number 2.9 of 2020). The Village Apparatus, also known as Village Officials, are auxiliary units assisting the Village Head and consist of the village secretariat, technical implementers, and territorial implementers, organized into territorial task forces called "*Padukuhan*." Each *Padukuhan* (Hamlet) is led by a Kepala Dukuh (Hamlet Chief). The pivotal figures involved in providing land information in Margoluwih Village are the "*Jagabaya*," serving as the technical implementer for security, and the *Kepala Dukuh* as the territorial implementer. The *Jagabaya* handles operational governance tasks and matters related to land and spatial planning. Both play crucial roles, with the *Jagabaya* traditionally recording land administration while *Kepala Dukuh* holds comprehensive knowledge of land and population

information within their jurisdiction. Moreover, the *Kepala Dukuh* is invited as a witness for any land ownership transfers. The Village Secretariat, particularly the "Carik," assists in administrative activities.

The Land Information System resulting from the MBKM output will subsequently be handed over to the village administration to facilitate land administration and enhance transparency regarding land information within the village. Village officials or staff are equipped with spatial knowledge to operate the system effectively. This land information system is specifically designed and tested for village officials or staff. The outcomes of the system's socialization and testing among village staff demonstrate their enthusiasm in participating in the series of activities for updating geospatial data and information. The expectation for the future is that the established system will empower the village to independently and sustainably manage and utilize this technology. Additional benefits include the utilization of geospatial data and information for village development planning and decision-making (Surdia et al., 2022), the enhancement of village geospatial data (Rahman et al., 2022), the availability of accurate land information (Soepandi & Widodo, 2021), the improvement of human resources (Redy et al., 2022), and the enhancement of services (Turmuzi et al., 2023).

***Sleman Regency Land Office***

The Sleman Regency Land Office serves as the forefront of the Ministry of ATR/BPN, tasked with providing services directly related to the community at the district/city level. These services pertain to land information management and administration. Services related to land information include providing physical and juridical data for each land parcel, information on land value, and details regarding land use and utilization. Land administration services concern the legalization of assets and land certification. Thus far, services at the Land Office have been facilitated through a computer-based information system and web services via the Land Activity Computerization (KKP) program.

In this MBKM activity, the Land Office plays a crucial role in providing data and information related to the spatial aspects of land parcels in Margoluwih Village. Additionally, it offers data on land quality (KW) in the area. The ultimate outcome achieved is a comprehensive village mapping containing P4T information, which will subsequently assist the Land Office in completing K4 activities in the PTSL program. This comprehensive village mapping integrates survey results conducted by students with land data from the Land Office. The relationship between the Land Office and the MBKM activities of STPN is characterized by mutual symbiosis, considering the limitations of the land office in directly conducting land survey activities. This parallels the PKL activities previously undertaken by STPN in completing the PTSL-K4 activities (Junarto & Suhattanto, 2022).

***Department of Land and Spatial Planning of Sleman Regency***

The Department of Land and Spatial Planning in Sleman Regency oversees land and spatial planning in the Special Region of Yogyakarta (DIY), governed by regulations outlined in the Special Autonomy Law. This department operates in each regency within DIY and is responsible for implementing spatial planning, utilization, and control, as well as administering land affairs. Land

information serves to support the regional development planning process of each regency or city. There is significant potential for integrating geospatial information between land-based data and regional spatial planning, given that both agencies utilize the same foundational maps (Meidodga et al., 2023).


Figure 2. Spatial Pattern Map in Margoluwih Village and WebGIS Land Distribution Map in Sleman Regency
Source: Sleman Regency Department of Land and Spatial Planning and Special Region of Yogyakarta Department of Land and Spatial Planning (2023)

To date, the Sleman Regency Department of Land and Spatial Planning (DPTR) has been disseminating spatial planning regulations such as Detailed Spatial Plans (RDTR) down to the village level by installing RDTR information boards in several villages. The installation of RDTR boards aims to familiarize the public with spatial planning regulations, which have hitherto been perceived as unfamiliar to communities, especially concerning the rampant use and conversion of agricultural land (Nabila, 2023; Setiawan, 2021). The installation of RDTR information can help curb the rate of land use conversion, particularly agricultural land. The information provided includes spatial allocation through maps and contact details for obtaining more detailed information, and the location of RDTR installations can be viewed by everyone, such as at the Village Office. Furthermore, the DIY DPTR also provides village land information through the Intantaruberinfo WebGIS portal. This information serves as a database to address land inventory issues in Margoluwih Village. Subsequently, this information is integrated with other geospatial data and information available in Margoluwih Village Office.

Another benefit for other stakeholders related to the data provided by the DPTR is for the land office, as information regarding the spatial planning of an area is highly beneficial in providing land rights services. In other words, any land rights application issued by the land office must comply with the existing spatial planning. Therefore, applicants must be prepared for all implications when their applications are aligned with the existing spatial planning. Another benefit is for the Village Government and the community to monitor land use changes in their area with the availability of spatial planning maps.

***Regional Financial and Asset Management Agency of Sleman Regency***

The Regional Financial and Asset Management Agency of Sleman Regency provides one of the available geospatial datasets in Margoluwih Village, namely the block map displaying the boundaries of each Tax Object Number (NOP). This map, issued by the Regional Financial and Asset Management Agency (BKAD) of Sleman Regency, is currently available in printed form. The textual data accompanying this map is provided in tabular form, separate from the map. This textual data includes information on the tax year, NOP, serial number, taxpayer name, taxpayer address, object address, and tax payable. The block map serves as a fundamental reference for determining land ownership and is often used to identify agricultural land ownership in agricultural censuses. Agricultural censuses encompass various subsectors such as food crops, horticulture, plantations, livestock, fisheries, forestry, and agricultural services. In 2023, the Central Bureau of Statistics (BPS) conducted its seventh agricultural census. Subsequently, the block map is clarified as agricultural information by the village head to Field Agricultural Extension Officers (PPL) or Self-Supporting Agricultural Extension Officers (PPS) in the BP4 UPTD Region III, assisting in the agricultural census data collection activities for 2023.

To enhance its utility, textual and spatial data can be integrated with land parcel information to form cadastral data containing tax information for landowners. Subsequently, integrating land data with tax object information can be beneficial for managing activities such as land registration or transfer of land rights (Meidodga et al., 2023). Other benefits include facilitating land valuation activities related to tax policy planning (Deviantari & Djurdjani, 2023) and fulfilling transparency and efficiency requirements in land valuation (Samad, 2018). Additionally, another positive impact could be an increase in tax revenues for a region (Aprianty & Lambey, 2016). Therefore, future expectations regarding this data and information integration include updating cadastral data, which can be utilized by the Sleman Regency Land Office, Sleman Regency Asset Management Agency (BKAD), and other relevant agencies.

***Regional Technical Implementation Unit of the Agricultural, Food, and Fisheries Extension Center (UPTD) Region III***

In accordance with Sleman Regency Regulation No. 79 of 2016, the Regional Technical Implementation Unit of the Agricultural, Food, and Fisheries Extension Center (UPTD BP4) is a technical unit under the Department of Agriculture, Food, and Fisheries, reporting to the Head of the Department through the Secretary. UPTD BP4 is led by a Head of UPTD. UPTD BP4 Region III is one of the UPTD BP4 units located in Sleman Regency, covering the administrative areas of Sub-Districts Seyegan, Mlati, and Tempel, which includes Margoluwih Village.

One of the major challenges faced by the Regional Technical Implementation Unit of the Agricultural, Food, and Fisheries Extension Center (UPTD BP4) Region III in Seyegan regarding agriculture is the widespread land conversion and the low interest of the younger generation in engaging in agriculture (Sa'diyah, 2015; UPTD BP4 Wilayah III, 2019). The data possessed by UPTD BP4 Region III is still in textual form, thus, information regarding land conversion changes is only known in

terms of area. The textual data related to agriculture includes information on the agricultural land area and the cultivators or landowners for the purpose of providing fertilizer assistance. In this regard, the data and information obtained are textual only, lacking geospatial data and information. Thus far, information regarding cultivators and land ownership has relied on the village head as a source and block maps. Therefore, the existence of geospatial data and information on land ownership and cultivators is one step toward preventing land conversion (Kanny et al., 2021) supported by firm government policies(Dewi & Sarjana, 2015; Dolly et al., 2022) and complementary to other policies of UPTD BP4 Region III. Furthermore, the existence of an information system can also be used for updating data on agricultural land cultivators, which is highly dynamic, as cultivators can change frequently, sometimes even changing with each harvest season, which occurs within less than a year.

***Community Institutions of Margoluwih Village***

According to the Regulation of Margoluwih Village No. 9 of 2021 regarding the Community Institutions of Margoluwih Village (LKK), LKK is a partner of the Margoluwih Village Government as a platform for community participation. LKK participates in planning and implementing development activities and enhances community services in the village. The types of LKK include: Neighborhood Association (RT), Community Unit (RW), Family Empowerment and Welfare (PKK), Youth Organization (Karang Taruna), Integrated Service Post (Posyandu), Community Protection Unit (Satlinmas), and Community Empowerment Institution (LPM). The LKK involved and actively participating in the database collection process is the RT chairperson. The involvement of RT chairpersons in these activities includes indicating the administrative boundaries of the village and RT in each hamlet, indicating the surveyed land parcels, providing information on P4T, and providing land history information. However, during the process, the RT heads encounter difficulties in indicating the administrative boundaries of RT on the working map. This is because the delineation of RT boundaries is not based on natural boundaries such as roads, rivers, bridges, and other easily recognizable boundaries on the map. In some areas, RT boundaries are delineated by land parcels or houses, thus requiring field clarification to directly indicate RT boundaries.

***Margoluwih Village Community***

The involvement of the Margoluwih Village community is pivotal in the program's execution. Their primary role encompasses active participation across all stages of village development, including planning, execution, reporting, monitoring, and oversight (Saragih, Ramainim, 2017; Palupi, Sri, 2016). The community holds significant responsibility as providers of data and geospatial information pertaining to land parcels. Their engagement in the integration process entails various tasks such as identifying surveyed land parcels, furnishing information on P4T, detailing the inheritance history of land and heirs, and presenting evidence of land rights or certificates. It's worth noting that the community's involvement stands on equal footing with the Margoluwih Village Government as partners. The overarching objective of this active community participation is to support the

development of comprehensive, digitally integrated databases, facilitating the multifaceted utilization of land services. Despite initial concerns among community members regarding providing comprehensive information and the legal aspects of land survey activities, these apprehensions were successfully addressed through clear explanations and the presentation of official assignment letters from Margoluwih Village.

**E. Support and Challenges in Geospatial Data and Information Integration**

Support for integrating geospatial data and information in Margoluwih Village is sourced from stakeholders and involved parties, as outlined below:

1. The existence of the Margoluwih Village website facilitates data acquisition and information dissemination, aiding in technology-based public service initiatives to enhance service effectiveness (Alvaro & Octavia, 2019).
2. Secondary data available within the village, such as administrative records, demographic data, block maps, RDTR maps, village land certificates, and maps from previous STPN internship programs, assists in primary data collection. Additionally, data from the Sleman District Land Office provides textual and spatial data on land parcels in Margoluwih Village.
3. The Margoluwih Village Government and Village Community (Lembaga Kemasyarakatan Kalurahan) play roles in providing, collecting, and disseminating land data and information.

Despite the support in the integration process, several challenges arise in its implementation:

1. There is a necessity to adjust land parcels to facilitate the creation of operational maps, reconciling data obtained from the land office and prior STPN internships with block maps provided by the Regional Asset Management Agency (BKAD). This arises due to discrepancies observed in the shapes of land parcels between data from the land office and BKAD block maps. Notably, the block maps and associated Tax Object Numbers (NOP) do not align and remain outdated. Consequently, instances arise where land parcels have undergone subdivision or change of ownership without corresponding updates on the block maps. Furthermore, some land parcels lack NOP information altogether. This deficiency in NOP data signifies potential categorizations as public facilities or inclusion within Village Land. To address these discrepancies, it is imperative to undertake surveys and engage in clarifications regarding land parcel information with both the Margoluwih Village Government and the local community;
2. Another challenge encountered during the implementation of P4T surveys was the suspicion and questioning by the community upon the arrival of the research team for the surveys. The lack of trust and reluctance of the community to provide comprehensive information stemmed from the fear that the survey activities were unauthorized. Although the Margoluwih Village Government had informed the community about the land survey activities, not all residents were aware of it. To address this, the survey team took the step of requesting an official assignment letter from the Margoluwih Village Government. This letter served as evidence that the survey activities were

legitimate and could be presented during the survey as a preemptive measure in case of any inquiries from the community; and

3. The frequent execution of surveys, particularly concerning information regarding land cultivators and ownership in Margoluwih Village, has resulted in situations where some informants deflect responsibility, stating that the necessary data is already held by other parties, and survey outcomes have not yet been provided to the relevant institutions. Therefore, the integration of spatial data and information is intended as a solution to consolidate geospatial information, especially concerning land affairs, in Margoluwih Village.

## F. Conclusion

The MBKM initiative organized by STPN Yogyakarta facilitates the integration of geospatial data and information in Margoluwih Village, Seyegan Sub-District, Sleman Regency, through the development of a customized information system. Apart from STPN Yogyakarta and the Margoluwih Village Government, other involved parties include the Sleman Regency Land Office, the Sleman Regency Department of Land and Spatial Planning, the Sleman Regency Finance and Asset Agency, the UPTD Agricultural Extension Center for Agriculture, Food, and Fisheries of Region III, the Community Institutions of Margoluwih Village, and the Residents of Margoluwih Village. Support for integrating geospatial data and information in Margoluwih Village is received from stakeholders or involved parties, including the availability of the Margoluwih Village website, the existence of secondary data aiding primary data collection, and stakeholder engagement in the activities. However, challenges encountered during implementation include discrepancies in land data between different institutions, community reluctance to share data and information, and the frequent occurrence of survey activities by various parties or institutions in Margoluwih Village.

The integration of geospatial data and information aids in the development of digital villages, the planning of village potential development, the transition of data through document digitalization, the establishment of land information systems, and the provision of single maps beneficial for multiple stakeholders. The Margoluwih Village Government, as the custodian or manager of the information system, is expected to maintain and update it independently and sustainably. Moreover, other agencies can utilize the information system and provide support by sharing existing data and information with the Village. However, in the future, standardization among data and information is necessary to prevent ambiguity, ensuring that the data and information can be optimally utilized by multiple stakeholders.

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