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Examining the Mediating Effects of Attitude and Intention on the Influence of Spatial Knowledge and Regulation Consciousness on Proper Land Use Behavior

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Abstract: This research aims to analyze the factors that influence sustainable land use behavior at the individual level. These factors include regulatory awareness, spatial knowledge, attitudes, intentions, and behavior. This research was carried out as part of the requirements for completing studies in the Master of Management program, Faculty of Economics and Business, Syiah Kuala University. This research uses quantitative methods by collecting data through questionnaires from respondents who are involved in land use practices in an area. Data analysis was carried out using descriptive and inferential statistical techniques, including hypothesis testing and mediation testing. The research results show that regulatory awareness, spatial knowledge, attitudes, and intentions contribute significantly to sustainable land use behavior. These findings strengthen our understanding of the complex relationships between these variables at the individual level. Additionally, serial mediation analysis identified the mediating role of attitudes and intentions in linking independent factors with land use behavior. Managerial recommendations include regulatory awareness development programs, spatial knowledge training, and the promotion of positive attitudes and intentions. Meanwhile, emphasizing this research underscores the importance of a holistic and contextual approach in designing sustainable land management policies. This research provides conceptual and practical contributions to understanding and improving individual behavior regarding sustainable land use, with the hope of guiding decision-makers, academics, and relevant stakeholders.

Keywords: Attitude, Intention to practice appropriate land use, Spatial Knowledge, Regulation Consciousness and Proper Land Use Behavior

I. Introduction

Indonesia, with its diversity of land use practices such as agriculture, forestry, mining, and urban development, faces serious challenges related to environmental degradation, social conflict, and economic inefficiency due to practices that are not suitable for their intended use (Utami, DN 2019). Land-related conflicts still plague the country, with a history of conflicts that have lasted for decades without adequate resolution from the government. Inappropriate land use practices in Indonesia, such as forest conversion for oil palm plantations, illegal mining, and agricultural land encroachment, result in major impacts including environmental degradation and social conflict (Budhiawan et al., 2022).

Previous research revealed several land use practices that were not appropriate for their intended use. Conversion of forests into agricultural land and plantations is a major concern, as can be seen from reports that Aceh's forests are experiencing degradation due to land conversion (Kompas.com, 2023-07-20). Meanwhile, residential development in Aceh's forest areas is also increasing, with reports that this development is damaging the environment (Metro TV, 2023-08-09). The use of peatlands for agriculture in Aceh is considered dangerous and even causes fires (Tempo.co, 2023-06-20; Detik.com, 2022-08-20). This data, obtained from various online media, highlights serious challenges related to land management in Aceh that require immediate attention and action to maintain environmental sustainability and prevent negative impacts on society.This improper use of land practices also causes the loss of important ecosystem services, such as water purification and climate regulation (Bonaiuto, M., Carrus, G., Martorella, H., & Bonnes, M. 2002).). Not only that, the impact includes a decrease in income, for example from the tourism sector, due to the degradation of natural attractions. Through understanding and complying with land use regulations and promoting sustainable resource management, Indonesia can overcome the negative economic impacts of unsustainable land use practices and create a more resilient and prosperous future (Hayes, T., Murtinho, F., & Wolff, H. 2017).

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Research that specifically discusses the problem of inappropriate land use in Indonesia in general and in Aceh in particular. The cause is thought to be low Intention to practice proper land use (Humaira, A., &Hudrasyah, H. (2016). Then the low Intention to practice proper land use is thought to be caused by Spatial Knowledge which is still poorly understood by land stakeholders in Indonesia (Yoon, E., Guffey, HJ, & Kijewski, V. 2003; Alawadhi, A., Chandrasekera, T., & Yang, C. 2011)and also the low level of Regulatory Consciousness regarding regulated land in Indonesia (Makanyeza, C., Svotwa, TD, &Jaiyeoba, O. 2021).

In contrast to existing literature, it focuses on broader issues related to land management, environmental sustainability, and economic development. This research will contribute to filling the research gap by providing insight into the specific factors that contribute to the low understanding of land use in Indonesia and identifying strategies to address this issue.

This research aims to investigate the factors that contribute to the existence of cases of land use that is not by its intended use because there is still a low understanding of land use in Indonesia, which is caused by a limited understanding of spatial knowledge and legal aspects of land in Indonesia. In the final section, it will be identified. strategies to increase awareness and compliance with land use regulations.

II. Literature Review

2.1. Spatial Knowledge

Spatial knowledge in land science is a key element for efficient and sustainable land management. However, inadequate knowledge regarding spatial aspects among stakeholders, including the general public, can cause serious impacts on appropriate land use (Chou et al., 2005). The importance of spatial knowledge involves understanding the movement, use, and management of land by considering its geographical location, including an understanding of land use, land use, zoning, and related environmental aspects (Fagerholm et al., 2013). In the Indonesian context, where land has diverse uses, spatial understanding is key to preventing land conflicts, land misuse, and adverse environmental impacts. Officials at the National Land Agency, Ministry of PUPR, and Bappeda have a vital role in policy making and land use planning, but low spatial knowledge can result in inadequate policies, harming society and the environment. The real impacts of low spatial knowledge include inappropriate land use changes, potentially damaging ecosystems, causing land conflicts, and damaging the environment with the risk of serious economic and sustainability losses (Dharmawan&Achsani, 2016).

2.2. Regulatory Consciousness

In the field of land science, Regulation Consciousness plays a central role in raising awareness of the importance of understanding regulations in land management. Efficiency and sustainability in land management are key factors in a country's development (Wang et al., 2015). In Indonesia, land has enormous value for its various purposes, making understanding and awareness of spatial planning and land use regulations very important. Regulatory Consciousness, which includes an understanding of regional zoning, spatial regulations, administrative boundaries, permits, and the environmental impacts of land use changes, is becoming increasingly relevant (Wang et al., 2015). However, this level of awareness is sometimes still inadequate among the public and government officials. This lack of awareness can have serious impacts on appropriate land use, resulting in inappropriate land use changes and the potential for conflict and detrimental environmental damage (Zhang et al., 2016). To overcome this challenge, efforts are needed to increase Regulatory Consciousness through public education, training for government officials, firm law enforcement, regulatory awareness campaigns, and collaboration between agencies. With increased awareness, it is hoped that more sustainable and appropriate land management can be achieved, protecting the environment, preventing land conflicts, and supporting balanced economic development.

2.3. Attitude

Attitude, as defined by Tran et al. (2018), is a consumer behavior concept that refers to an individual's evaluation of a product, service, or idea. It involves a relatively enduring evaluation of an attitude object, which could be a person, product, or social group. Attitude encompasses preferences for or towards an attitude object, expressed through terms like like, dislike, love, hate, and more. It is a crucial aspect of self-concept, guiding decisions on engaging in specific behaviors, approaching or avoiding certain individuals, and even purchasing products. The components of attitude, outlined by Swanwick (2009), include cognitive, affective, and behavioral components. The cognitive component relates to beliefs and thoughts associated with an object, the affective component involves emotional aspects, while the behavioral component consists of one's inclination to behave in a particular way towards an object. Attitude often predicts behavior.

In the context of land use and licensing, proper land management is crucial for sustainable development, as emphasized by Akbar et al. (2020). However, instances of land use diverging from regulations and intended purposes are common, such as green areas

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transforming into settlements or protected forests converted into palm oil plantations. Stakeholders' attitudes play a central role in these phenomena, influenced by factors such as a lack of understanding of spatial knowledge and Regulatory Consciousness. The stakeholders' attitude is shaped by inadequate spatial knowledge education, information gaps, unawareness of impacts, unclear regulations, weak law enforcement, and irresponsible actions exploiting regulatory weaknesses. Improving stakeholder attitudes requires addressing these challenges through enhanced education, information dissemination, and strengthened regulatory awareness, ultimately fostering sustainable land use practices.

2.4. Intention to practice appropriate land use

According to Valizadeh et al. (2021), the concepts of "Intention to Purchase" in marketing management and "Intention to practice appropriate land use" in the context of appropriate land use are deeply related, especially when applied to people who often make mistakes in land use. This relationship reflects that the Intention to Purchase in marketing management is often a determining factor that influences Intention to practice proper land use. In this context, the components of the relationship between the two can be explained based on the steps in the purchasing decision cycle. According to Valizadeh et al. (2021), there are important aspects such as Awareness and Interest, Consideration, Intent, and Purchase which can shape people's real intentions and actions regarding appropriate land use. Awareness of negative impacts, consideration of social and environmental impacts, intention to change behavior, and implementation of concrete actions are crucial stages in linking purchase intentions with appropriate land use practices (Alemu, et al., 2021). Understanding these linkages has important implications for the development of strategies by companies, governments, and non-governmental organizations to encourage appropriate land use practices. Efforts involving education, awareness, training, and information campaigns are the key to changing people's attitudes regarding land use, with the hope of having a positive impact on the environment, sustainability, and social life under research that has been conducted (Valizadeh et al., 2021).

2.5. Proper Land Use Behavior

According to Peña-García et al. (2020), the concept of "Purchase Behavior" in the marketing management context and "Proper Land Use Behavior" in the context of appropriate land use are significantly interconnected, especially when considering "Proper Land Use Behavior" as an outcome of "Intention to practice proper land use." Intention to practice appropriate land use represents an individual's or community's intent to adopt sustainable and appropriate land use practices. This includes a commitment to adhere to spatial planning regulations, preserve the environment, and maintain land sustainability. Purchase Behavior, in this context, involves concrete actions supporting the intention to practice appropriate land use, such as purchasing land for conservation purposes, planting trees, or participating in ecosystem restoration programs. There is a clear correlation between Purchase Behavior and Proper Land Use Behavior; individuals or communities with a strong intent to practice appropriate land use are likely to engage in purchases or actions supporting these practices. Factors influencing Purchase Behavior in marketing contexts, such as price, quality, or social influence, can also impact Proper Land Use Behavior. For example, the price of land conservation or land compliance with spatial planning regulations can influence purchasing decisions. Similarly, social influence, such as support from family or colleagues, can motivate individuals to adopt appropriate land use practices (Peña-García et al., 2020). Understanding Purchase Behavior is crucial in designing marketing campaigns focused on appropriate land use. Companies, governments, and non-governmental organizations can develop marketing campaigns that encourage Purchase Behavior supporting Proper Land Use Behavior. This may involve campaigns educating the public about the importance of environmental conservation and sustainable land use practices. By measuring indicators such as the rate of purchasing land conservation or participation in restoration programs, the success of campaigns designed to encourage actions supporting appropriate land use can be evaluated. To achieve sustainability and environmental preservation goals, it is essential to link Purchase Behavior in marketing management with Proper Land Use Behavior. As a result, awareness of the importance of appropriate land use and sustainable practices can lead to actions supporting environmental conservation and sustainability goals. Understanding and support from various stakeholders, including companies, governments, and the community, are crucial for achieving positive outcomes in appropriate land management (Peña-García et al., 2020).

2.6 . Hypothetical Development

2.6.1. The impact of Spatial knowledge on Attitude, Intention to practice proper land use, and Proper Land Use Behavior

Spatial knowledge, a fundamental element in the field of soil science, plays a pivotal role in the efficient and sustainable management of land. As illustrated by Chou et al. (2005), inadequate knowledge regarding spatial aspects among stakeholders, including the general public, can lead to severe consequences for the appropriate utilization of land designated for specific purposes. Understanding spatial knowledge involves grasping the dynamics of land movement, usage, and management, considering its geographical location (Bronstert, A., Niehoff, D., & Bürger, G. 2002). This comprehension encompasses insights

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into land allocation, land-use planning, zoning, and related environmental aspects (Fagerholm et al., 2013). Particularly in the diverse land allocations of Indonesia, spatial understanding becomes paramount in averting land conflicts, misuse, and detrimental environmental impacts. Officials from the National Land Agency, Ministry of Public Works and Housing, and Regional Development Planning Agency play vital roles in policy-making and land-use planning. However, their decision-making may be compromised by insufficient spatial knowledge, leading to inadequate policies that harm both society and the environment. The tangible repercussions of low spatial knowledge include inappropriate changes in land use, potentially damaging ecosystems, triggering land conflicts, and causing environmental harm, with associated risks of severe economic losses and sustainability issues (Dharmawan&Achsani, 2016).

In examining the three hypotheses regarding the influence of spatial knowledge, it is evident that spatial knowledge forms the bedrock of informed decision-making in land management. The first hypothesis posits the impact of spatial knowledge on attitude (Tran, H., Nguyen, Q., & Kervyn, M. (2018), emphasizing that a more profound understanding of spatial aspects contributes to more positive evaluations and perceptions. The second hypothesis suggests that spatial knowledge influences the intention to practice appropriate land use (Broudy, H. S. 2017), indicating that a higher level of spatial knowledge correlates with an increased likelihood of individuals or communities intending to adopt land-use practices aligned with regulations and sustainability. Finally, the third hypothesis proposes that spatial knowledge has an impact on appropriate land-use practices, indicating that individuals or communities with enhanced spatial knowledge are more likely to implement land-use practices that align with designated purposes and regulatory guidelines. Together, these hypotheses underscore the critical role of spatial knowledge in shaping attitudes, intentions, and actual practices related to land use.

Therefore:

H1. There is an influence of Spatial Knowledge on attitude

H2. There is an influence of Spatial Knowledge on Intention to practice proper land use

H3. There is an Influence of Spatial Knowledge on Proper Land Use Practice

2.6.2. The impact of Regulation Consciousness on Attitude, Intention to practice proper land use and Proper Land Use Behavior

In the realm of soil science, Regulation Consciousness assumes a central role in raising awareness about the significance of understanding regulations in land management (Regulation Consciousness). Efficiency and sustainability in land management are pivotal factors for a nation's development (Wang et al., 2015). In Indonesia, where land holds immense value with diverse allocations, the understanding and awareness of spatial regulations and land use are critically important. Regulation Consciousness, encompassing an understanding of regional zoning, spatial regulations, administrative boundaries, permits, and the environmental impact of land-use changes, becomes increasingly relevant (Wang et al., 2015). Nevertheless, the awareness levels, at times, remain insufficient among both the public and government officials. This lack of awareness can significantly impact appropriate land utilization, leading to improper land-use changes, potential conflicts, and detrimental environmental damage (Zhang et al., 2016). Addressing these challenges requires efforts to enhance Regulatory Consciousness through public education, training for government officials, rigorous law enforcement, regulatory awareness campaigns, and inter-agency collaboration. With increased awareness, it is anticipated that more sustainable and purpose-aligned land management can be achieved, safeguarding the environment, preventing land conflicts, and supporting balanced economic development (Carrigan, M., & Attalla, A. 2001).

Considering the three hypotheses regarding the influence of Regulatory Consciousness, it is evident that Regulation Consciousness plays a vital role in shaping attitudes, intentions, and actual practices related to land use. The first hypothesis suggests that Regulatory Consciousness has an impact on attitude, emphasizing that a deeper understanding of regulations contributes to more positive evaluations and perceptions. The second hypothesis posits that Regulation Consciousness influences the intention to practice appropriate land use, indicating that a higher level of Regulation Consciousness correlates with an increased likelihood of individuals or communities intending to adopt land-use practices aligned with regulations and sustainability. Finally, the third hypothesis proposes that Regulation Consciousness has an impact on appropriate land-use practices, suggesting that individuals or communities with enhanced Regulatory Consciousness are more likely to implement land-use practices that align with designated purposes and regulatory guidelines. These hypotheses underscore the critical role of Regulatory Consciousness in shaping attitudes, intentions, and actual practices related to land use.

Therefore:

H4. There is an Influence of Regulatory Consciousness on Attitude

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H5. There is an influence of Regulatory Consciousness on Intention to practice proper land use

H6. There is an Influence of Regulatory Consciousness on Proper Land Use Practice

2.7 Research Framework

The theoretical framework serves as the cornerstone for all research endeavors, according to Sekaran and Bougie (2003). It provides the groundwork from which hypotheses can be derived and subsequently tested to ascertain the validity of the formulated theory. Following this validation, the subsequent step involves measurement using appropriate statistical analyses. Drawing from existing theories and prior research, there exists an established relationship between the previously described variables. Based on this premise, the authors have devised a research model, as illustrated in the following figure.

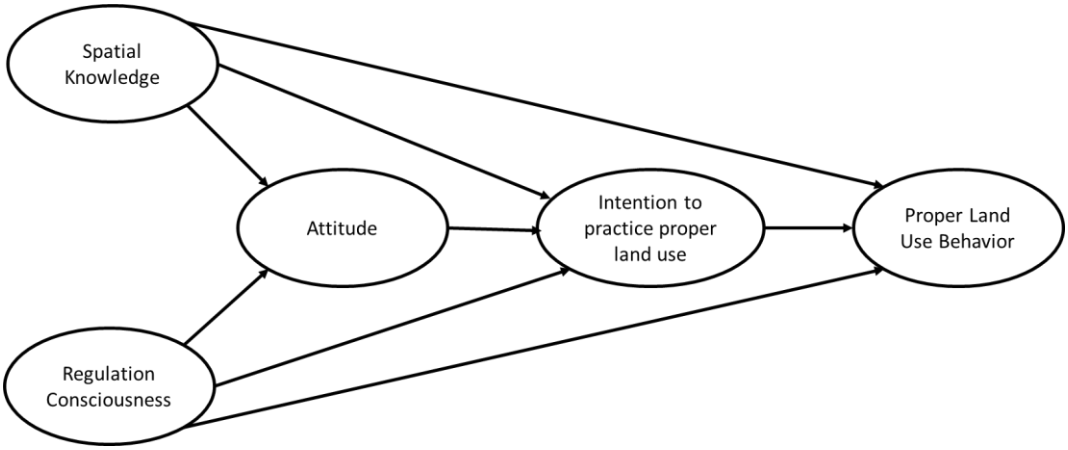

Figure 1: Research Framework

III. Methodology

3.1 Research Instruments

To ensure the validity of the study, all measurement items were derived from prior research, with slight modifications to ensure alignment with the present analysis. Specifically, five items within the "Spatial Knowledge" questionnaire were adapted from Akbar, A., Flacke, J., Martinez, J., & van Maarseveen, M. F. (2020), while an additional five items were borrowed from Tarlock, A. D. (2007) to assess "Regulation Consciousness." The operationalization of "Attitude" employed five indicator items proposed by Makanyeza, C., Svotwa, T. D., &Jaiyeoba, O. (2021). Moreover, the measurement of "Intention to practice appropriate land use" involved the adoption of five items from Humaira, A., &Hudrasyah, H. (2016). Furthermore, the evaluation of "Proper Land Use Behavior" utilized four indicators sourced from Booth, D. B., Karr, J. R., Schauman, S., Konrad, C. P., Morley, S. A., Larson, M. G., & Burges, S. J. (2004). The data collection process utilized questionnaires featuring a 5-point Likert scale. Additionally, in-depth interviews were conducted with multiple sources (informants) to obtain comprehensive information concerning the research variables and to complement the results derived from the quantitative analysis.

3.2 Population and Research Sample

The population used in this research are people who need land ownership and allocation services in the Aceh region in general and Banda Aceh and Aceh Besar in particular. The population is infinite because it involves those who have carried out land management and those who will carry out land management. The sample size is 200 people, which is the multiplication of the number of indicators (25 indicators) by the number 8 (Hair, 2017). The sampling technique uses convenience sampling, with the prerequisite being that the community has and will carry out land permits, both ownership and use.

3.3 Data analysis

The research employs a two-fold data analysis approach encompassing descriptive and verification methods. Initially, a descriptive analysis is undertaken to comprehensively examine the demographic profile of the respondents, shedding light on the diverse characteristics of the study participants. This phase of the analysis also extends its purview to assess the internal consistency of the

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constructs under investigation.Subsequently, a verification analysis is conducted utilizing Structural Equation Modeling (SEM) to scrutinize and validate the paths delineating the relationships between variables postulated in this study. SEM offers a robust statistical technique for modeling and analyzing complex relationships, allowing for the examination of both observed and latent variables. In this context, SEM serves as a powerful tool to empirically test the hypothesized connections between the key constructs.The SEM analysis is facilitated through the utilization of IBM SPSS-AMOS version 22, a widely recognized and sophisticated software application designed specifically for Structural Equation Modeling. This software provides a comprehensive platform for assessing the intricate interplay of variables and examining the overall fit of the proposed research model. The utilization of SEM, coupled with the advanced features of IBM SPSS-AMOS version 22, ensures a rigorous and thorough verification process, contributing to the robustness and reliability of the study's findings.

IV. RESEARCH RESULTS AND DISCUSSION

4.1 Characteristics of Respondents

The research involved 125 respondents with various characteristics. The majority of respondents were men, 75 people (60%), while women made up 50 people (40%). The age variations of respondents included 43 people (34.4%) under 30 years, 39 people (31.2%) between 30 and 40 years, 26 people (20.8%) between 41 and 50 years, and 17 people (13.6%) over 50 years. Job diversity was also visible, with 9 people (7.2%) working independently, 35 people (28%) as Civil Servants (PNS), 31 people (24.8%) in the private sector, and 50 people (40%) having other jobs. Regarding education level, the majority of respondents (48%) had a Bachelor's degree (S1), followed by 24 people (19.2%) with a Master's degree (S2), 24 people (19.2%) with a Diploma degree, 14 people (11.2%) with a Diploma, and 3 people (2.4%) with a Doctoral degree (S3). Regarding work experience, variations were also visible, with 39 people (31.2%) having less than 5 years of experience, 28 people (22.4%) 5 to 10 years, 24 people (19.2%) 11 to 15 years, 11 people (8.8%) 16 to 20 years old, and 23 people (18.4%) more than 20 years old. Overall, the diversity of respondents' characteristics creates comprehensive insights related to research problems.

4.2 Research Instrument Testing

a. Validity with Average Variance Extracted (AVE)

Average Variance Extracted (AVE) is used to test the validity per indicator and variable, with the AVE value reflecting how much variance or diversity of the manifest variable can be accommodated by the latent construct. The greater the AVE value, the greater the representation of the manifest variable to the latent construct. The Average Variance Extracted (AVE) table indicates the extent to which the variance of each variable can be explained by the indicators used. AVE values range from 0 to 1, with higher values indicating a better ability to explain the variable by the indicator. The AVE measurement results for each variable are as follows: Attitude: 0.554, Intention to practice proper land use: 0.664, Proper Land Use Behavior: 0.567, Awareness Regulation (Regulation Consciousness): 0.617, and Spatial Knowledge: 0.659. Relatively high AVE values indicate that the indicators used to measure these variables are effective in explaining the total variance in each variable.

b. Reliability

Reliability testing is a crucial step in research to ensure the consistency and dependability of the measurement instruments. Cronbach Alpha (CA) is a commonly used approach to measure reliability, with values above 0.60 considered an indication of adequate measurement consistency. The Cronbach Alpha table above indicates the internal reliability or consistency levels of the four variables measured in this research. Cronbach's Alpha, ranging from 0 to 1, measures how reliable or consistent items within a variable are. The Cronbach Alpha values for each variable are as follows: Attitude (0.8), Intention to practice proper land use (0.874), Proper Land Use Behavior (0.72), Regulatory Consciousness (0.839), and Spatial Knowledge (0.871). All Cronbach Alpha values exceeding 0.7 suggest that the measurement instruments exhibit good consistency and can be considered reliable for measuring the respective variables in this study.

c. Measurement Model (Measurement Model)

Confirmatory Factor Analysis (CFA) is a crucial step in measuring the dimensions constituting latent variables within the framework of this research. The latent variables or constructs applied in this research model consist of three exogenous variables and two endogenous variables, including mediating and dependent variables. Similar to conventional factor analysis, the primary objective of CFA is to test the unidimensionality of the dimensions forming each latent variable. This process allows researchers to examine how accurately the indicators used reflect the single dimension of these latent variables. CFA also plays a vital role in validating the conceptual model, ensuring that the proposed latent variables align with the empirical data collected. Subsequently, the results of the CFA for each model will be presented and discussed. These findings not only provide insights into the extent to

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which indicators measure latent variables but also allow researchers to understand the alignment between the conceptual model and the empirical reality present in the research data.

Table 1. Loading Factors

Items	Original Sample	Standard Deviation	T Statistics	P Values
a1 <- Spatial Knowledge	0.85	0.026	32,772	0
a2 <- Spatial Knowledge	0.823	0.036	22,982	0
a3 <- Spatial Knowledge	0.797	0.049	16,318	0
a4 <- Spatial Knowledge	0.83	0.025	33,108	0
a5 <- Spatial Knowledge	0.757	0.046	16,592	0
b1 <- Regulation Consciousness	0.808	0.045	17.8	0
b2 <- Regulation Consciousness	0.857	0.025	34,578	0
b3 <- Regulation Consciousness	0.876	0.022	40,271	0
b4 <- Regulation Consciousness	0.535	0.076	7,005	0
b5 <- Regulation Consciousness	0.803	0.039	20,819	0
c1 <- Attitude	0.767	0.031	24,469	0
c2 <- Attitude	0.799	0.04	19,991	0
c3 <- Attitude	0.706	0.076	9,348	0
c4 <- Attitude	0.766	0.039	19,701	0
c5 <- Attitude	0.676	0.059	11,555	0
d1 <- Intention to practice appropriate land use	0.828	0.03	28,018	0
d2 <- Intention to practice appropriate land use	0.768	0.039	19,744	0
d3 <- Intention to practice appropriate land use	0.836	0.029	28,574	0
d4 <- Intention to practice appropriate land use	0.856	0.022	38,543	0
d5 <- Intention to practice appropriate land use	0.784	0.028	28,032	0
e1 <- Proper Land Use Behavior	0.868	0.022	38.8	0
e2 <- Proper Land Use Behavior	0.868	0.026	33,064	0
e3 <- Proper Land Use Behavior	0.867	0.022	39,536	0
e4 <- Proper Land Use Behavior	0.754	0.057	13,315	0
e5 <- Proper Land Use Behavior	0.093	0.084	1,099	0.272

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The processed data results for CFA for all constructs in this study are displayed and can be utilized for validity testing. To observe the contribution of each indicator to its variable, the magnitude can be seen in the following table. This table provides information about the outer loading of the indicators on the latent variables measured in the research model. Outer loading measures how well these indicators can predict the actual latent variables. The primary focus is on the Original Sample column, where values >0.50 indicate that the indicator is considered valid in measuring the respective latent variable. From these results, it can be concluded that, except for the e5 indicator in Proper Land Use Behavior, which is considered invalid (value <0.50), all other indicators are deemed valid for measuring the related latent variables in this research model. This indicates that these indicators are reliable and relevant in helping measure these constructs in the context of this study.

4.3 Hypothesis Testing

Hypothesis testing verification in this research was conducted to test and analyze the influence of Spatial Knowledge and Regulatory Consciousness on Attitude, Intention to practice proper land use, and Proper Land Use Behavior. The verification hypothesis testing consists of testing the direct influence hypothesis and testing the indirect influence hypothesis.

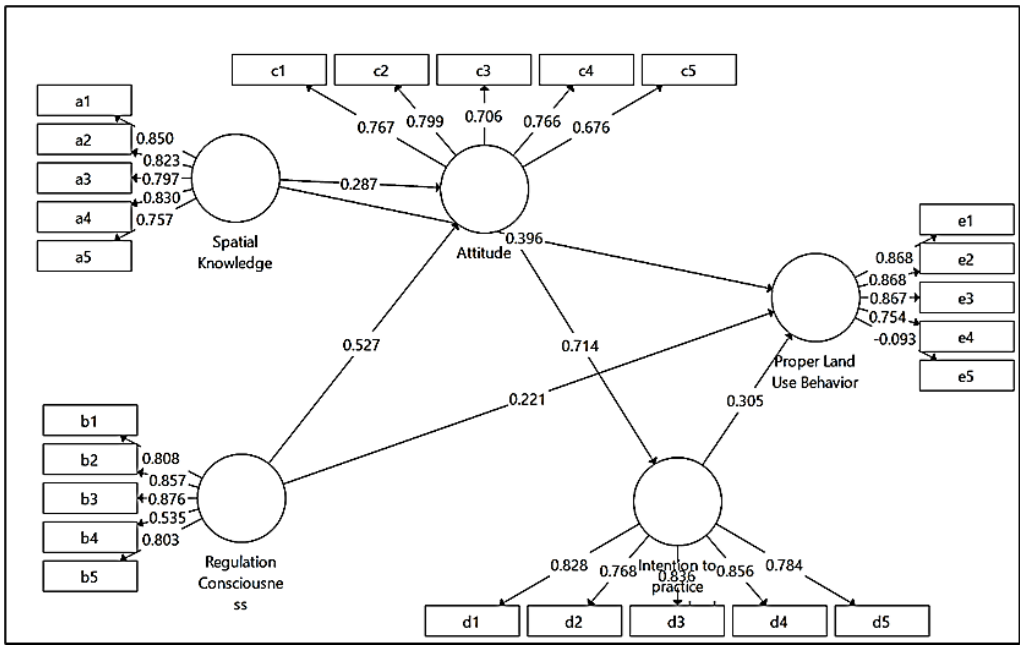

Table 2. Results of Direct Effect Hypothesis Testing

Proving the Direct Influence Hypothesis	Original Sample	Standard Deviation	T Statistics	P Values
Attitude -> Intention to practice proper land use	0.714	0.035	20,646	0
Intention to practice proper land use -> Proper Land Use Behavior	0.305	0.071	4.31	0
Regulation Consciousness -> Attitude	0.527	0.085	6,238	0
Regulatory Consciousness -> Proper Land Use Behavior	0.221	0.083	2.65	0.008
Spatial Knowledge -> Attitude	0.287	0.094	3,036	0.003
Spatial Knowledge -> Proper Land Use Behavior	0.396	0.093	4,259	0

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The hypothesis testing results provide insights into the direct effects between the specified variables in the research model. Let's break down each line of the results:

Attitude -> Intention to practice proper land use (T Statistics: 20.646, P Value: 0):

The strong T-statistic value of 20.646 indicates a highly significant positive direct effect from Attitude to Intention to Practice Proper Land Use. The P-value of 0 supports the rejection of the null hypothesis and suggests a robust and statistically significant influence of attitude on the intention to practice proper land use. This implies that individuals with a positive attitude are more likely to express the intention to engage in appropriate land use practices.

Intention to practice proper land use -> Proper Land Use Behavior (T Statistics: 4.31, P Value: 0):

The T-statistic value of 4.31 and a P-value of 0 indicate a significant positive direct effect from Intention to practice proper land use to Proper Land Use Behavior. This suggests that individuals who have a strong intention to practice proper land use are more likely to exhibit actual behavior aligning with proper land use practices. The statistical significance reinforces the hypothesis that intention plays a crucial role in influencing behavior.

Regulation Consciousness -> Attitude (T Statistics: 6.238, P Value: 0):

A T-statistic value of 6.238 and a P-value of 0 demonstrate a significant positive direct effect from Regulation Consciousness to Attitude. This suggests that individuals with a higher level of regulatory consciousness are likely to develop positive attitudes toward appropriate land use. The statistical significance supports the idea that awareness and understanding of regulations contribute to shaping attitudes.

Regulatory Consciousness -> Proper Land Use Behavior (T Statistics: 2.65, P Value: 0.008):

The T-statistic value of 2.65 and a P-value of 0.008 indicate a significant positive direct effect from Regulatory Consciousness to Proper Land Use Behavior. This implies that individuals with a heightened sense of regulatory consciousness are more likely to exhibit behaviors consistent with appropriate land use practices. Although the T-statistic is lower than in some other cases, the statistical significance supports the hypothesis.

Spatial Knowledge -> Attitude (T Statistics: 3.036, P Value: 0.003):

A T-statistic value of 3.036 and a P-value of 0.003 suggest a significant positive direct effect from Spatial Knowledge to Attitude. This implies that individuals with a better understanding of spatial knowledge are more likely to develop positive attitudes toward proper land use. The statistical significance reinforces the importance of spatial knowledge in shaping attitudes.

Spatial Knowledge -> Proper Land Use Behavior (T Statistics: 4.259, P Value: 0):

The T-statistic value of 4.259 and a P-value of 0 indicate a significant positive direct effect from Spatial Knowledge to Proper Land Use Behavior. This suggests that individuals with higher spatial knowledge are more likely to exhibit behaviors aligned with appropriate land use practices. The statistical significance supports the hypothesis that spatial knowledge contributes to shaping actual land use behaviors.

V. Discussion

The findings from the hypothesis testing provide valuable insights when considering the specific items associated with each variable. Let's analyze the results within the context of the items related to each variable. The positive direct effect from Spatial Knowledge to Attitude (T Statistics: 3.036, P Value: 0.003) implies that individuals with a better understanding of geographical concepts are more likely to develop positive attitudes toward appropriate land use (Tran, H., Nguyen, Q., & Kervyn, M. 2018). The statistical significance aligns with items such as understanding basic geography concepts, regulations governing land use, and the ability to use digital mapping software. It suggests that knowledge of spatial concepts contributes significantly to shaping positive attitudes, potentially due to the capacity to identify land designations on maps. Moreover, the significant positive direct effect of Spatial Knowledge on Proper Land Use Behavior (T Statistics: 4.259, P Value: 0) emphasizes that individuals with higher spatial knowledge are more prone to exhibit behaviors consistent with proper land use practices. This aligns with the items related to understanding geographical concepts, regulations, and the ability to use mapping software. The statistical significance supports the hypothesis that spatial knowledge contributes significantly to shaping actual land use behaviors.

The noteworthy positive impact observed from Regulatory Consciousness to Attitude (T Statistics: 6.238, P Value: 0) indicates that individuals with a heightened awareness of land use regulations are inclined to foster positive attitudes toward proper land use (Wang, C., Wang, L., Jiang, F., & Lu, Z. 2015).This alignment is reflected in various items such as understanding regulations,

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recognizing the impact of degradation, knowledge of application requirements, awareness of rights and obligations, and an interest in learning about spatial planning processes. The statistical significance underscores the pivotal role of regulatory awareness in shaping positive attitudes, reinforcing the relevance of these aspects in fostering a positive mindset.Furthermore, the affirmative direct effect of Regulatory Consciousness on Proper Land Use Behavior (T Statistics: 2.65, P Value: 0.008) implies that individuals with an elevated sense of regulatory consciousness are more likely to manifest behaviors consistent with proper land use practices (Hayes, T., Murtinho, F., & Wolff, H. 2017). Despite a marginally lower T-statistic, the statistical significance reinforces the hypothesis and corresponds with items related to understanding regulations, recognizing the impact of degradation, knowledge of application requirements, awareness of rights and obligations, and an interest in learning about spatial planning processes.

Shifting the focus to the positive direct effect from Attitude to Intention to practice proper land use (T Statistics: 20.646, P Value: 0), it accentuates that individuals harboring a positive attitude are markedly inclined to express the intention to engage in proper land use practices (Peña-García, N., Gil-Saura, I., Rodríguez-Orejuela, A., & Siqueira-Junior, J. R. 2020). This alignment is evident in items such as belief in the importance of land use regulations, understanding environmental impacts, belief in the significance of conservation, interest in environmental learning, and belief in public participation in sustainable development. The statistical significance robustly supports the assertion that a positive attitude significantly influences the intention to practice appropriate land use.Additionally, the affirmative direct effect of Intention to practice proper land use to Proper Land Use Behavior (T Statistics: 4.31, P Value: 0) suggests that individuals with a strong intention to practice proper land use are more likely to actualize their intentions in behaviors aligned with appropriate land use practices (Yoon, E., Guffey, H. J., & Kijewski, V. (2003). This correspondence is reflected in items related to intending to comply with spatial planning regulations, taking actions to reduce environmental impacts, participating in land conservation initiatives, learning more about climate change, and participating in spatial planning processes. The statistical significance provides robust backing for the hypothesis, affirming the pivotal role of intention in influencing actual behaviors related to land use.

Moreover, the positive direct effect from Proper Land Use Behavior to Attitude (T Statistics: 2.65, P Value: 0.008) accentuates that individuals consistently adhering to land use regulations are likely to harbor positive attitudes toward proper land use. Although the T-statistic is marginally lower, the statistical significance aligns with items related to consistently adhering to regulations, taking actions to reduce environmental impacts, participating in land conservation initiatives, participating in spatial planning processes, and using land according to its designation. The outcomes suggest a reciprocal relationship wherein individuals exhibiting appropriate land use behaviors tend to harbor positive attitudes.These nuanced analyses offer a deeper comprehension of how specific items under each variable contribute to the observed direct effects in the hypothesis testing results. It underscores the significance of spatial knowledge, regulatory consciousness, attitude, intention, and actual behaviors in shaping a sustainable approach to land use practices, providing valuable insights for both academic and practical applications.

The current analysis focuses on examining individual-level factors influencing appropriate land use behavior. However, a comprehensive understanding requires the incorporation of contextual elements such as institutional policies, socio-economic conditions, and cultural norms. Institutional Policies play a pivotal role, as strong and well-enforced regulations regarding land use can significantly augment the influence of individual knowledge and awareness. Accessible information on regulations and clear consequences for non-compliance can strengthen the impact of regulatory consciousness on attitudes and behaviors. Conversely, weak or ambiguous policies may impede individual efforts, creating a potential gap between spatial knowledge and actual adherence to proper land use behavior. Socio-economic Conditions are crucial determinants shaping behaviors. Factors like income inequality and resource accessibility can significantly influence decision-making. Individuals facing limited access to resources may prioritize immediate needs, even if they possess the knowledge and intention to engage in sustainable practices. Addressing underlying socio-economic disparities becomes imperative to establish a level playing field where responsible land use practices are not only accessible but also encouraged for all.

5.1 Managerial Implications

The findings of this study have several important managerial implications that can guide policymakers, land-use planners, and environmental managers in developing effective strategies and interventions. Promoting Positive Attitudes: The study highlights the significance of fostering positive attitudes among the general public toward proper land use. Managers and policymakers can develop awareness campaigns, educational programs, and community engagement initiatives aimed at instilling positive attitudes. This can be achieved by emphasizing the importance of adhering to land-use regulations and the positive impact of sustainable land practices on the environment.

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Given the positive correlation between regulation consciousness and attitudes as well as proper land-use behavior, there is a need to enhance the public's understanding of land-use regulations. Managers can work on improving communication channels to disseminate information about existing regulations, the consequences of land degradation, and the process of obtaining land-use permits. This can contribute to a more informed and conscious public regarding land-use practices. The study underscores the importance of spatial knowledge in shaping attitudes and behaviors related to land use. Managers can collaborate with educational institutions, government agencies, and technology providers to implement training programs that enhance spatial knowledge. This may involve providing access to digital mapping tools, conducting workshops, and integrating spatial knowledge into the educational curriculum. The study suggests that individuals with strong intentions to practice proper land use are more likely to exhibit corresponding behaviors. Managers can leverage this insight by designing interventions that specifically target the development of intentions. This could involve incentivizing sustainable practices, creating community-driven conservation projects, and incorporating land-use considerations into urban planning.

To ensure that individuals align their behaviors with regulations, managers can focus on strengthening regulation consciousness. This may include simplifying the permitting process, improving accessibility to information about regulations, and actively involving communities in the regulatory decision-making process. Additionally, the study emphasizes the importance of understanding the rights and responsibilities associated with land use, which can be incorporated into educational initiatives. Managers and policymakers can use the insights from this study to design and implement sustainable land-use initiatives. These initiatives can range from afforestation and reforestation projects to community-based conservation efforts. By aligning these initiatives with the identified factors influencing proper land use, such as positive attitudes, heightened regulation consciousness, and strong intentions, these programs are more likely to be embraced by the community and produce positive environmental outcomes.

Recognizing the multifaceted nature of factors influencing land-use practices, managers should encourage collaboration among various stakeholders. This includes government bodies, environmental organizations, educational institutions, and local communities. A collaborative approach ensures a holistic understanding of the challenges and opportunities associated with appropriate land use, fostering comprehensive and sustainable solutions. Overall, the managerial implications of this study offer actionable insights for developing strategies that promote sustainable land-use practices, increase public awareness, and contribute to positive environmental outcomes.

VI. Conclusion

In conclusion, this study delved into the intricate dynamics of factors influencing land-use practices, aiming to contribute valuable insights for policymakers, land-use planners, and environmental managers. The research model, consisting of variables such as spatial knowledge, regulation consciousness, attitude, intention to practice proper land use, and proper land-use behavior, provided a framework to understand the relationships among these elements. The findings yielded interesting outcomes and shed light on several key aspects.

Firstly, the study identified a robust positive relationship between attitude and intention to practice appropriate land use. Individuals with positive attitudes were significantly more likely to express intentions aligned with engaging in appropriate land-use practices. This underscores the pivotal role of attitudes in shaping behavioral intentions, emphasizing the need for interventions that foster positive attitudes toward sustainable land use. Second, the study highlighted the significant influence of intention on actual behavior related to land use. Individuals with strong intentions to practice proper land use exhibited behaviors consistent with these intentions. This insight suggests that interventions aimed at cultivating strong intentions can potentially translate into tangible changes in land-use behavior. Thirdly, the findings emphasize the importance of regulation of consciousness in shaping attitudes and behaviors. Individuals with a heightened awareness of land-use regulations were more likely to develop positive attitudes and engage in behaviors consistent with appropriate land use. This underscores the need for educational initiatives and awareness campaigns to enhance the regulation of consciousness among the public.

Moreover, spatial knowledge emerged as a critical factor influencing both attitudes and behaviors related to land use. Individuals with a better understanding of spatial knowledge demonstrate a propensity for positive attitudes and engagement in appropriate land-use behaviors. This finding underscores the importance of incorporating spatial knowledge into educational programs and initiatives aimed at promoting sustainable land use. The study's managerial implications provide actionable strategies for enhancing public awareness, aligning behaviors with regulations, and fostering a positive attitude toward appropriate land use. These implications include promoting positive attitudes, enhancing regulatory consciousness, developing spatial knowledge, targeting intentions, aligning behaviors with regulations, initiating sustainable land-use projects, and encouraging multi-stakeholder collaboration.

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This study contributes to the broader understanding of factors influencing land-use practices and provides a foundation for the development of effective strategies to promote sustainable land use. By addressing these factors through targeted interventions and collaborative efforts, stakeholders can work towards a future where land is utilized responsibly, contributing to environmental conservation and long-term societal well-being.

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