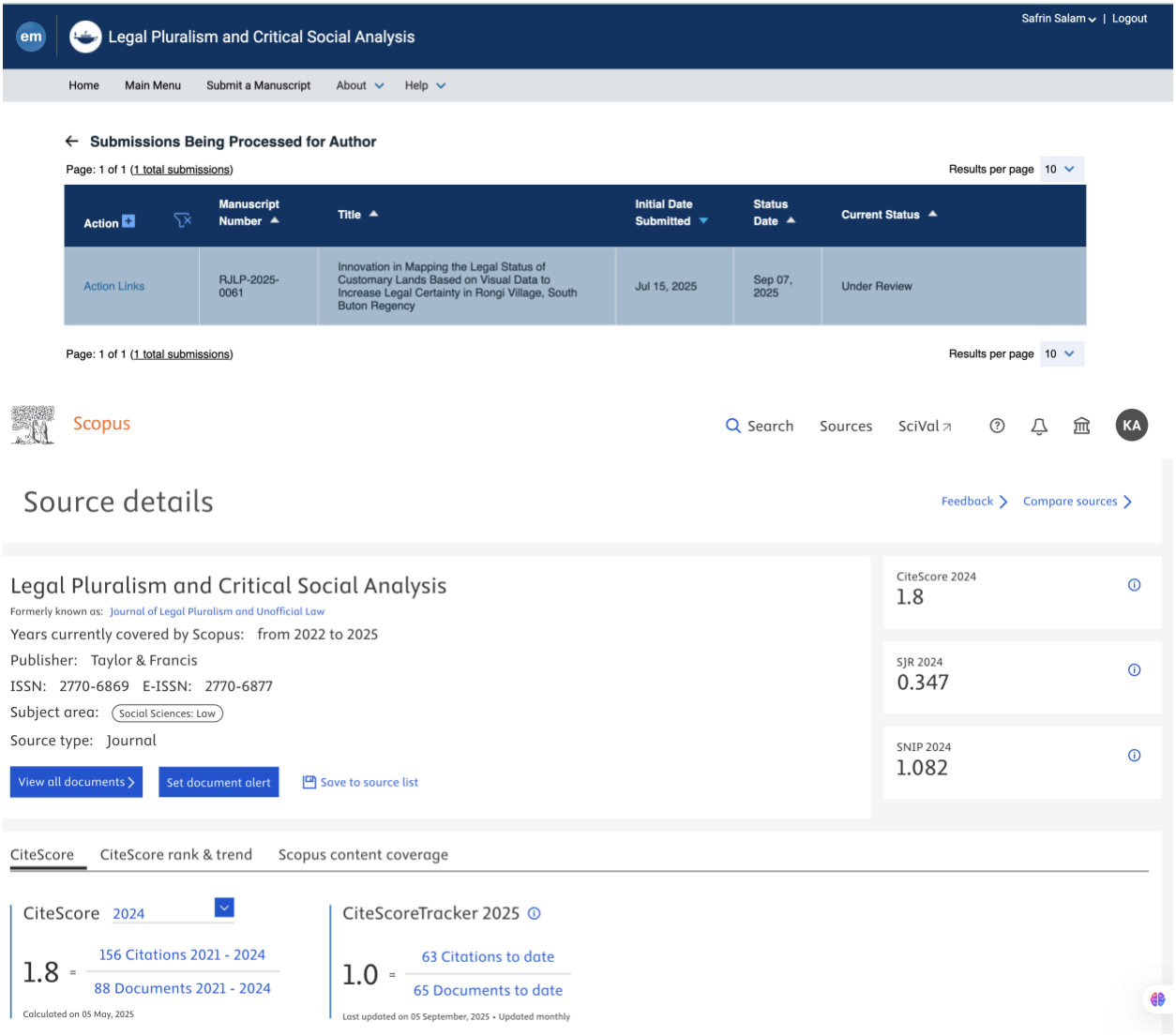
HASIL PENELITIAN YANG DIBUAT DALAM BENTUK ARTIKEL ILMIAH YANG DISUBMIT DI JURNAL LEGAL PLURALISM AND CRITICAL SOCIAL ANALYSIS (TERINDEKS SCOPUS Q2) DENGAN STATUS "UNDER REVIEW"



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Legal Pluralism and Critical Social Analysis

Formerly known as: Journal of Legal Pluralism and Unofficial Law

Years currently covered by Scopus: from 2022 to 2025

Publisher: Taylor & Francis

ISSN: 2770-6869 E-ISSN: 2770-6877

Subject area: Social Sciences: Law

Source type: Journal

View all documents | Set document alert | Save to source list

CiteScore 2024: 1.8

SJR 2024: 0.347

SNIP 2024: 1.082

CiteScore | CiteScore rank & trend | Scopus content coverage

CiteScore 2024: 1.8 = 156 Citations 2021 - 2024 / 88 Documents 2021 - 2024

Calculated on 05 May, 2025

CiteScoreTracker 2025: 1.0 = 63 Citations to date / 65 Documents to date

Last updated on 05 September, 2025 • Updated monthly

Legal Pluralism and Critical Social Analysis

COUNTRY	SUBJECT AREA AND CATEGORY	PUBLISHER	SJR 2024
United Kingdom Universities and research institutions in United Kingdom Media Ranking in United Kingdom	Social Sciences └ Law	Routledge	0.347 Q2 H-INDEX 30

PUBLICATION TYPE	ISSN	COVERAGE	INFORMATION
Journals	27706869, 27706877	2022-2025	Homepage How to publish in this journal

Legal Pluralism and Critical Social Analysis

Innovation in Mapping the Legal Status of Customary Lands Based on Visual Data to Increase Legal Certainty in Rongi Village, South Buton Regency

--Manuscript Draft--

Full Title:	Innovation in Mapping the Legal Status of Customary Lands Based on Visual Data to Increase Legal Certainty in Rongi Village, South Buton Regency
Manuscript Number:	RJLP-2025-0061
Article Type:	Original Article
Keywords:	Customary Lands; Legal Status; Tableau; Indigenous Peoples' Legal Certainty
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Innovation in Mapping the Legal Status of Customary Lands Based on Visual Data to Increase Legal Certainty in Rongi Village, South Buton Regency

Customary lands are an important element in the social, cultural, and economic life of indigenous peoples in Indonesia. However, the unclear legal status of customary lands often triggers conflicts between indigenous peoples and outsiders. This study aims to examine innovations in mapping the legal status of customary land using Tableau-based visual data technology to improve legal certainty in Ronggi Village, South Buton Regency. The research method used is *the Socio-Legal Approach*, with primary data collection through observation and interviews, as well as qualitative analysis. The results of the study show that mapping using Tableau has succeeded in providing a clear visualization of customary land boundaries and their legal status, which were previously not recorded in the state land system. This mapping helps strengthen indigenous peoples' rights to their land and reduce frequent land disputes. The discussion revealed that this technology not only increases transparency but also empowers indigenous peoples to be involved in the management of their lands. The suggestion from this study is the need for technology training for indigenous peoples to maximize the benefits of Tableau-based mapping, as well as the application of this method in other areas facing similar problems to improve legal recognition of indigenous lands

Keywords: Customary Lands; Legal Status; Tableau; Indigenous Peoples' Legal Certainty

I. INTRODUCTION

Customary lands in Indonesia are a very important element in the social, cultural, and economic life of indigenous peoples. This land not only serves as a natural resource that supports life, but is also an integral part of the identity and sovereignty of indigenous peoples [1]. In the Indonesian context, customary lands often have a very strong relationship

[1] Rye dan Kurniawan, "Claiming Indigenous Rights through Participatory Mapping and the Making of Citizenship."

with ancestral heritage and governance that has existed since ancient times [2]. Customary land is a symbol of the sustainability of indigenous peoples' lives who rely on the land for agriculture, fisheries, and other activities. In addition, customary lands are also a space to carry out deep traditions and rituals for the communities that manage them, reflecting how indigenous peoples interact with nature and the surrounding environment.

However, although customary lands have great value for indigenous peoples, the issue of legal uncertainty related to customary lands in Indonesia is still a very complex issue. Unclear legal status of customary lands often creates uncertainty that has the potential to trigger conflict. In many cases, customary lands are not officially recorded in the country's land system, which makes it difficult for indigenous peoples to obtain legal recognition of their rights to the land. This is a bigger problem, considering that Indonesia has more than 1,100 (one thousand hundred) indigenous groups spread throughout the archipelago, with extraordinary diversity in land management and ownership.

The unclear legal status of customary land risks causing tension that leads to conflicts between indigenous peoples and outsiders, be it the government or private parties who want the use of land for development, mining, or other natural resources. Indigenous lands that do not have clear legal status are often the target of unilateral claims, which can lead to evictions and injustice to indigenous peoples. Conflicts arising from the unclear legal status of customary lands are often protracted, as there is no clear legal basis that can be used as a guideline in resolving disputes. For example, in Rongi Village, South Buton Regency, indigenous people face the same uncertainty regarding the legal status of the customary lands they manage. Although the land has been managed

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[2] Zaimah dkk., "Cultural Construct of Customary Land from the Perspective of Bidayuh Community."

by indigenous peoples since their ancestors, it is not registered in the country's land system. This causes legal uncertainty and allows outside parties, such as the government or private companies, to claim rights to the land. This uncertainty is further exacerbated by the lack of access for indigenous peoples to the existing formal legal and bureaucratic system. Without legal documents acknowledging the status of their land, indigenous peoples are often marginalized in legal debates over their land, leading to the abandonment of their rights to indigenous lands.

This problem of legal uncertainty worsens the social and economic conditions of indigenous peoples. Without legal recognition of their land, indigenous peoples cannot make optimal use of the land to improve their welfare. They are unable to access credit facilities or other resources available through legal recognition of land, which makes them more vulnerable to poverty and social powerlessness. Often, development policies undertaken without involving indigenous peoples lead to their marginalization, as they do not have the legal legitimacy to protect their lands from destruction or takeover.

In facing this problem, one of the solutions that can be applied is to use visual data-based mapping technology through the Geographic Information System (GIS) [3], . GIS technology offers a more effective and efficient way to map the legal status of customary lands in a more transparent and verified way [4],[5]. GIS allows the integration of spatial data with legal information, which allows visualization of customary land

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[3] "Geographic Information Systems."

[4] Syafiq dkk., "Customary Land Ownership Rights Need."

[5] Honarmand dkk., "AN OVERVIEW OF THE LOCATION OF AIRPORTS USING GEOGRAPHIC INFORMATION SYSTEM."

boundaries and their legal status [6]. One platform that can be used for this purpose is Tableau, a data visualization tool that allows the creation of interactive maps that can be easily accessed and understood by indigenous peoples, governments, and other related parties. Using Tableau, mapping the legal status of customary lands can be done in a more granular and dynamic way. Tableau allows more complex spatial data, such as customary land boundaries, legal status of land, outside party claims, and changes in legal status, to be visualized in the form of an easy-to-understand map. As an interactive data visualization platform, Tableau allows users to interact with maps, dig deeper into information, and obtain the data they need to make better decisions. For example, if there are overlapping claims on customary lands, a map generated by Tableau can show the actual boundaries of customary lands, as well as the legal status that applies to the land. With clearer and more transparent visualization, indigenous peoples can easily verify the legal status of their lands and take appropriate action.

As Bakker and Derks explain, GIS technology allows for the collection, analysis, and visualization of accurate data on customary lands, which can reduce legal uncertainty [7]. With the visualization of the data generated through Tableau, all interested parties, from indigenous peoples to governments, can easily access relevant information regarding the legal status of indigenous lands. This will speed up the dispute resolution process and ensure that indigenous peoples' rights to their lands are respected. Tableau also allows for real-time mapping of the legal status of customary lands. The data generated can be updated quickly and instantly, allowing indigenous peoples to get the latest information on the status of their land without having to wait for a lengthy bureaucratic process. As

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[6] "Indigenous Mapping."

[7] E dan M, "The Role of GIS in Mapping Customary Land Rights."

noted by Rahim, GIS technology in mapping customary lands can accelerate the recognition and protection of indigenous peoples' rights. Using Tableau makes the process of updating information easier and faster, which ultimately reduces the potential for conflicts caused by uncertain soil status [8]. Through visual data-based mapping, indigenous peoples can also obtain clearer information about their rights to the customary lands they manage. Visualization of the legal status of land will provide indigenous peoples with clarity on whether the land they manage is registered as property, use rights, or other legal status. With clearer and more accessible information, they can more easily fight for their rights and protect their customary lands from unauthorized outside claims.

This data-based visualization also provides an advantage in terms of conflict prevention. With data that is transparent and accessible together, the risk of land disputes can be minimized [9]. For example, in the case of land disputes between indigenous peoples and companies seeking to use the land for commercial activities, maps generated through Tableau can be used to show the legal boundaries of indigenous lands and confirm their legal status. With strong visual evidence, the parties involved can resolve disputes on a clearer and more verified basis.

In turn, Tareland-based data visualization technology can also increase the involvement of indigenous peoples in decision-making related to their lands. By having access to accurate and up-to-date maps in real-time, indigenous peoples can participate in the process of managing and protecting their customary lands. They will feel more empowered and have greater control over the land they manage. This opens up

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[8] A, "The Role of Geographic Information Systems in Land Conflict Resolution in Indonesia."

[9] Dewi, "Gaining Recognition Through Participatory Mapping?"

opportunities for indigenous peoples to engage in more inclusive and equitable land management policies, in accordance with the principles of human rights and social justice.

Previous research has shown that while indigenous lands play an important role in the lives of indigenous peoples, the legal recognition and protection of these lands in Indonesia is often unclear. One relevant study is that conducted by *Bakker and Derks* which revealed that many indigenous peoples in different countries face challenges in obtaining legal recognition of their customary lands due to the unclear status of land in the national land system. This research highlights the importance of GIS-based mapping technology in mapping customary land rights and provides solutions to clarify the legal status of customary lands, so that indigenous peoples can obtain better protection. Another relevant research is conducted by *Rahim* who researches the application of GIS technology in land dispute resolution in Indonesia. Umar points out that GIS technology, including the use of data visualization platforms such as Tableau, can help increase transparency in customary land mapping and speed up the dispute resolution process. In this context, Rahim's research suggests that the implementation of GIS can minimize potential conflicts that are often caused by unclear legal status of customary lands, as well as provide better access to indigenous peoples to manage their lands more equitablely.

However, although various studies have been conducted on customary land and GIS mapping, there are still many that have not specifically discussed the application of Tableau in the context of mapping the legal status of customary land in villages that have large indigenous communities and have not been registered in the state land system, as happened in Rongi Village, Pasarwajo Regency. Therefore, this study offers *novelty* in the approach used to map the legal status of customary land through Tableau-based data visualization that not only provides an overview of customary land boundaries, but also

the integration of detailed legal data on the legal status of the land, which has not been available in many previous studies.

The novelty of this research lies in the application of Tableau as a visualization tool that is able to combine spatial data and legal information in a more interactive and dynamic way. Using Tableau, the data obtained regarding customary land boundaries and their legal status can be visualized in the form of interactive maps that allow users to interact with the data, dig deeper into the information, and update the information in real-time. This is in contrast to traditional mapping methods which are often static and difficult to update, especially when there is a change in the legal status of land or land claims by outsiders. In addition, the novelty of this research lies in the application of data visualization technology at the village level, which has been more often used at the government level or by large institutions, but has not been widely applied directly at the local level involving indigenous peoples. Rongi Village is a good example of implementing Tableau-based mapping, as the indigenous people in this village are heavily dependent on land for their survival, but they face legal uncertainty regarding the status of the land they manage.

This research is also novel in terms of its approach to indigenous peoples' engagement. Previously, research on customary lands often focused more on legal or government policy analysis without actively involving indigenous peoples in the decision-making or management process of their land. However, in this study, Tableau was not only used to map the legal status of land, but also as a tool that indigenous peoples can access to understand more clearly about their rights to the land. Thus, this study seeks to empower indigenous peoples to be more involved in the management of their customary lands with more transparent and trustworthy data. Another novelty also lies in the focus of this research to provide solutions to the problem of unclear legal status of

customary lands, which has often been a source of conflict between parties. By adopting visual data-based mapping technology, this study aims to reduce the uncertainty faced by indigenous peoples in defending their land rights. A more accurate and transparent mapping of the legal status of customary lands is expected to minimize the potential for disputes that often occur due to unilateral claims to customary lands.

This research is also different because it proposes a more practical and direct approach in its application. While many previous studies have talked about the theory and model of mapping ideal customary land rights, this study aims to show how existing data visualization technologies, such as Tableau, can be used directly in the field to solve problems faced by indigenous peoples, as well as clarify the legal status of indigenous lands in a more practical and applicable way. Overall, the novelty of this research lies in the integration between modern technologies, such as Tableau, and customary land management which has been faced with various legal and administrative constraints. With more transparent, accurate, and easy-to-understand mapping, it is hoped that this research can provide a more effective solution in providing legal certainty for customary lands and reducing potential conflicts arising from the unclear status of the land. The application of Tableau in mapping the legal status of customary land in Rongi Village, Pasarwajo Regency, will have a positive impact in clarifying the legal status of customary land. Indigenous peoples in these villages will have easier access to relevant information about their lands, as well as have a stronger basis to fight for their rights. In addition, the application of this technology will also facilitate more efficient and fair dispute resolution, as the resulting data can be used as valid evidence in legal proceedings. With transparency in the management of customary lands, conflicts caused by unclear land status can be minimized, and indigenous peoples can obtain better legal protection over their lands.

II. Research Methods

This research uses a socio-legal approach, which combines social and legal dimensions in analyzing customary land problems and the application of mapping technology to solve these problems. The socio-legal approach was chosen because the issue of customary land in Indonesia not only involves positive legal norms, but also relates to social interactions and social impacts caused by the unclear legal status of customary lands. In this study, the author focuses on how technology, especially Tableau-based customary land mapping, can provide solutions to the legal uncertainty faced by indigenous peoples in Kaongkokea Village, Pasarwajo Regency. The type of research conducted is socio-legal, because this research aims to delve deeper into the problems that exist in the management of customary lands with an approach that not only looks at legal aspects, but also social aspects that affect indigenous peoples themselves. This approach helps in understanding the relationship between existing legal norms and the social practices carried out by indigenous peoples regarding their land. Given that the problem that often arises is the unclear legal status, this study also tries to offer technology as a solution to clarify the legal status of customary lands which have often triggered conflicts. As *Merry (2006)* The social law approach provides a broader framework to understand how the law is accepted and practiced by communities at the local level, as well as how the law can function to defuse conflicts. The data sources used in this study consist of primary data and secondary data. Primary data was collected through direct observation of the conditions of customary land management in Kaongkokea Village, as well as in-depth interviews with indigenous peoples who are directly involved in the management of the land. In addition, Tableau-based customary land mapping is also an important part of primary data collection, where this technology is used to describe

customary land boundaries and their legal status. Thus, the primary data collected in this study provides a clearer picture of the field conditions and problems faced by indigenous peoples related to their customary lands. Primary data in qualitative research plays a role in providing a direct understanding of the phenomenon being studied and is an invaluable resource in social research that focuses on individuals and groups [10].

Secondary data in this study were obtained from literature related to customary law theories, customary land mapping, and the application of GIS technology in the management and settlement of customary land disputes. This secondary data serves as a theoretical foundation that enriches the analysis and provides a broader perspective on customary land issues and the application of technology in this context. These secondary sources are drawn from various international journals, books, and articles relevant to the research topic. The Rongi indigenous people are known to have managed customary land for generations, but they face uncertainty regarding the legal status of the land they manage. Therefore, the Ronggi indigenous people were chosen as the subjects of the study to understand how the uncertainty of customary land law affects their social and economic lives. The research sample was taken purposively, namely by selecting several individuals or families representing indigenous groups in the village, who are actively involved in the management of customary lands. The selection of this sample was carried out with the consideration that they have direct experience in managing customary lands and experience difficulties related to the uncertainty of the legal status of their land. The selection of purposive samples was carried out to obtain in-depth information from individuals who had direct experience with the phenomenon being studied. To collect

[10] J.W., *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*.

data, this study uses several data collection techniques [11]. Direct observation was carried out in the field to observe the process of customary land management by the community in Kaongkokea Village. These observations allowed researchers to see firsthand how indigenous peoples manage their lands, as well as to understand the challenges they face related to the legal status of the land. In addition, observations were also made on the application of Tableau-based mapping technology to describe customary land boundaries, so that researchers can directly observe how the technology is applied and whether it can provide a solution to the uncertainty of the legal status of customary lands. This observation technique refers to the approach described by *Patton* which emphasizes the importance of direct observation in qualitative research to gain an in-depth understanding of the dynamics that occur in the field [12].

In-depth interviews were also conducted with the Ronggi indigenous people in Kaongkokea Village, as well as several other related parties such as the village government and institutions that have a role in land management. This interview aims to explore more information about indigenous peoples' views on the legal uncertainty they experience, as well as their opinions on the use of technology in mapping and clarifying the legal status of customary lands. The interviews were conducted in a semi-structured manner, which allowed the researcher to develop questions based on the answers given by the respondents, so that the data obtained was more in-depth and relevant to the problems faced. This semi-structured interview technique also corresponds to the

[11] M.B., dan A.M., *Qualitative Data Analysis: An Expanded Sourcebook*.

[12] M.Q., *Qualitative Research and Evaluation Methods*.

approach described by *Bryman* which states that these interviews provide flexibility that allows researchers to explore topics more openly and in-depth [13].

In addition to interviews, Tableau-based customary land mapping techniques were also used in this study. Using Tableau, researchers can map the boundaries of customary land managed by the Ronggi indigenous people, as well as identify the legal status of the land, both property rights, use rights, and other legal statuses. Tableau-based mapping also makes it possible to show changes in the legal status of customary lands, external claims to the land, and other relevant information that can help increase transparency and provide indigenous peoples with a clearer picture of their rights. After the data is collected, the data analysis is carried out with a qualitative approach. The qualitative approach was chosen because the purpose of this research is to explore a deeper understanding of the problems faced by indigenous peoples related to customary lands and how the application of data visualization technology can provide solutions to these problems. Qualitative data analysis is carried out by encoding data obtained from interviews and observations, as well as comparing and categorizing information relevant to the main theme of the research, namely customary land law issues and the use of technology to overcome legal uncertainty.

The analysis process begins with data encoding, which involves identifying the main themes of the information obtained. These themes are then further analyzed to look for patterns and relationships that are relevant to the research topic. Furthermore, the data that has been categorized will be analyzed in depth to understand how customary land law issues affect the social and economic lives of indigenous peoples, as well as to evaluate the effectiveness of Tableau technology in increasing the legal certainty of

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[13] A, *Social Research Methods*.

customary lands and reducing the potential for disputes. *Miles and Huberman* explains that qualitative analysis based on data coding allows researchers to compile systematic and structured findings, and relate them to a broader context [14]. In conducting the analysis, the researcher also used a triangulation technique to ensure the validity of the findings. Triangulation was carried out by comparing data obtained from Tableau-based customary land interviews, observations, and mapping. Thus, this research is expected to produce more valid and accurate findings regarding customary land problems and the application of technology in the management and resolution of disputes related to customary lands.

III. Results and discussion

A. Visual Data-Based Customary Land Legal Status Mapping Innovation Can Increase Legal Certainty in Rongi Village, South Buton Regency

In a study on the innovation of mapping the legal status of customary land based on visual data in Ronggi Village, South Buton Regency, the researcher focused on how Geographic Information System (GIS) technology, especially Tableau, can be used to clarify the legal status of customary lands that have been neglected, thereby providing legal certainty for indigenous peoples. The problem of the legal status of customary land in Indonesia, especially in Ronggi Village, is one of the complex issues due to the large number of customary lands that are not recorded in the state land system, as well as the frequent unilateral claims by outsiders against customary lands that have been managed by indigenous peoples for generations. Therefore, the use of visual mapping technology

[14] M.B., dan A.M., *Qualitative Data Analysis: An Expanded Sourcebook*.

in this context is important as an effort to clarify and confirm the legal status of customary lands, which in turn can reduce the potential conflicts arising from such ambiguity.

Based on the results of this study, the use of Tableau as a visual data-based customary land mapping tool in Ronggi Village can provide significant results in increasing legal certainty. This is evidenced by increased transparency regarding customary land boundaries, which were previously not clearly recorded in the land system. Tableau, with its ability to combine spatial data and legal information related to customary land status, has provided a more comprehensive picture of the legal status of customary lands in these villages. The resulting data-based mapping process clearly shows the boundaries of customary land managed by the Ronggi people, along with their legal status, whether it is property rights, use rights, or other relevant statuses. Tableau enables more dynamic and interactive data, which can be updated in real-time. Previously, data on customary land in Ronggi Village was often not recorded in the legal system, or if it was recorded, did not include detailed information about the rights attached to the land. Visual data-based mapping with Tableau allows indigenous peoples to access clearer information about the legal status of their land, which can be used as a stronger legal basis in defending their rights to the land. This is very important, because with more transparent mapping, indigenous people in Ronggi Village can now more easily identify their land boundaries and prove their ownership in the event of an unauthorized claim from outside parties.

The use of Tableau also has a significant impact in minimizing conflicts related to customary land in Rongi Village. Before the mapping was carried out, many land disputes arose between indigenous peoples and outsiders who claimed customary land for development or investment purposes. The unclear legal status of customary lands is often the main source of these disputes. However, with a clear visual mapping of the boundaries

of customary land and its legal status, indigenous people in Ronggi Village can now have legitimate data that strengthens their claim to the land. This mapping not only provides clarity on land boundaries, but also maps changes in the legal status of land that may occur over time. With more transparent and directly accessible data, previously difficult land disputes can now be minimized, as all parties involved can refer to legitimate maps generated by Tableau.

Prior to Tableau-based mapping, the Ronggi indigenous people often felt marginalized in the management of their land, as they did not have legal documents acknowledging their rights to the land. Customary lands that are managed for generations are often not recorded in the national land system, resulting in indigenous peoples losing the opportunity to utilize the land as an economic resource that can provide long-term benefits. With Tableau-based visual mapping, indigenous people in Ronggi Village now have legitimate tools that can be used to access better economic resources, such as credit facilities and legal protection of their land. As previous research has shown, the importance of recognizing customary land rights in developing countries can encourage indigenous peoples to be more economically independent, as well as mitigate the risk of exploitation of the land they manage [15].

However, visual data-driven mapping with Tableau not only focuses on increasing transparency and recognition of customary land rights, but also makes a major contribution to more sustainable management of customary lands. This mapping allows indigenous peoples to manage their land more efficiently, as they can easily access information regarding land boundaries and their legal status. This information can be used to better plan land use, avoid environmental damage, and maintain the sustainability of

[15] A.T. dan D, "Challenges in Legalizing Customary Land Rights in Indonesia."

customary land management in the long term. *Carpenters* argues that accurate and accountable data-driven mapping will provide indigenous peoples with the tools necessary to ensure their land management remains in line with sustainability principles [16].

While these mapping innovations have shown positive impacts, the study also identified some of the challenges faced in their implementation. One of them is the limited knowledge of indigenous peoples about technology and difficulties in accessing the hardware needed to run Tableau-based mapping. Nonetheless, this study shows that training provided to indigenous peoples on the use of mapping technology can reduce these barriers. Therefore, it is important for governments and relevant agencies to provide adequate training so that indigenous peoples can be more active in managing their lands using existing technologies. Training and capacity building are urgently needed to ensure that indigenous peoples can make the most of technology in the fight for their rights. One of the problems that is often faced by indigenous peoples in Indonesia, including in Ronggi Village, South Buton Regency, is the unclear legal status of customary lands. This ambiguity often leads to uncertainty in the recognition of land rights, which in turn increases the potential for conflict, both within the indigenous peoples themselves and between indigenous peoples and outsiders who claim the land. This issue is further complicated when customary lands are not registered in the state land system and do not have valid documents confirming their legal status. This adds to the difficulty for indigenous peoples to access their rights, both in terms of natural resource management, access to economic facilities, and legal protection. Prior to the implementation of

[16] S, "The Integration of Geospatial Technologies for Sustainable Land Use Management in Indigenous Communities."

Tableau-based mapping, the Ronggi indigenous people faced serious uncertainty related to the legal status of their land. Customary lands that have been managed for generations by indigenous peoples are often not formally recorded in the national land system. Even when there are attempts to register the land, lengthy legal processes and complicated bureaucracy are often the main barriers for indigenous peoples to obtain legal status. This worsens their situation, as the unclear legal status of these lands is often an excuse to ignore their rights and cause land disputes with outsiders, such as local governments or private companies that want to use the land for development or natural resource purposes.

The process of mapping customary lands based on visual data using Tableau in Rongi Village, South Buton Regency, was carried out with the aim of providing legal certainty for customary lands that have been managed by indigenous peoples without official recognition or registration in the state land system. Customary lands in Ronggi Village have been managed for generations by indigenous peoples, but because they are not officially recorded, their legal status is often unclear, which raises potential disputes. Tableau-based mapping aims to change this situation by providing a clearer and more transparent picture of the boundaries of customary lands, as well as the legal status attached to them.

a) **Customary Land Mapping Using Tableau**

The first stage in mapping customary lands using Tableau begins with the collection of spatial data required for mapping. This spatial data includes information about the geographical location of customary lands in Rongi Village. Previously, prior to the implementation of Tableau, data on customary lands was only known to indigenous peoples orally and was not recorded on official maps managed by the government. Therefore, accurate spatial data collection is a very important first step in this mapping process.

To obtain accurate spatial data, field observations were carried out to map the boundaries of customary land managed by the Ronggi indigenous people. Researchers together with members of indigenous peoples went directly to the field to identify the boundary points of customary lands that have been managed for generations. This process involves field measurements with appropriate tools, such as GPS, to ensure that the mapped land boundary corresponds to the reality on the ground. This location data is then fed into the Geographic Information System (GIS) using Tableau, which allows for clearer and easier to understand data visualization.

b) Collection of Legal Data Related to the Status of Customary Land

As a follow-up step, legal data on the status of customary land, whether the land has the status of ownership, right of use, or other status, is collected. This process involves interviews with indigenous peoples, village officials, and other relevant parties to obtain accurate information about the legal status of customary land in Ronggi Village. This legal information is very important because it provides a broader context regarding the rights of indigenous peoples to the lands they manage. This legal status recording also serves to identify whether there are other claims to the land by outside parties, such as the government or companies.

Once the spatial data and legal data are collected, the next stage is the integration of the data into Tableau. Using Tableau, spatial data that includes customary land boundaries and legal data on land status can be combined in one interactive data visualization platform. At this stage, Tableau is used to create an interactive map that shows the boundaries of customary lands managed by indigenous peoples, as well as the legal status of the associated land. Each mapped customary land boundary will be labeled with its legal status, so that indigenous people can easily find out whether the land they manage is registered as ownership, use rights, or other legal status.

Mapping generated using Tableau provides clearer visualizations and is accessible to indigenous peoples, governments, and other stakeholders. The interactive map generated allows users to directly examine customary land boundaries and their legal status, as well as identify potential claims or disputes that may arise. This map is a very important tool for indigenous peoples to prove their rights to the land they have managed. Tableau allows these maps to be updated in real-time, so that if there are any new changes or claims related to the status of customary lands, the data can be entered and published immediately.

c) Verification and Validation

After the interactive map is completed, the next stage is data verification and validation with indigenous peoples and other related parties. This verification process is important to ensure that the resulting map reflects the actual conditions on the ground. Indigenous peoples, along with village officials, can examine the map and provide input or corrections if there is inaccurate information. This process not only ensures the accuracy of the maps, but also reinforces indigenous peoples' sense of ownership and involvement in their land management processes. Thus, Tableau not only serves as a tool for mapping indigenous lands, but also as a tool to empower indigenous peoples in fighting for their rights.

d) Use of Maps for the Public Interest

Finally, after the data has been mapped and verified, the final stage is the use of the map for legal purposes. Maps generated through Tableau can be used by indigenous peoples to fight for their rights to land. These maps became a legitimate tool to prove their claims to customary land before the authorities, including in the case of land disputes. For example, if there is a unilateral claim by an outsider to customary land,

indigenous peoples can use the map generated by Tableau to show that the land belongs to them, based on clear and accountable mapping.

From the results of the research carried out and linked to the mapping application, the results of customary land mapping in the Rongi indigenous people can be described as follows

>>> Figure 1 >>>

>>> Figure 2 >>>

Figure 1 shows a map of Ronggi customary land in South Buton Regency, Southeast Sulawesi, covering an area of 468.1 hectares. This map provides a very important picture of the boundaries of customary land managed by the Ronggi indigenous people, depicted with a yellow line around the area. In general, these maps provide visual information that is very useful for indigenous peoples because they show clear boundaries regarding the land they manage for generations. Customary land in Ronggi Village has a very high social and cultural value, as an integral part of the identity and economic life of indigenous peoples. More transparent mapping like this is crucial, especially given that customary lands are often not officially registered in the country's land system and are often a source of legal uncertainty that leads to land disputes.

Previously, customary land in Rongi Village may have been only known by the local community and was not clearly recorded in the national land system. With this mapping, customary land boundaries become clearer and recorded in a visual format that can be accessed and verified by various parties, including the government, indigenous peoples, and other parties who may have an interest in the land. The use of Tableau as a mapping tool in this map is very useful because it can clarify the legal status of customary lands that were previously not recorded. Data-based visual mapping makes it possible to depict customary land boundaries more accurately, as well as provide a more complete

picture of land rights. With interactive maps, indigenous peoples can easily verify the boundaries of the land they manage and learn more about their legal status. If there is a claim from an outsider who feels they have rights to the land, this map can serve as valid visual evidence showing that the land belongs to the rogi indigenous people. Furthermore, this clear mapping also encourages legal certainty for the Ronggi indigenous people. Previously, indigenous peoples were often marginalized and had difficulty getting recognition of their rights to customary lands, especially in the face of outsiders who had an interest in using the land for development or investment. With accountable and easily accessible maps, indigenous peoples now have a stronger legal basis to fight for their rights to these customary lands.

While figure 2 shows that the customary land map was created using the Tableau application, which depicts the area around Pasarwajo and Baubau in South Buton, Southeast Sulawesi. This map maps different zones of land using color codes that describe the legal status or land use in the area. Overall, the map provides a clear visualization of land distribution in the region, which is particularly useful in the context of customary land management, dispute resolution, and legal recognition of land managed by indigenous peoples.

This map shows several areas that have been identified with different colors to indicate the status of their soils. The blue color signifies the Takawa protected forest, which is a conservation area protected by regulations. The red color indicates the Takawa Area, which is a zone that has certain rules or restrictions regarding its use. Furthermore, the color orange indicates that there is a dispute or legal problem that occurs in an area, which may be related to ownership claims or differences of opinion between interested parties. Lastly, the green color indicates the area referred to as the Lapandewa customary

land, which is land recognized as belonging to the Lapandewa indigenous people, which they have managed for generations.

The resulting mapping using Tableau allows us to clearly see the differences in soil status in the region. With detailed visualization, indigenous peoples, governments, and other related parties can easily identify the boundaries of customary land areas that are important to those communities. Customary lands have very high social and cultural value, and through this map, the legal status of customary lands can be more clearly identified, providing a stronger basis for legal protection of such lands. One of the main benefits of this mapping is to provide legal certainty over land managed by indigenous peoples. Before technologies like Tableau, customary lands were often not recorded in the country's land system and had no formal recognition. This often leads to legal uncertainty, especially when an outside party, such as a government or company, seeks to claim the land for the purpose of development or exploitation of natural resources. With clear maps, indigenous peoples can more easily fight for their rights to the land they have managed, both in the context of land dispute resolution and to ensure that their land is not taken or used without their consent.

Visually-based mapping like this also provides greater transparency in terms of customary land management. Previously, many unilateral claims to customary land occurred due to unclear boundaries and legal status of the land. However, with more detailed mapping technology, customary land boundaries can be depicted more accurately, providing stronger evidence in a legal context. In addition, the interactive map also allows all interested parties, both indigenous peoples and the government, to verify the status of the land more easily and faster.

Mapping like this is not only beneficial for indigenous people in Ronggi Village, but can also be used as a model for other areas that have similar issues related to the legal

status of customary lands. In a broader context, this Tableau-based mapping can help facilitate the legalization process of customary lands that have not yet been recorded in the country's land system, accelerate the recognition of customary land rights, and support the protection of indigenous peoples' rights to their lands.

Overall, the map shows that visual data-based mapping technology has an important role in land dispute resolution and the protection of customary land rights. By providing greater legal certainty over lands managed by indigenous peoples, the map clarifies the legal status of indigenous lands, reduces potential conflicts, and gives indigenous peoples stronger tools to protect their rights. Mapping like this also contributes to more sustainable management of indigenous lands, as it provides indigenous peoples with more transparency in their land management and encourages active participation in maintaining the sustainability of the environment and existing resources.

With clear and easily accessible mapping, indigenous peoples can leverage this data to fight for their rights, better plan for land management, and gain more legal recognition in the country's land system. This map, which depicts the boundaries and legal status of customary lands, is an important tool in ensuring that indigenous peoples' rights are respected and protected, and in supporting the sustainable equitable and inclusive management of customary lands.

In addition, this map provides greater transparency in the management of customary lands. Before this mapping is carried out, there may be unilateral claims to customary land that are difficult to resolve because there is no valid data on land boundaries and status. Using visual data-based mapping technology, such claims can be mitigated, as the resulting maps provide a clearer picture of the boundaries of customary lands managed by the Rongi Indigenous people. These maps can also serve as a dispute

resolution tool. If a dispute arises, either between indigenous peoples and outsiders or between groups within the indigenous peoples themselves, the resulting map can be used to clearly show the boundaries of the land in dispute. Thus, Tableau serves as a tool to clarify and document customary lands that have not been registered or ignored by the formal legal system, with the aim of reducing potential conflicts that arise due to unclear land status. Viewed from a social perspective, the map also empowers indigenous peoples in their land management processes. Previously, in the absence of clear and accountable data, indigenous peoples tended to be marginalized in decision-making related to the land they managed. However, with this map, indigenous peoples can now be more active in managing and planning their land use, both for agricultural needs, social development, and nature conservation.

Based on this data, there is a visual data-based mapping using Tableau, the legal status of customary land in Rongi Village can be clarified, and the legal certainty desired by indigenous peoples can be achieved. Clear mapping of customary land boundaries and their legal status gives indigenous peoples a powerful tool to prove their rights to the land they have managed for generations. Prior to Tableau-based mapping, indigenous peoples often had difficulty getting recognition of their rights because the land they managed was not officially recorded in the country's land system. The existence of maps generated through Tableau provides greater legal certainty for indigenous peoples, as they serve as valid evidence in legal proceedings related to land. With a clear visualization of land boundaries, indigenous peoples can more easily defend their rights in the event of unilateral claims from other parties, such as the government or private companies. The use of GIS technology in customary land mapping increases transparency in land management and accelerates the process of legal recognition of the land. Data-based visual mapping also reduces the risk of injustice that often occurs when the legal status

of customary land is unclear. With more transparent data, indigenous peoples can more easily fight for their rights without having to rely on verbal claims or unauthorized documentation. This gives them legal certainty in carrying out their land management, as well as providing stronger legal protection against potential threats arising from unclear land status. In addition, the process of data verification and validation with indigenous peoples ensures that the resulting maps reflect the actual conditions on the ground, thus giving higher legitimacy to the status of the customary lands that have been mapped. Recognition of the legal status of indigenous lands is the first step to improving the social and economic well-being of indigenous peoples. With a valid and accountable map, indigenous peoples in Ronggi Village now have stronger tools to protect their rights to customary lands that have been managed without formal recognition. Mapping using Tableau has a very significant impact in strengthening the position of indigenous peoples in dealing with land disputes. With clearer and more accurate maps, indigenous peoples now have legitimate evidence that they can use in legal proceedings to ensure that their rights to indigenous lands are recognized. This creates a sense of security and confidence for indigenous peoples to fight for their rights without fear of unauthorized claims from outsiders.

B. The Use of Visual Data Technology in Determining the Legal Status of Customary Lands in the Rongi Indigenous People

In Ronggi Village, South Buton Regency, visual data-based customary land mapping, particularly using Tableau, has shown great potential to clarify the legal status of customary lands that were previously unregistered or not recognized by the state.

Customary lands in Ronggi Village, which have been managed by indigenous peoples for generations, can now be mapped more clearly and accurately, providing legal certainty for indigenous peoples in managing their lands. This is relevant to the Minister of Agrarian Affairs/Head of BPN No. 10 of 2016, which regulates the procedure for recording customary land in the state land system, providing a strong legal basis to ensure that customary lands that have been managed by indigenous peoples receive official recognition in the state legal system. The data-based visual mapping carried out in Ronggi Village is not only spatially describing the boundaries of customary land, but also includes integrating legal data regarding the status of the land. Tableau technology allows spatial data involving customary land boundaries to be combined with legal data describing the status of land, whether it is a title, a right of use or any other status. With this mapping, the Ronggi indigenous people can now more easily obtain clear information about the land they manage, as well as its legal status. This mapping not only clarifies the physical boundaries of the land, but also provides a legitimate tool that can be used in legal proceedings to prove land rights.

The Minister of Agrarian Affairs/Head of BPN No. 10 of 2016 provides a legal framework for the registration of customary lands, which is an important step in providing legal recognition of land managed by indigenous peoples. This regulation states that customary lands that have been managed by indigenous peoples for many years must receive clear legal recognition, either through customary land registration or certification. As stipulated in the regulation, customary lands recorded in the state land system will receive legal protection and allow indigenous peoples to make more optimal use of their land, both socially, economically, and culturally. Prior to the implementation of visual data-based mapping using Tableau, indigenous peoples in Ronggi Village faced high legal uncertainty related to the status of the customary lands they managed.

Indigenous lands that have been an integral part of their lives for centuries are often not listed in the country's land system, leading to unilateral claims to the land. This conflict becomes increasingly complex when an outside party, such as a company or government, claims the land for the sake of development or exploitation of natural resources. The unclear legal status of customary land often causes the Ronggi indigenous people to have difficulty in proving their ownership of the land they have managed. In this context, the use of visual data technology through Tableau is an important breakthrough in clarifying the boundaries of customary land and providing legal certainty to the Ronggi indigenous people. The resulting mapping not only describes the physical boundaries of customary land but also presents legal information that clarifies the status of the land whether it has the status of ownership, right of use, or other status. With Tableau, the resulting data becomes more verified, which can be used as valid evidence in dispute resolution and recognition of the customary land. Based on the Minister of Agrarian Affairs/Head of BPN No. 10 of 2016, which regulates the procedure for customary land registration and customary land certification, the use of Tableau allows the Ronggi indigenous people to more easily obtain legal recognition of their land. This regulation provides clear guidelines on how customary lands that have been managed by indigenous peoples for many years can be recorded in the country's land system, provide legal protection for the land, and open access for indigenous peoples to make the most of their land. As explained in the regulation, customary lands recorded in the state land system will have stronger legal protections, and indigenous peoples will be able to manage their land without worrying about unilateral claims from outsiders. The mapping carried out using Tableau helps accelerate the process of recording customary lands, which is part of the implementation efforts of the Minister of Agrarian Affairs No. 10 of 2016. With clear and accurate visualizations, Tableau not only makes it easier for

indigenous peoples to fight for their rights to indigenous lands but also gives them the tools to clarify their position before others who may claim the land. In addition, the resulting maps can also be used to strengthen land data recorded in the country's land system, making customary land more accessible in a legal context. As revealed by *Bakker and Derks (2020),* the use of GIS technology in the management and mapping of customary lands makes it possible to clarify the legal status of previously elusive lands, as well as help reduce conflicts that often arise due to unclear status of customary lands. This data-based visual mapping provides a more transparent picture of customary land boundaries, which may have been known only orally by indigenous peoples or recorded in unofficial documents. With interactive maps generated by Tableau, customary land boundary data becomes more accessible and verified, leading to clearer legal recognition.

This mapping has a major impact on strengthening legal certainty for the Ronggi indigenous people. Customary lands that were previously unrecorded or have ambiguous legal status can now be recognized more legally through data-based visual mapping. The Ronggi indigenous people, who previously faced uncertainty over ownership rights over the land they managed, now have clearer and more structured data on the legal status of their land. This map gives them the right to defend their land from unauthorized claims, and ensures that their rights to customary land are recognized by the country's legal system.

Apart from the legal side, Tableau also provides high social and cultural value, which is in line with the goal of the Minister of Agrarian Affairs No. 10 of 2016 to recognize the rights to customary lands in accordance with the socio-cultural context of indigenous peoples. Customary land is not only a physical space for farming or cultivation, but also related to the identity and cultural values that exist in the lives of indigenous peoples. Through data visualization, the resulting map also accommodates

broader social aspects, given that customary land for the Rongi people is an ancestral heritage that has important value in their lives. However, data-based visual mapping not only clarifies the legal status of customary lands, but also assists indigenous peoples in managing their lands more sustainably. With clearer data, indigenous peoples can better plan their land use and avoid internal or external conflicts that arise due to unclear boundaries and legal status of the land. This is very much in line with the goals of the Minister of Agrarian Affairs No. 10 of 2016, which not only provides legal recognition of customary lands but also leads to sustainable management by involving indigenous peoples in decision-making.

The use of Tableau in mapping customary lands in Rongi Village strongly supports the implementation of the Minister of Agrarian Regulation No. 10 of 2016. Data-based visual mapping makes it possible to identify, document, and provide a clearer legal status to lands managed by indigenous peoples. Prior to this technology, indigenous peoples often had difficulty obtaining recognition of their land because the land was not recorded in the country's land system. With maps generated through Tableau, which maps the boundaries of customary lands and the legal status of those lands, indigenous peoples now have a more powerful tool to fight for their rights to the customary lands they have managed for centuries. From a juridical perspective, the use of Tableau as a tool to map the legal status of customary lands strongly supports the validity and legal legitimacy of customary lands. The Minister of Agrarian Affairs No. 10 of 2016 regulates clear procedures on how customary land must be recorded in the country's land system. Data-driven visuals-based mapping allows this process to be done more efficiently, given that Tableau can produce interactive maps that are easy to understand and use by all parties involved, including indigenous peoples, governments, and the private sector. With a verified map, indigenous peoples can fight for their rights on a solid basis, considering

that this map is valid evidence in legal proceedings. For example, if a party claims customary land for the purpose of development or exploitation of natural resources, indigenous peoples can use this map to prove that the land belongs to them. Meanwhile, theoretically, the application of visual data-based mapping technology is in line with the basic principles of customary land rights contained in Indonesian customary law, namely the right given to indigenous peoples to manage the land they have controlled for generations. In customary law theory, customary land is not only considered as a physical object, but also as part of the social and cultural identity of indigenous peoples. Customary land is an ancestral heritage that has been managed by indigenous peoples with the principle of sustainability and mutual respect between community members. Therefore, data-based visual mapping such as Tableau provides great benefits in strengthening the position of indigenous peoples in defending their rights to the land they manage.

Customary land mapping carried out using Tableau also shows a shift in the paradigm of land law in Indonesia. Previously, customary lands were often not recognized in the country's land system, and indigenous peoples were often marginalized in the process of managing their land. However, with clearer and more verified mapping, indigenous peoples can now gain greater recognition of their lands, which were not previously registered in the national land system. This is in line with social justice which is one of the principles in the Minister of Agrarian Regulation No. 10 of 2016, which seeks to provide legal protection for the rights of indigenous peoples in managing their land. The relationship between customary land mapping and the Minister of Agrarian Regulation No. 10 of 2016 can also be seen in terms of the sustainability of fairer customary land management. With more accurate and transparent mapping, indigenous peoples not only gain legal certainty, but also have better access to the economic

opportunities offered by their lands. As expressed by *Carpenters* GIS-based mapping not only clarifies land boundaries, but also aids in more sustainable management by taking into account the social and ecological aspects associated with customary lands [17].

Mapping indigenous lands using Tableau also provides great advantages in terms of indigenous peoples' participation in their land management. As stipulated in the Minister of Agrarian Regulation No. 10 of 2016, indigenous peoples have the right to be involved in the management and recognition of the legal status of their land. This mapping technology provides indigenous peoples with stronger tools to be involved in decision-making processes related to their land management, as well as strengthen their position in the face of claims or challenges to the lands they manage. Technology such as GIS can empower indigenous peoples to be more active in fighting for their rights, both at the local and national levels. Along with the use of Tableau, there is hope to expand the use of visual mapping of data to various other regions that have similar problems related to customary lands. Given the large number of customary lands in Indonesia that have not been clearly recorded in the state land system, this technology can be an effective solution to provide legal recognition for customary lands that have been neglected. This will provide stronger legal protections for indigenous peoples across Indonesia, as well as assist the government in implementing more inclusive and equitable land policies.

IV. Conclusion

The innovation in mapping the legal status of customary lands using visual data technology, especially through the use of Tableau, has had a very positive impact in increasing legal certainty for indigenous peoples in Ronggi Village, South Buton

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[17] S, "The Integration of Geospatial Technologies for Sustainable Land Use Management in Indigenous Communities."

Regency. Prior to the adoption of this technology, many customary lands managed by indigenous peoples were not registered in the country's land system, leading to legal uncertainty and potential disputes with outsiders. Using Tableau, customary land boundaries can now be mapped clearly and transparently, and information about the legal status of the land—whether it's title, use rights, or other status—can be displayed in more detail. This provides a stronger legal basis for indigenous peoples to prove their ownership of the land they have managed for centuries. This clarity not only increases legal recognition of customary lands, but also reduces the possibility of land disputes that have been caused by unclear legal status. On the other hand, this data-based mapping also plays a role in empowering indigenous peoples to be more active in their land management. With access to accurate and easily accessible maps, indigenous peoples have greater control over the lands they manage, allowing them to be directly involved in the decision-making process regarding the management and protection of those lands. This mapping supports the sustainability of customary land management by clarifying land boundaries and providing useful information in planning land use more wisely, avoiding environmental damage, and preserving existing natural resources. However, while this mapping provides many benefits, the study also shows that there are challenges in its implementation. One of the main challenges is the limited knowledge and skills of indigenous peoples in using mapping technologies such as Tableau. Therefore, it is imperative for governments and relevant agencies to provide adequate training so that indigenous peoples can make the most of this technology. The suggestion from the results of this study is that there should be continuous efforts to increase the capacity of indigenous peoples through technology training, so that they can be more active in the management and protection of their land rights. This training will allow indigenous peoples to not only access the generated maps but also be involved in the data update

process, so that their customary lands can be protected more effectively. In addition, it is also important to expand the application of visual data-based mapping in various other regions that face similar problems related to the legal status of customary lands. The use of this technology can be an effective solution in clarifying the legal status of customary lands, accelerating legal recognition, and helping to prevent conflicts caused by unclear land status. Thus, Tableau-based mapping can be a model that can be applied in various regions in Indonesia, to provide better legal protection for indigenous peoples and ensure the sustainability of fair and inclusive customary land management.

Acknowledgments

The author would like to express his deepest gratitude to the Directorate of Research and Community Service (DPPM) of the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia for the funding provided for this research. Without the support of DPPM, this research would not have been able to be carried out properly. We would also like to express our deep appreciation to the leadership of the University of Muhammadiyah Buton who have given full support to the completion of this research. This support is very meaningful for the smooth and successful of this research. Hopefully this good cooperation can continue to be established for the advancement of science and community development in the future.

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Innovation in Mapping the Legal Status of Customary Lands Based on Visual Data to Increase Legal Certainty in Rongi Village, South Buton Regency

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Innovation in Mapping the Legal Status of Customary Lands Based on Visual Data to Increase Legal Certainty in Rongi Village, South Buton Regency

Customary lands are an important element in the social, cultural, and economic life of indigenous peoples in Indonesia. However, the unclear legal status of customary lands often triggers conflicts between indigenous peoples and outsiders. This study aims to examine innovations in mapping the legal status of customary land using Tableau-based visual data technology to improve legal certainty in Ronggi Village, South Buton Regency. The research method used is *the Socio-Legal Approach*, with primary data collection through observation and interviews, as well as qualitative analysis. The results of the study show that mapping using Tableau has succeeded in providing a clear visualization of customary land boundaries and their legal status, which were previously not recorded in the state land system. This mapping helps strengthen indigenous peoples' rights to their land and reduce frequent land disputes. The discussion revealed that this technology not only increases transparency but also empowers indigenous peoples to be involved in the management of their lands. The suggestion from this study is the need for technology training for indigenous peoples to maximize the benefits of Tableau-based mapping, as well as the application of this method in other areas facing similar problems to improve legal recognition of indigenous lands

Keywords: Customary Lands; Legal Status; Tableau; Indigenous Peoples' Legal Certainty

I. INTRODUCTION

Customary lands in Indonesia are a very important element in the social, cultural, and economic life of indigenous peoples. This land not only serves as a natural resource that supports life, but is also an integral part of the identity and sovereignty of indigenous peoples [1]. In the Indonesian context, customary lands often have a very strong relationship

[1] Rye dan Kurniawan, "Claiming Indigenous Rights through Participatory Mapping and the Making of Citizenship."

with ancestral heritage and governance that has existed since ancient times [2]. Customary land is a symbol of the sustainability of indigenous peoples' lives who rely on the land for agriculture, fisheries, and other activities. In addition, customary lands are also a space to carry out deep traditions and rituals for the communities that manage them, reflecting how indigenous peoples interact with nature and the surrounding environment.

However, although customary lands have great value for indigenous peoples, the issue of legal uncertainty related to customary lands in Indonesia is still a very complex issue. Unclear legal status of customary lands often creates uncertainty that has the potential to trigger conflict. In many cases, customary lands are not officially recorded in the country's land system, which makes it difficult for indigenous peoples to obtain legal recognition of their rights to the land. This is a bigger problem, considering that Indonesia has more than 1,100 (one thousand hundred) indigenous groups spread throughout the archipelago, with extraordinary diversity in land management and ownership.

The unclear legal status of customary land risks causing tension that leads to conflicts between indigenous peoples and outsiders, be it the government or private parties who want the use of land for development, mining, or other natural resources. Indigenous lands that do not have clear legal status are often the target of unilateral claims, which can lead to evictions and injustice to indigenous peoples. Conflicts arising from the unclear legal status of customary lands are often protracted, as there is no clear legal basis that can be used as a guideline in resolving disputes. For example, in Rongi Village, South Buton Regency, indigenous people face the same uncertainty regarding the legal status of the customary lands they manage. Although the land has been managed

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[2] Zaimah dkk., "Cultural Construct of Customary Land from the Perspective of Bidayuh Community."

by indigenous peoples since their ancestors, it is not registered in the country's land system. This causes legal uncertainty and allows outside parties, such as the government or private companies, to claim rights to the land. This uncertainty is further exacerbated by the lack of access for indigenous peoples to the existing formal legal and bureaucratic system. Without legal documents acknowledging the status of their land, indigenous peoples are often marginalized in legal debates over their land, leading to the abandonment of their rights to indigenous lands.

This problem of legal uncertainty worsens the social and economic conditions of indigenous peoples. Without legal recognition of their land, indigenous peoples cannot make optimal use of the land to improve their welfare. They are unable to access credit facilities or other resources available through legal recognition of land, which makes them more vulnerable to poverty and social powerlessness. Often, development policies undertaken without involving indigenous peoples lead to their marginalization, as they do not have the legal legitimacy to protect their lands from destruction or takeover.

In facing this problem, one of the solutions that can be applied is to use visual data-based mapping technology through the Geographic Information System (GIS) [3], . GIS technology offers a more effective and efficient way to map the legal status of customary lands in a more transparent and verified way [4],[5]. GIS allows the integration of spatial data with legal information, which allows visualization of customary land

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[3] "Geographic Information Systems."

[4] Syafiq dkk., "Customary Land Ownership Rights Need."

[5] Honarmand dkk., "AN OVERVIEW OF THE LOCATION OF AIRPORTS USING GEOGRAPHIC INFORMATION SYSTEM."

boundaries and their legal status [6]. One platform that can be used for this purpose is Tableau, a data visualization tool that allows the creation of interactive maps that can be easily accessed and understood by indigenous peoples, governments, and other related parties. Using Tableau, mapping the legal status of customary lands can be done in a more granular and dynamic way. Tableau allows more complex spatial data, such as customary land boundaries, legal status of land, outside party claims, and changes in legal status, to be visualized in the form of an easy-to-understand map. As an interactive data visualization platform, Tableau allows users to interact with maps, dig deeper into information, and obtain the data they need to make better decisions. For example, if there are overlapping claims on customary lands, a map generated by Tableau can show the actual boundaries of customary lands, as well as the legal status that applies to the land. With clearer and more transparent visualization, indigenous peoples can easily verify the legal status of their lands and take appropriate action.

As Bakker and Derks explain, GIS technology allows for the collection, analysis, and visualization of accurate data on customary lands, which can reduce legal uncertainty [7]. With the visualization of the data generated through Tableau, all interested parties, from indigenous peoples to governments, can easily access relevant information regarding the legal status of indigenous lands. This will speed up the dispute resolution process and ensure that indigenous peoples' rights to their lands are respected. Tableau also allows for real-time mapping of the legal status of customary lands. The data generated can be updated quickly and instantly, allowing indigenous peoples to get the latest information on the status of their land without having to wait for a lengthy bureaucratic process. As

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[6] "Indigenous Mapping."

[7] E dan M, "The Role of GIS in Mapping Customary Land Rights."

noted by Rahim, GIS technology in mapping customary lands can accelerate the recognition and protection of indigenous peoples' rights. Using Tableau makes the process of updating information easier and faster, which ultimately reduces the potential for conflicts caused by uncertain soil status [8]. Through visual data-based mapping, indigenous peoples can also obtain clearer information about their rights to the customary lands they manage. Visualization of the legal status of land will provide indigenous peoples with clarity on whether the land they manage is registered as property, use rights, or other legal status. With clearer and more accessible information, they can more easily fight for their rights and protect their customary lands from unauthorized outside claims.

This data-based visualization also provides an advantage in terms of conflict prevention. With data that is transparent and accessible together, the risk of land disputes can be minimized [9]. For example, in the case of land disputes between indigenous peoples and companies seeking to use the land for commercial activities, maps generated through Tableau can be used to show the legal boundaries of indigenous lands and confirm their legal status. With strong visual evidence, the parties involved can resolve disputes on a clearer and more verified basis.

In turn, Tareland-based data visualization technology can also increase the involvement of indigenous peoples in decision-making related to their lands. By having access to accurate and up-to-date maps in real-time, indigenous peoples can participate in the process of managing and protecting their customary lands. They will feel more empowered and have greater control over the land they manage. This opens up

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[8] A, "The Role of Geographic Information Systems in Land Conflict Resolution in Indonesia."

[9] Dewi, "Gaining Recognition Through Participatory Mapping?"

opportunities for indigenous peoples to engage in more inclusive and equitable land management policies, in accordance with the principles of human rights and social justice.

Previous research has shown that while indigenous lands play an important role in the lives of indigenous peoples, the legal recognition and protection of these lands in Indonesia is often unclear. One relevant study is that conducted by *Bakker and Derks* which revealed that many indigenous peoples in different countries face challenges in obtaining legal recognition of their customary lands due to the unclear status of land in the national land system. This research highlights the importance of GIS-based mapping technology in mapping customary land rights and provides solutions to clarify the legal status of customary lands, so that indigenous peoples can obtain better protection. Another relevant research is conducted by *Rahim* who researches the application of GIS technology in land dispute resolution in Indonesia. Umar points out that GIS technology, including the use of data visualization platforms such as Tableau, can help increase transparency in customary land mapping and speed up the dispute resolution process. In this context, Rahim's research suggests that the implementation of GIS can minimize potential conflicts that are often caused by unclear legal status of customary lands, as well as provide better access to indigenous peoples to manage their lands more equitablely.

However, although various studies have been conducted on customary land and GIS mapping, there are still many that have not specifically discussed the application of Tableau in the context of mapping the legal status of customary land in villages that have large indigenous communities and have not been registered in the state land system, as happened in Rongi Village, Pasarwajo Regency. Therefore, this study offers *novelty* in the approach used to map the legal status of customary land through Tableau-based data visualization that not only provides an overview of customary land boundaries, but also

the integration of detailed legal data on the legal status of the land, which has not been available in many previous studies.

The novelty of this research lies in the application of Tableau as a visualization tool that is able to combine spatial data and legal information in a more interactive and dynamic way. Using Tableau, the data obtained regarding customary land boundaries and their legal status can be visualized in the form of interactive maps that allow users to interact with the data, dig deeper into the information, and update the information in real-time. This is in contrast to traditional mapping methods which are often static and difficult to update, especially when there is a change in the legal status of land or land claims by outsiders. In addition, the novelty of this research lies in the application of data visualization technology at the village level, which has been more often used at the government level or by large institutions, but has not been widely applied directly at the local level involving indigenous peoples. Rongi Village is a good example of implementing Tableau-based mapping, as the indigenous people in this village are heavily dependent on land for their survival, but they face legal uncertainty regarding the status of the land they manage.

This research is also novel in terms of its approach to indigenous peoples' engagement. Previously, research on customary lands often focused more on legal or government policy analysis without actively involving indigenous peoples in the decision-making or management process of their land. However, in this study, Tableau was not only used to map the legal status of land, but also as a tool that indigenous peoples can access to understand more clearly about their rights to the land. Thus, this study seeks to empower indigenous peoples to be more involved in the management of their customary lands with more transparent and trustworthy data. Another novelty also lies in the focus of this research to provide solutions to the problem of unclear legal status of

customary lands, which has often been a source of conflict between parties. By adopting visual data-based mapping technology, this study aims to reduce the uncertainty faced by indigenous peoples in defending their land rights. A more accurate and transparent mapping of the legal status of customary lands is expected to minimize the potential for disputes that often occur due to unilateral claims to customary lands.

This research is also different because it proposes a more practical and direct approach in its application. While many previous studies have talked about the theory and model of mapping ideal customary land rights, this study aims to show how existing data visualization technologies, such as Tableau, can be used directly in the field to solve problems faced by indigenous peoples, as well as clarify the legal status of indigenous lands in a more practical and applicable way. Overall, the novelty of this research lies in the integration between modern technologies, such as Tableau, and customary land management which has been faced with various legal and administrative constraints. With more transparent, accurate, and easy-to-understand mapping, it is hoped that this research can provide a more effective solution in providing legal certainty for customary lands and reducing potential conflicts arising from the unclear status of the land. The application of Tableau in mapping the legal status of customary land in Rongi Village, Pasarwajo Regency, will have a positive impact in clarifying the legal status of customary land. Indigenous peoples in these villages will have easier access to relevant information about their lands, as well as have a stronger basis to fight for their rights. In addition, the application of this technology will also facilitate more efficient and fair dispute resolution, as the resulting data can be used as valid evidence in legal proceedings. With transparency in the management of customary lands, conflicts caused by unclear land status can be minimized, and indigenous peoples can obtain better legal protection over their lands.

II. Research Methods

This research uses a socio-legal approach, which combines social and legal dimensions in analyzing customary land problems and the application of mapping technology to solve these problems. The socio-legal approach was chosen because the issue of customary land in Indonesia not only involves positive legal norms, but also relates to social interactions and social impacts caused by the unclear legal status of customary lands. In this study, the author focuses on how technology, especially Tableau-based customary land mapping, can provide solutions to the legal uncertainty faced by indigenous peoples in Kaongkokea Village, Pasarwajo Regency. The type of research conducted is socio-legal, because this research aims to delve deeper into the problems that exist in the management of customary lands with an approach that not only looks at legal aspects, but also social aspects that affect indigenous peoples themselves. This approach helps in understanding the relationship between existing legal norms and the social practices carried out by indigenous peoples regarding their land. Given that the problem that often arises is the unclear legal status, this study also tries to offer technology as a solution to clarify the legal status of customary lands which have often triggered conflicts. As *Merry (2006)* The social law approach provides a broader framework to understand how the law is accepted and practiced by communities at the local level, as well as how the law can function to defuse conflicts. The data sources used in this study consist of primary data and secondary data. Primary data was collected through direct observation of the conditions of customary land management in Kaongkokea Village, as well as in-depth interviews with indigenous peoples who are directly involved in the management of the land. In addition, Tableau-based customary land mapping is also an important part of primary data collection, where this technology is used to describe

customary land boundaries and their legal status. Thus, the primary data collected in this study provides a clearer picture of the field conditions and problems faced by indigenous peoples related to their customary lands. Primary data in qualitative research plays a role in providing a direct understanding of the phenomenon being studied and is an invaluable resource in social research that focuses on individuals and groups [10].

Secondary data in this study were obtained from literature related to customary law theories, customary land mapping, and the application of GIS technology in the management and settlement of customary land disputes. This secondary data serves as a theoretical foundation that enriches the analysis and provides a broader perspective on customary land issues and the application of technology in this context. These secondary sources are drawn from various international journals, books, and articles relevant to the research topic. The Rongi indigenous people are known to have managed customary land for generations, but they face uncertainty regarding the legal status of the land they manage. Therefore, the Ronggi indigenous people were chosen as the subjects of the study to understand how the uncertainty of customary land law affects their social and economic lives. The research sample was taken purposively, namely by selecting several individuals or families representing indigenous groups in the village, who are actively involved in the management of customary lands. The selection of this sample was carried out with the consideration that they have direct experience in managing customary lands and experience difficulties related to the uncertainty of the legal status of their land. The selection of purposive samples was carried out to obtain in-depth information from individuals who had direct experience with the phenomenon being studied. To collect

[10] J.W., *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*.

data, this study uses several data collection techniques [11]. Direct observation was carried out in the field to observe the process of customary land management by the community in Kaongkokea Village. These observations allowed researchers to see firsthand how indigenous peoples manage their lands, as well as to understand the challenges they face related to the legal status of the land. In addition, observations were also made on the application of Tableau-based mapping technology to describe customary land boundaries, so that researchers can directly observe how the technology is applied and whether it can provide a solution to the uncertainty of the legal status of customary lands. This observation technique refers to the approach described by *Patton* which emphasizes the importance of direct observation in qualitative research to gain an in-depth understanding of the dynamics that occur in the field [12].

In-depth interviews were also conducted with the Ronggi indigenous people in Kaongkokea Village, as well as several other related parties such as the village government and institutions that have a role in land management. This interview aims to explore more information about indigenous peoples' views on the legal uncertainty they experience, as well as their opinions on the use of technology in mapping and clarifying the legal status of customary lands. The interviews were conducted in a semi-structured manner, which allowed the researcher to develop questions based on the answers given by the respondents, so that the data obtained was more in-depth and relevant to the problems faced. This semi-structured interview technique also corresponds to the

[11] M.B., dan A.M., *Qualitative Data Analysis: An Expanded Sourcebook*.

[12] M.Q., *Qualitative Research and Evaluation Methods*.

approach described by *Bryman* which states that these interviews provide flexibility that allows researchers to explore topics more openly and in-depth [13].

In addition to interviews, Tableau-based customary land mapping techniques were also used in this study. Using Tableau, researchers can map the boundaries of customary land managed by the Ronggi indigenous people, as well as identify the legal status of the land, both property rights, use rights, and other legal statuses. Tableau-based mapping also makes it possible to show changes in the legal status of customary lands, external claims to the land, and other relevant information that can help increase transparency and provide indigenous peoples with a clearer picture of their rights. After the data is collected, the data analysis is carried out with a qualitative approach. The qualitative approach was chosen because the purpose of this research is to explore a deeper understanding of the problems faced by indigenous peoples related to customary lands and how the application of data visualization technology can provide solutions to these problems. Qualitative data analysis is carried out by encoding data obtained from interviews and observations, as well as comparing and categorizing information relevant to the main theme of the research, namely customary land law issues and the use of technology to overcome legal uncertainty.

The analysis process begins with data encoding, which involves identifying the main themes of the information obtained. These themes are then further analyzed to look for patterns and relationships that are relevant to the research topic. Furthermore, the data that has been categorized will be analyzed in depth to understand how customary land law issues affect the social and economic lives of indigenous peoples, as well as to evaluate the effectiveness of Tableau technology in increasing the legal certainty of

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[13] A, *Social Research Methods*.

customary lands and reducing the potential for disputes. *Miles and Huberman* explains that qualitative analysis based on data coding allows researchers to compile systematic and structured findings, and relate them to a broader context [14]. In conducting the analysis, the researcher also used a triangulation technique to ensure the validity of the findings. Triangulation was carried out by comparing data obtained from Tableau-based customary land interviews, observations, and mapping. Thus, this research is expected to produce more valid and accurate findings regarding customary land problems and the application of technology in the management and resolution of disputes related to customary lands.

III. Results and discussion

A. Visual Data-Based Customary Land Legal Status Mapping Innovation Can Increase Legal Certainty in Rongi Village, South Buton Regency

In a study on the innovation of mapping the legal status of customary land based on visual data in Ronggi Village, South Buton Regency, the researcher focused on how Geographic Information System (GIS) technology, especially Tableau, can be used to clarify the legal status of customary lands that have been neglected, thereby providing legal certainty for indigenous peoples. The problem of the legal status of customary land in Indonesia, especially in Ronggi Village, is one of the complex issues due to the large number of customary lands that are not recorded in the state land system, as well as the frequent unilateral claims by outsiders against customary lands that have been managed by indigenous peoples for generations. Therefore, the use of visual mapping technology

[14] M.B., dan A.M., *Qualitative Data Analysis: An Expanded Sourcebook*.

in this context is important as an effort to clarify and confirm the legal status of customary lands, which in turn can reduce the potential conflicts arising from such ambiguity.

Based on the results of this study, the use of Tableau as a visual data-based customary land mapping tool in Ronggi Village can provide significant results in increasing legal certainty. This is evidenced by increased transparency regarding customary land boundaries, which were previously not clearly recorded in the land system. Tableau, with its ability to combine spatial data and legal information related to customary land status, has provided a more comprehensive picture of the legal status of customary lands in these villages. The resulting data-based mapping process clearly shows the boundaries of customary land managed by the Ronggi people, along with their legal status, whether it is property rights, use rights, or other relevant statuses. Tableau enables more dynamic and interactive data, which can be updated in real-time. Previously, data on customary land in Ronggi Village was often not recorded in the legal system, or if it was recorded, did not include detailed information about the rights attached to the land. Visual data-based mapping with Tableau allows indigenous peoples to access clearer information about the legal status of their land, which can be used as a stronger legal basis in defending their rights to the land. This is very important, because with more transparent mapping, indigenous people in Ronggi Village can now more easily identify their land boundaries and prove their ownership in the event of an unauthorized claim from outside parties.

The use of Tableau also has a significant impact in minimizing conflicts related to customary land in Rongi Village. Before the mapping was carried out, many land disputes arose between indigenous peoples and outsiders who claimed customary land for development or investment purposes. The unclear legal status of customary lands is often the main source of these disputes. However, with a clear visual mapping of the boundaries

of customary land and its legal status, indigenous people in Ronggi Village can now have legitimate data that strengthens their claim to the land. This mapping not only provides clarity on land boundaries, but also maps changes in the legal status of land that may occur over time. With more transparent and directly accessible data, previously difficult land disputes can now be minimized, as all parties involved can refer to legitimate maps generated by Tableau.

Prior to Tableau-based mapping, the Ronggi indigenous people often felt marginalized in the management of their land, as they did not have legal documents acknowledging their rights to the land. Customary lands that are managed for generations are often not recorded in the national land system, resulting in indigenous peoples losing the opportunity to utilize the land as an economic resource that can provide long-term benefits. With Tableau-based visual mapping, indigenous people in Ronggi Village now have legitimate tools that can be used to access better economic resources, such as credit facilities and legal protection of their land. As previous research has shown, the importance of recognizing customary land rights in developing countries can encourage indigenous peoples to be more economically independent, as well as mitigate the risk of exploitation of the land they manage [15].

However, visual data-driven mapping with Tableau not only focuses on increasing transparency and recognition of customary land rights, but also makes a major contribution to more sustainable management of customary lands. This mapping allows indigenous peoples to manage their land more efficiently, as they can easily access information regarding land boundaries and their legal status. This information can be used to better plan land use, avoid environmental damage, and maintain the sustainability of

[15] A.T. dan D, "Challenges in Legalizing Customary Land Rights in Indonesia."

customary land management in the long term. *Carpenters* argues that accurate and accountable data-driven mapping will provide indigenous peoples with the tools necessary to ensure their land management remains in line with sustainability principles [16].

While these mapping innovations have shown positive impacts, the study also identified some of the challenges faced in their implementation. One of them is the limited knowledge of indigenous peoples about technology and difficulties in accessing the hardware needed to run Tableau-based mapping. Nonetheless, this study shows that training provided to indigenous peoples on the use of mapping technology can reduce these barriers. Therefore, it is important for governments and relevant agencies to provide adequate training so that indigenous peoples can be more active in managing their lands using existing technologies. Training and capacity building are urgently needed to ensure that indigenous peoples can make the most of technology in the fight for their rights. One of the problems that is often faced by indigenous peoples in Indonesia, including in Ronggi Village, South Buton Regency, is the unclear legal status of customary lands. This ambiguity often leads to uncertainty in the recognition of land rights, which in turn increases the potential for conflict, both within the indigenous peoples themselves and between indigenous peoples and outsiders who claim the land. This issue is further complicated when customary lands are not registered in the state land system and do not have valid documents confirming their legal status. This adds to the difficulty for indigenous peoples to access their rights, both in terms of natural resource management, access to economic facilities, and legal protection. Prior to the implementation of

[16] S, "The Integration of Geospatial Technologies for Sustainable Land Use Management in Indigenous Communities."

Tableau-based mapping, the Ronggi indigenous people faced serious uncertainty related to the legal status of their land. Customary lands that have been managed for generations by indigenous peoples are often not formally recorded in the national land system. Even when there are attempts to register the land, lengthy legal processes and complicated bureaucracy are often the main barriers for indigenous peoples to obtain legal status. This worsens their situation, as the unclear legal status of these lands is often an excuse to ignore their rights and cause land disputes with outsiders, such as local governments or private companies that want to use the land for development or natural resource purposes.

The process of mapping customary lands based on visual data using Tableau in Rongi Village, South Buton Regency, was carried out with the aim of providing legal certainty for customary lands that have been managed by indigenous peoples without official recognition or registration in the state land system. Customary lands in Ronggi Village have been managed for generations by indigenous peoples, but because they are not officially recorded, their legal status is often unclear, which raises potential disputes. Tableau-based mapping aims to change this situation by providing a clearer and more transparent picture of the boundaries of customary lands, as well as the legal status attached to them.

a) **Customary Land Mapping Using Tableau**

The first stage in mapping customary lands using Tableau begins with the collection of spatial data required for mapping. This spatial data includes information about the geographical location of customary lands in Rongi Village. Previously, prior to the implementation of Tableau, data on customary lands was only known to indigenous peoples orally and was not recorded on official maps managed by the government. Therefore, accurate spatial data collection is a very important first step in this mapping process.

To obtain accurate spatial data, field observations were carried out to map the boundaries of customary land managed by the Ronggi indigenous people. Researchers together with members of indigenous peoples went directly to the field to identify the boundary points of customary lands that have been managed for generations. This process involves field measurements with appropriate tools, such as GPS, to ensure that the mapped land boundary corresponds to the reality on the ground. This location data is then fed into the Geographic Information System (GIS) using Tableau, which allows for clearer and easier to understand data visualization.

b) Collection of Legal Data Related to the Status of Customary Land

As a follow-up step, legal data on the status of customary land, whether the land has the status of ownership, right of use, or other status, is collected. This process involves interviews with indigenous peoples, village officials, and other relevant parties to obtain accurate information about the legal status of customary land in Ronggi Village. This legal information is very important because it provides a broader context regarding the rights of indigenous peoples to the lands they manage. This legal status recording also serves to identify whether there are other claims to the land by outside parties, such as the government or companies.

Once the spatial data and legal data are collected, the next stage is the integration of the data into Tableau. Using Tableau, spatial data that includes customary land boundaries and legal data on land status can be combined in one interactive data visualization platform. At this stage, Tableau is used to create an interactive map that shows the boundaries of customary lands managed by indigenous peoples, as well as the legal status of the associated land. Each mapped customary land boundary will be labeled with its legal status, so that indigenous people can easily find out whether the land they manage is registered as ownership, use rights, or other legal status.

Mapping generated using Tableau provides clearer visualizations and is accessible to indigenous peoples, governments, and other stakeholders. The interactive map generated allows users to directly examine customary land boundaries and their legal status, as well as identify potential claims or disputes that may arise. This map is a very important tool for indigenous peoples to prove their rights to the land they have managed. Tableau allows these maps to be updated in real-time, so that if there are any new changes or claims related to the status of customary lands, the data can be entered and published immediately.

c) Verification and Validation

After the interactive map is completed, the next stage is data verification and validation with indigenous peoples and other related parties. This verification process is important to ensure that the resulting map reflects the actual conditions on the ground. Indigenous peoples, along with village officials, can examine the map and provide input or corrections if there is inaccurate information. This process not only ensures the accuracy of the maps, but also reinforces indigenous peoples' sense of ownership and involvement in their land management processes. Thus, Tableau not only serves as a tool for mapping indigenous lands, but also as a tool to empower indigenous peoples in fighting for their rights.

d) Use of Maps for the Public Interest

Finally, after the data has been mapped and verified, the final stage is the use of the map for legal purposes. Maps generated through Tableau can be used by indigenous peoples to fight for their rights to land. These maps became a legitimate tool to prove their claims to customary land before the authorities, including in the case of land disputes. For example, if there is a unilateral claim by an outsider to customary land,

indigenous peoples can use the map generated by Tableau to show that the land belongs to them, based on clear and accountable mapping.

From the results of the research carried out and linked to the mapping application, the results of customary land mapping in the Rongi indigenous people can be described as follows

>>> Figure 1 >>>

>>> Figure 2 >>>

Figure 1 shows a map of Ronggi customary land in South Buton Regency, Southeast Sulawesi, covering an area of 468.1 hectares. This map provides a very important picture of the boundaries of customary land managed by the Ronggi indigenous people, depicted with a yellow line around the area. In general, these maps provide visual information that is very useful for indigenous peoples because they show clear boundaries regarding the land they manage for generations. Customary land in Ronggi Village has a very high social and cultural value, as an integral part of the identity and economic life of indigenous peoples. More transparent mapping like this is crucial, especially given that customary lands are often not officially registered in the country's land system and are often a source of legal uncertainty that leads to land disputes.

Previously, customary land in Rongi Village may have been only known by the local community and was not clearly recorded in the national land system. With this mapping, customary land boundaries become clearer and recorded in a visual format that can be accessed and verified by various parties, including the government, indigenous peoples, and other parties who may have an interest in the land. The use of Tableau as a mapping tool in this map is very useful because it can clarify the legal status of customary lands that were previously not recorded. Data-based visual mapping makes it possible to depict customary land boundaries more accurately, as well as provide a more complete

picture of land rights. With interactive maps, indigenous peoples can easily verify the boundaries of the land they manage and learn more about their legal status. If there is a claim from an outsider who feels they have rights to the land, this map can serve as valid visual evidence showing that the land belongs to the rogi indigenous people. Furthermore, this clear mapping also encourages legal certainty for the Ronggi indigenous people. Previously, indigenous peoples were often marginalized and had difficulty getting recognition of their rights to customary lands, especially in the face of outsiders who had an interest in using the land for development or investment. With accountable and easily accessible maps, indigenous peoples now have a stronger legal basis to fight for their rights to these customary lands.

While figure 2 shows that the customary land map was created using the Tableau application, which depicts the area around Pasarwajo and Baubau in South Buton, Southeast Sulawesi. This map maps different zones of land using color codes that describe the legal status or land use in the area. Overall, the map provides a clear visualization of land distribution in the region, which is particularly useful in the context of customary land management, dispute resolution, and legal recognition of land managed by indigenous peoples.

This map shows several areas that have been identified with different colors to indicate the status of their soils. The blue color signifies the Takawa protected forest, which is a conservation area protected by regulations. The red color indicates the Takawa Area, which is a zone that has certain rules or restrictions regarding its use. Furthermore, the color orange indicates that there is a dispute or legal problem that occurs in an area, which may be related to ownership claims or differences of opinion between interested parties. Lastly, the green color indicates the area referred to as the Lapandewa customary

land, which is land recognized as belonging to the Lapandewa indigenous people, which they have managed for generations.

The resulting mapping using Tableau allows us to clearly see the differences in soil status in the region. With detailed visualization, indigenous peoples, governments, and other related parties can easily identify the boundaries of customary land areas that are important to those communities. Customary lands have very high social and cultural value, and through this map, the legal status of customary lands can be more clearly identified, providing a stronger basis for legal protection of such lands. One of the main benefits of this mapping is to provide legal certainty over land managed by indigenous peoples. Before technologies like Tableau, customary lands were often not recorded in the country's land system and had no formal recognition. This often leads to legal uncertainty, especially when an outside party, such as a government or company, seeks to claim the land for the purpose of development or exploitation of natural resources. With clear maps, indigenous peoples can more easily fight for their rights to the land they have managed, both in the context of land dispute resolution and to ensure that their land is not taken or used without their consent.

Visually-based mapping like this also provides greater transparency in terms of customary land management. Previously, many unilateral claims to customary land occurred due to unclear boundaries and legal status of the land. However, with more detailed mapping technology, customary land boundaries can be depicted more accurately, providing stronger evidence in a legal context. In addition, the interactive map also allows all interested parties, both indigenous peoples and the government, to verify the status of the land more easily and faster.

Mapping like this is not only beneficial for indigenous people in Ronggi Village, but can also be used as a model for other areas that have similar issues related to the legal

status of customary lands. In a broader context, this Tableau-based mapping can help facilitate the legalization process of customary lands that have not yet been recorded in the country's land system, accelerate the recognition of customary land rights, and support the protection of indigenous peoples' rights to their lands.

Overall, the map shows that visual data-based mapping technology has an important role in land dispute resolution and the protection of customary land rights. By providing greater legal certainty over lands managed by indigenous peoples, the map clarifies the legal status of indigenous lands, reduces potential conflicts, and gives indigenous peoples stronger tools to protect their rights. Mapping like this also contributes to more sustainable management of indigenous lands, as it provides indigenous peoples with more transparency in their land management and encourages active participation in maintaining the sustainability of the environment and existing resources.

With clear and easily accessible mapping, indigenous peoples can leverage this data to fight for their rights, better plan for land management, and gain more legal recognition in the country's land system. This map, which depicts the boundaries and legal status of customary lands, is an important tool in ensuring that indigenous peoples' rights are respected and protected, and in supporting the sustainable equitable and inclusive management of customary lands.

In addition, this map provides greater transparency in the management of customary lands. Before this mapping is carried out, there may be unilateral claims to customary land that are difficult to resolve because there is no valid data on land boundaries and status. Using visual data-based mapping technology, such claims can be mitigated, as the resulting maps provide a clearer picture of the boundaries of customary lands managed by the Rongi Indigenous people. These maps can also serve as a dispute

resolution tool. If a dispute arises, either between indigenous peoples and outsiders or between groups within the indigenous peoples themselves, the resulting map can be used to clearly show the boundaries of the land in dispute. Thus, Tableau serves as a tool to clarify and document customary lands that have not been registered or ignored by the formal legal system, with the aim of reducing potential conflicts that arise due to unclear land status. Viewed from a social perspective, the map also empowers indigenous peoples in their land management processes. Previously, in the absence of clear and accountable data, indigenous peoples tended to be marginalized in decision-making related to the land they managed. However, with this map, indigenous peoples can now be more active in managing and planning their land use, both for agricultural needs, social development, and nature conservation.

Based on this data, there is a visual data-based mapping using Tableau, the legal status of customary land in Rongi Village can be clarified, and the legal certainty desired by indigenous peoples can be achieved. Clear mapping of customary land boundaries and their legal status gives indigenous peoples a powerful tool to prove their rights to the land they have managed for generations. Prior to Tableau-based mapping, indigenous peoples often had difficulty getting recognition of their rights because the land they managed was not officially recorded in the country's land system. The existence of maps generated through Tableau provides greater legal certainty for indigenous peoples, as they serve as valid evidence in legal proceedings related to land. With a clear visualization of land boundaries, indigenous peoples can more easily defend their rights in the event of unilateral claims from other parties, such as the government or private companies. The use of GIS technology in customary land mapping increases transparency in land management and accelerates the process of legal recognition of the land. Data-based visual mapping also reduces the risk of injustice that often occurs when the legal status

of customary land is unclear. With more transparent data, indigenous peoples can more easily fight for their rights without having to rely on verbal claims or unauthorized documentation. This gives them legal certainty in carrying out their land management, as well as providing stronger legal protection against potential threats arising from unclear land status. In addition, the process of data verification and validation with indigenous peoples ensures that the resulting maps reflect the actual conditions on the ground, thus giving higher legitimacy to the status of the customary lands that have been mapped. Recognition of the legal status of indigenous lands is the first step to improving the social and economic well-being of indigenous peoples. With a valid and accountable map, indigenous peoples in Ronggi Village now have stronger tools to protect their rights to customary lands that have been managed without formal recognition. Mapping using Tableau has a very significant impact in strengthening the position of indigenous peoples in dealing with land disputes. With clearer and more accurate maps, indigenous peoples now have legitimate evidence that they can use in legal proceedings to ensure that their rights to indigenous lands are recognized. This creates a sense of security and confidence for indigenous peoples to fight for their rights without fear of unauthorized claims from outsiders.

B. The Use of Visual Data Technology in Determining the Legal Status of Customary Lands in the Rongi Indigenous People

In Ronggi Village, South Buton Regency, visual data-based customary land mapping, particularly using Tableau, has shown great potential to clarify the legal status of customary lands that were previously unregistered or not recognized by the state.

Customary lands in Ronggi Village, which have been managed by indigenous peoples for generations, can now be mapped more clearly and accurately, providing legal certainty for indigenous peoples in managing their lands. This is relevant to the Minister of Agrarian Affairs/Head of BPN No. 10 of 2016, which regulates the procedure for recording customary land in the state land system, providing a strong legal basis to ensure that customary lands that have been managed by indigenous peoples receive official recognition in the state legal system. The data-based visual mapping carried out in Ronggi Village is not only spatially describing the boundaries of customary land, but also includes integrating legal data regarding the status of the land. Tableau technology allows spatial data involving customary land boundaries to be combined with legal data describing the status of land, whether it is a title, a right of use or any other status. With this mapping, the Ronggi indigenous people can now more easily obtain clear information about the land they manage, as well as its legal status. This mapping not only clarifies the physical boundaries of the land, but also provides a legitimate tool that can be used in legal proceedings to prove land rights.

The Minister of Agrarian Affairs/Head of BPN No. 10 of 2016 provides a legal framework for the registration of customary lands, which is an important step in providing legal recognition of land managed by indigenous peoples. This regulation states that customary lands that have been managed by indigenous peoples for many years must receive clear legal recognition, either through customary land registration or certification. As stipulated in the regulation, customary lands recorded in the state land system will receive legal protection and allow indigenous peoples to make more optimal use of their land, both socially, economically, and culturally. Prior to the implementation of visual data-based mapping using Tableau, indigenous peoples in Ronggi Village faced high legal uncertainty related to the status of the customary lands they managed.

Indigenous lands that have been an integral part of their lives for centuries are often not listed in the country's land system, leading to unilateral claims to the land. This conflict becomes increasingly complex when an outside party, such as a company or government, claims the land for the sake of development or exploitation of natural resources. The unclear legal status of customary land often causes the Ronggi indigenous people to have difficulty in proving their ownership of the land they have managed. In this context, the use of visual data technology through Tableau is an important breakthrough in clarifying the boundaries of customary land and providing legal certainty to the Ronggi indigenous people. The resulting mapping not only describes the physical boundaries of customary land but also presents legal information that clarifies the status of the land whether it has the status of ownership, right of use, or other status. With Tableau, the resulting data becomes more verified, which can be used as valid evidence in dispute resolution and recognition of the customary land. Based on the Minister of Agrarian Affairs/Head of BPN No. 10 of 2016, which regulates the procedure for customary land registration and customary land certification, the use of Tableau allows the Ronggi indigenous people to more easily obtain legal recognition of their land. This regulation provides clear guidelines on how customary lands that have been managed by indigenous peoples for many years can be recorded in the country's land system, provide legal protection for the land, and open access for indigenous peoples to make the most of their land. As explained in the regulation, customary lands recorded in the state land system will have stronger legal protections, and indigenous peoples will be able to manage their land without worrying about unilateral claims from outsiders. The mapping carried out using Tableau helps accelerate the process of recording customary lands, which is part of the implementation efforts of the Minister of Agrarian Affairs No. 10 of 2016. With clear and accurate visualizations, Tableau not only makes it easier for

indigenous peoples to fight for their rights to indigenous lands but also gives them the tools to clarify their position before others who may claim the land. In addition, the resulting maps can also be used to strengthen land data recorded in the country's land system, making customary land more accessible in a legal context. As revealed by *Bakker and Derks (2020),* the use of GIS technology in the management and mapping of customary lands makes it possible to clarify the legal status of previously elusive lands, as well as help reduce conflicts that often arise due to unclear status of customary lands. This data-based visual mapping provides a more transparent picture of customary land boundaries, which may have been known only orally by indigenous peoples or recorded in unofficial documents. With interactive maps generated by Tableau, customary land boundary data becomes more accessible and verified, leading to clearer legal recognition.

This mapping has a major impact on strengthening legal certainty for the Ronggi indigenous people. Customary lands that were previously unrecorded or have ambiguous legal status can now be recognized more legally through data-based visual mapping. The Ronggi indigenous people, who previously faced uncertainty over ownership rights over the land they managed, now have clearer and more structured data on the legal status of their land. This map gives them the right to defend their land from unauthorized claims, and ensures that their rights to customary land are recognized by the country's legal system.

Apart from the legal side, Tableau also provides high social and cultural value, which is in line with the goal of the Minister of Agrarian Affairs No. 10 of 2016 to recognize the rights to customary lands in accordance with the socio-cultural context of indigenous peoples. Customary land is not only a physical space for farming or cultivation, but also related to the identity and cultural values that exist in the lives of indigenous peoples. Through data visualization, the resulting map also accommodates

broader social aspects, given that customary land for the Rongi people is an ancestral heritage that has important value in their lives. However, data-based visual mapping not only clarifies the legal status of customary lands, but also assists indigenous peoples in managing their lands more sustainably. With clearer data, indigenous peoples can better plan their land use and avoid internal or external conflicts that arise due to unclear boundaries and legal status of the land. This is very much in line with the goals of the Minister of Agrarian Affairs No. 10 of 2016, which not only provides legal recognition of customary lands but also leads to sustainable management by involving indigenous peoples in decision-making.

The use of Tableau in mapping customary lands in Rongi Village strongly supports the implementation of the Minister of Agrarian Regulation No. 10 of 2016. Data-based visual mapping makes it possible to identify, document, and provide a clearer legal status to lands managed by indigenous peoples. Prior to this technology, indigenous peoples often had difficulty obtaining recognition of their land because the land was not recorded in the country's land system. With maps generated through Tableau, which maps the boundaries of customary lands and the legal status of those lands, indigenous peoples now have a more powerful tool to fight for their rights to the customary lands they have managed for centuries. From a juridical perspective, the use of Tableau as a tool to map the legal status of customary lands strongly supports the validity and legal legitimacy of customary lands. The Minister of Agrarian Affairs No. 10 of 2016 regulates clear procedures on how customary land must be recorded in the country's land system. Data-driven visuals-based mapping allows this process to be done more efficiently, given that Tableau can produce interactive maps that are easy to understand and use by all parties involved, including indigenous peoples, governments, and the private sector. With a verified map, indigenous peoples can fight for their rights on a solid basis, considering

that this map is valid evidence in legal proceedings. For example, if a party claims customary land for the purpose of development or exploitation of natural resources, indigenous peoples can use this map to prove that the land belongs to them. Meanwhile, theoretically, the application of visual data-based mapping technology is in line with the basic principles of customary land rights contained in Indonesian customary law, namely the right given to indigenous peoples to manage the land they have controlled for generations. In customary law theory, customary land is not only considered as a physical object, but also as part of the social and cultural identity of indigenous peoples. Customary land is an ancestral heritage that has been managed by indigenous peoples with the principle of sustainability and mutual respect between community members. Therefore, data-based visual mapping such as Tableau provides great benefits in strengthening the position of indigenous peoples in defending their rights to the land they manage.

Customary land mapping carried out using Tableau also shows a shift in the paradigm of land law in Indonesia. Previously, customary lands were often not recognized in the country's land system, and indigenous peoples were often marginalized in the process of managing their land. However, with clearer and more verified mapping, indigenous peoples can now gain greater recognition of their lands, which were not previously registered in the national land system. This is in line with social justice which is one of the principles in the Minister of Agrarian Regulation No. 10 of 2016, which seeks to provide legal protection for the rights of indigenous peoples in managing their land. The relationship between customary land mapping and the Minister of Agrarian Regulation No. 10 of 2016 can also be seen in terms of the sustainability of fairer customary land management. With more accurate and transparent mapping, indigenous peoples not only gain legal certainty, but also have better access to the economic

opportunities offered by their lands. As expressed by *Carpenters* GIS-based mapping not only clarifies land boundaries, but also aids in more sustainable management by taking into account the social and ecological aspects associated with customary lands [17].

Mapping indigenous lands using Tableau also provides great advantages in terms of indigenous peoples' participation in their land management. As stipulated in the Minister of Agrarian Regulation No. 10 of 2016, indigenous peoples have the right to be involved in the management and recognition of the legal status of their land. This mapping technology provides indigenous peoples with stronger tools to be involved in decision-making processes related to their land management, as well as strengthen their position in the face of claims or challenges to the lands they manage. Technology such as GIS can empower indigenous peoples to be more active in fighting for their rights, both at the local and national levels. Along with the use of Tableau, there is hope to expand the use of visual mapping of data to various other regions that have similar problems related to customary lands. Given the large number of customary lands in Indonesia that have not been clearly recorded in the state land system, this technology can be an effective solution to provide legal recognition for customary lands that have been neglected. This will provide stronger legal protections for indigenous peoples across Indonesia, as well as assist the government in implementing more inclusive and equitable land policies.

IV. Conclusion

The innovation in mapping the legal status of customary lands using visual data technology, especially through the use of Tableau, has had a very positive impact in increasing legal certainty for indigenous peoples in Ronggi Village, South Buton

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[17] S, "The Integration of Geospatial Technologies for Sustainable Land Use Management in Indigenous Communities."

Regency. Prior to the adoption of this technology, many customary lands managed by indigenous peoples were not registered in the country's land system, leading to legal uncertainty and potential disputes with outsiders. Using Tableau, customary land boundaries can now be mapped clearly and transparently, and information about the legal status of the land—whether it's title, use rights, or other status—can be displayed in more detail. This provides a stronger legal basis for indigenous peoples to prove their ownership of the land they have managed for centuries. This clarity not only increases legal recognition of customary lands, but also reduces the possibility of land disputes that have been caused by unclear legal status. On the other hand, this data-based mapping also plays a role in empowering indigenous peoples to be more active in their land management. With access to accurate and easily accessible maps, indigenous peoples have greater control over the lands they manage, allowing them to be directly involved in the decision-making process regarding the management and protection of those lands. This mapping supports the sustainability of customary land management by clarifying land boundaries and providing useful information in planning land use more wisely, avoiding environmental damage, and preserving existing natural resources. However, while this mapping provides many benefits, the study also shows that there are challenges in its implementation. One of the main challenges is the limited knowledge and skills of indigenous peoples in using mapping technologies such as Tableau. Therefore, it is imperative for governments and relevant agencies to provide adequate training so that indigenous peoples can make the most of this technology. The suggestion from the results of this study is that there should be continuous efforts to increase the capacity of indigenous peoples through technology training, so that they can be more active in the management and protection of their land rights. This training will allow indigenous peoples to not only access the generated maps but also be involved in the data update

process, so that their customary lands can be protected more effectively. In addition, it is also important to expand the application of visual data-based mapping in various other regions that face similar problems related to the legal status of customary lands. The use of this technology can be an effective solution in clarifying the legal status of customary lands, accelerating legal recognition, and helping to prevent conflicts caused by unclear land status. Thus, Tableau-based mapping can be a model that can be applied in various regions in Indonesia, to provide better legal protection for indigenous peoples and ensure the sustainability of fair and inclusive customary land management.

Acknowledgments

The author would like to express his deepest gratitude to the Directorate of Research and Community Service (DPPM) of the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia for the funding provided for this research. Without the support of DPPM, this research would not have been able to be carried out properly. We would also like to express our deep appreciation to the leadership of the University of Muhammadiyah Buton who have given full support to the completion of this research. This support is very meaningful for the smooth and successful of this research. Hopefully this good cooperation can continue to be established for the advancement of science and community development in the future.

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