Fit for Purpose Land Administration (FFP-LA) Implementation to Accelerate Land Mapping in Sayang Village, Sumedang Regency, Indonesia

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Key words: parcel boundaries, Fit-for-Purpose Land Administration

SUMMARY

The Indonesian government is targeting land registration to be completed by 2025 but land parcels that have been registered at the end of 2016 have only reached 46 million parcels of a total of 126 million land parcels in Indonesia. Nowadays, Indonesia hold a Complete Systematic Land Registration (PTSL) program to fulfill the target, but the methods used are still various. Terrestrial methods using measuring tape and theodolite are still commonly used in the program. Therefore, an approach method is needed to accelerate the land registration process in Indonesia. The the Fit-for-purpose Land Administration (FFP-LA) concept is capable to fulfill the needs of land registration in Indonesia. Fit-for-purpose Land Administration (FFP-LA) can provide a basis building system for land use planning and control. The concept of FFP can be a solution in resolving land issues and apply global standards in the field of land that are aligned with country-specific, affordable and flexible needs.

The FFP approach based on high resolution satellite imagery and/or aerial image are the right choice for mapping boundaries. This research offer methodology can be applied to solve this issues. Land parcels mapping was carried out using the FFP-LA approach through a boundary delineation process by utilizing the interpretation of the land parcels in 1:1000 scale of orhtophoto maps. Area of digitized land parcels would be compared to the exact land parcels to produce the area difference. This method produces 80% of the land area that fulfill the tolerance by Indonesia Land Agency (BPN)

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1. INTRODUCTION

Land registration is defined as a series of activities carried out by the Government continuously, continuously and regularly, including collection, processing, bookkeeping, and presentation and maintenance of physical data and juridical data, in the form of maps and lists, concerning plots of land and one unit of flats, including the issuance of letters of proof of their rights to the fields of land that already have their rights and ownership rights to the apartment units and certain rights that burden them [1].

The implementation of land registration in Indonesia has been going on for 58 years since 1960, but land parcels that have been registered at the end of 2016 have only reached 46 million fields out of a total of 126 million land parcels in Indonesia [2]. If no acceleration is implemented, it will take more than 100 years to issue land title certificates [3]. As land registration offers many positive impacts, it is not only for the people but also for national economic development, acceleration in registering land is necessary [4]. Since 2017, the Indonesian government through the Ministry of Agrarian Affairs and Spatial Planning has carried out mass land certification activities through Complete Systematic Land Registration (PTSL). This activity aims to reduce land registration time to 9 years so that by 2025 all land parcels have been registered and certified [3].

To support the acceleration of land registration, one of the efforts that can be done is to carry out a comprehensive inventory of plots of land through mapping land parcels. With the complete mapping of plots of land, it is expected that each region will have complete master data on land parcels so that it can be used for various purposes specifically to facilitate the identification of fields to accelerate the measurement, mapping and accounting of land.

One concept that can be used is *Fit-for-Purpose (FFP). FFP* can be the basis for the development of a system for land use planning and control because the concept offered is in the form of implementing global standards in land that are in line with country specific needs, affordable, and flexible. In the FFP approach, mapping can utilize high-resolution satellite imagery (CSRT) or aerial photography not only to provide spatial data but also to support regional development planning and functions [5]. The advantages of the mapping method are also supported by research by Ramadhani et al. (2017) that the acquisition of aerial photographs with UAVs shows an increase in cost efficiency and a relatively short time. The FFP approach is also participatory and inclusive especially in terms of data collection and use involving community support [5]. The participatory mapping process can foster enthusiasm to explore local knowledge, history of origins, local institutional systems, local legal institutions and identification of natural resources owned [6]. This paper is intended to review the implementation of Fit For Purpose to accelerated land registration conducted in Sayang Village which part of District Sumedang in West Java Province, the project can be used to support land registration acceleration

2. THE MATERIAL AND METHOD

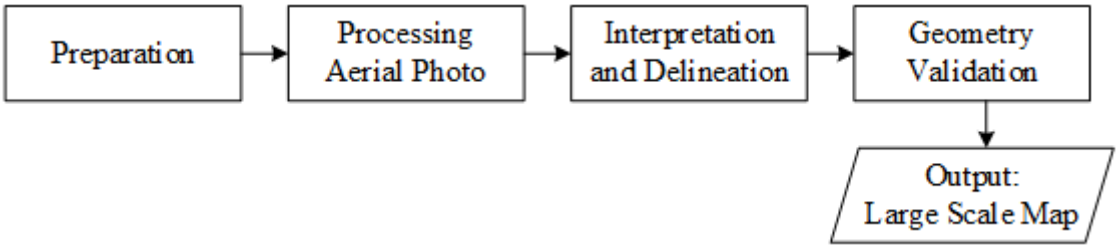

Figure 1. Research Methodology

2.1. Preparation

Preparation activities are the initial stages of research needed to identify needs in research. The activity included the preparation of activity plans, preparation of mapping teams, preparation of tools and materials. At this stage also determined the scope of the study where RW 05 was taken as the sample of this study. The typical of this region is regular settlements which consist of 70 building houses.

2.2. Aerial Photo Processing

In this study, aerial photography was used as a base map for mapping land parcels. Aerial photography used is secondary data with a spatial resolution of 0.05 x 0.05 meters obtained from processing photo data because of taking using *Unmanned Aerial Vehicle* (UAV). The selection is based on the need for the use of rigorous and the standards of large-scale maps (1: 2500-1: 500) in National Land Agency of Indonesia (BPN RI).

2.3. Interpretation and Delineation

Parcel boundaries are made by delineating parcel boundaries on the base map (ie aerial photo) by members of the research. Delineation of the boundary is based on principle of image interpretation which consists of size, shape, shadow, tone, texture, pattern, site, etc [8]. The results of the parcel illustrated can be seen in Figure 2 below.

Figure 2. Land parcel delineated

2.4. Geometry Validation

Validation of parcels is done by calculating the value of the difference resulting from the actual area delineation. The actual land area value is obtained from the map of the land area of the Sumedang Regency Land Office as can be seen in Figure 3 below.

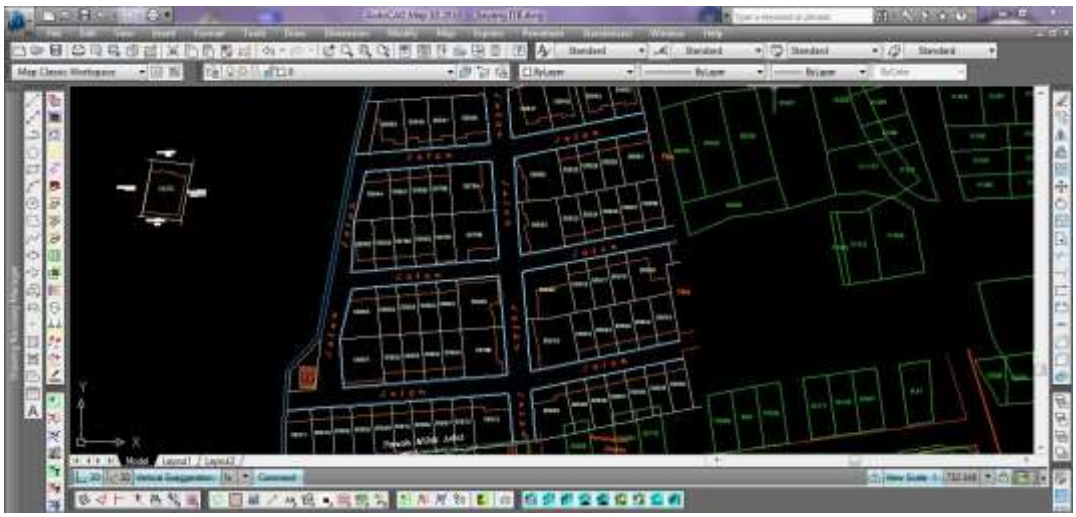

Figure 3. Land parcel map from BPN

The difference value is then compared with the tolerance value that has been determined by the BPN in the Cadastral Mapping Measurement and Technical Specification document. The document in question is a limitation and reference in carrying out work and is made by considering the development of the methodology and technology of the Cadastral Mapping and Measurement progress along with the regulations / technical standards of the Cadastral Measurement and Mapping applicable to the National Land Agency. In Article 11-part h stated that the comprehensive

accuracy (KL) are allowed on the field is a KL ≤ 0.5 √L (L = area of the ground plane). Therefore, the results of the delineation of parcels can be said to be valid if the difference in value is smaller equal to the value of tolerance. Calculation of geometry validation can be seen in table 1 below.

Table 1. Geometry validation based on Area

Number of Parcel	Area based on BPN (AB)	Area based on Digitation (AD)	Difference	Tolerance	Acceptance
	m^2	m^2	AD-AB	0.5 √AB	
1	62.455	66.337	-3.882	3.951	Yes
2	62.543	62.875	-0.332	3.954	Yes
3	62.572	62.931	-0.359	3.955	Yes
4	62.629	60.427	2.202	3.957	Yes
5	62.629	60.254	2.375	3.957	Yes
6	62.639	62.218	0.421	3.957	Yes
7	114.870	119.218	-4.347	5.359	Yes
8	116.837	117.165	-0.328	5.405	Yes
9	63.536	69.930	-6.394	3.985	No
10	63.659	70.486	-6.828	3.989	No
11	63.789	69.287	-5.498	3.993	No
12	63.902	72.244	-8.342	3.997	No
13	64.023	66.771	-2.748	4.001	Yes
14	64.145	71.411	-7.266	4.005	No
15	64.266	71.004	-6.738	4.008	No
16	64.388	74.127	-9.739	4.012	No
17	85.471	97.798	-12.327	4.623	No
18	121.013	122.078	-1.065	5.500	Yes
19	60.004	59.729	0.275	3.873	Yes
20	60.004	63.522	-3.518	3.873	Yes
21	60.004	60.175	-0.171	3.873	Yes
22	60.004	57.564	2.440	3.873	Yes
23	125.520	134.230	-8.711	5.602	No
24	141.094	154.328	-13.233	5.939	No
25	59.910	56.780	3.129	3.870	Yes
26	59.927	63.601	-3.674	3.871	Yes
27	50.944	60.281	-9.337	3.569	No
28	59.961	60.616	-0.655	3.872	Yes
29	64.981	63.382	1.600	4.031	Yes
30	119.615	111.604	8.011	5.468	No
31	60.797	61.114	-0.317	3.899	Yes

Number of Parcel	Area based on BPN (AB)	Area based on Digitation (AD)	Difference	Tolerance	Acceptance
	m^2	m^2	AD-AB	0.5 √AB	
32	61.068	63.410	-2.342	3.907	Yes
33	61.339	62.870	-1.531	3.916	Yes
34	141.497	139.059	2.437	5.948	Yes
35	129.692	136.634	-6.942	5.694	No
36	61.206	61.826	-0.621	3.912	Yes
37	60.833	64.510	-3.677	3.900	Yes
38	60.460	62.153	-1.694	3.888	Yes
39	60.087	62.455	-2.368	3.876	Yes
40	94.833	100.953	-6.120	4.869	No
41	63.703	60.155	3.548	3.991	Yes
42	61.574	62.638	-1.064	3.923	Yes
43	61.293	60.154	1.139	3.914	Yes
44	61.011	60.153	0.859	3.905	Yes
45	60.730	66.569	-5.840	3.896	No
46	126.498	128.573	-2.075	5.624	Yes
47	131.452	140.020	-8.567	5.733	No
48	61.787	63.697	-1.910	3.930	Yes
49	60.005	63.241	-3.236	3.873	Yes
50	60.005	64.691	-4.686	3.873	No
51	60.005	61.517	-1.512	3.873	Yes
52	61.033	60.264	0.769	3.906	Yes
53	95.256	92.217	3.039	4.880	Yes
54	59.940	58.324	1.616	3.871	Yes
55	59.751	61.144	-1.393	3.865	Yes
56	59.560	59.634	-0.074	3.859	Yes
57	130.973	131.427	-0.454	5.722	Yes
58	125.950	139.556	-13.606	5.611	No
59	60.002	64.304	-4.301	3.873	No
60	60.002	64.638	-4.635	3.873	No
61	60.002	68.893	-8.891	3.873	No
62	90.600	96.817	-6.218	4.759	No
63	94.671	76.651	18.021	4.865	No
64	75.967	77.216	-1.249	4.358	Yes
65	74.655	76.932	-2.277	4.320	Yes
66	101.666	107.772	-6.107	5.041	No
67	112.661	122.879	-10.218	5.307	No
68	94.478	94.337	0.141	4.860	Yes

Number of Parcel	Area based on BPN (AB)	Area based on Digitation (AD)	Difference	Tolerance	Acceptance
	m^2	m^2	AD-AB	0.5 √AB	
69	97.576	98.693	-1.117	4.939	Yes
70	85.075	84.128	0.947	4.612	Yes
Number of Error					25 of 70
Level of Error (%)					35.7

2.5. Large Scale Map

In this research activity large scale maps can be produced for various uses according to user needs. The main benefit of mapping land parcels with the FFP-LA method approach is the ease of identifying and conducting an inventory of plots of land as a land database.

3. RESULT AND DISCUSSION

In this research, the application of the FFP-LA method can produce 64.3% of the area that fulfil with BPN's tolerance. Based on these results, this method can be an alternative in land parcels mapping to support the acceleration of land registration in Indonesia. Nonetheless, results are strongly influenced by supporting technological devices and the ability of operators to interpret and delineate field boundaries.

The results of the map can also be used as a form of inventory of ownership, use and utilization of land parcels which are then used as preliminary data in land registration. This certainly can reduce the burden and accelerate land registration because not all parcels need to be measured. Re-measurement can be carried out in land parcels with different areas. The measurement can also be done as an effort to improve the quality of data as stated by Enemark (2016) that quality (such as accuracy and scale) is important but can be gradually increased. Improvement of the quality is in line with modern land information systems that are integrated when demanding conditions require high quality [9].

4. CONCLUSION

The Fit-for-Purpose Land Administration approach can be used as an alternative to mapping land parcels by utilizing aerial photo data. The concept also views that the quality of maps produced are important but depend on the needs and allows for an incremental improvement of qualities. Things that need to be considered while implementing this method are the availability of supporting technology devices and the ability of operators to interpret and delineate land boundaries.

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