Developing an LADM-compliant Mobile Data Collector for Accelerating Participatory Cadastral Mapping and Registration Activities

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SUMMARY

Land registration activities emerge as a national priority aiming at completing land registration progress for all unregistered land parcels in Indonesia by the year 2024. A national project on systematic land registration has been implemented to map all land parcels and to certify unregistered land parcels nationwide from village to village. The country's current progress on land registration program uncovers an essential need for mobile technology adoption to help accelerate map all land parcels completely while to reassure land data quality. Local land offices and project executors see a mobile application as an alternative that facilitates public participation and supports surveyor's tasks to collect land boundaries and their associated formal data for land registration purposes. As a result, various tools of data collectors have been implemented by surveyors and project contractors for enabling field data collection. Unfortunately, these tools provided challenges on data standardisation and data usability hindering an efficient land registration to take place.

Based on user studies and evaluation of existing tools, this paper presents a new design of a mobile data collector enabling surveyors and para surveyors, residents help government surveyor in land registration program, to connect with national land databases. Data collection and verification on land boundaries and their corresponding status by para surveyors can be submitted to the national databases, pending for approval from local land offices. Here, the collected data are designed to align with LADM basic classes, known as parties, RRR, spatial units, surveying and mapping classes. Information on taxation, valuation and land use can be captured and linked with LADM external classes. This tool is targeted to help government surveyors and para surveyors to collect physical documents from landowners by applying a photo-scanning and indexing processing to documents. Application forms and related formal letters submitted by landowners are converted as digital data and sent to national land databases. For that purpose, the application server receives the submitted data and subsequently forwards these essential source documents to the national LADM-based land databases. The app is designed to facilitate the para surveyors collecting spatial data and legal documents needed for every parcel. Legal documents will be obtained using the questionnaire method; therefore, it will ease the para surveyors.

The mobile app is not just designed to collect field coordinates from either field survey or photo-mapping but also to document the process of land boundaries delimitation and demarcation. For this, geotagged video and photo in regards to identity and means of boundary determination of the field for each land parcel can be stored and uploaded into the databases. As a result, using the app, surveyors produced a comprehensive data set of coordinates, metadata and ownership documents related to individual parcels. The app can connect to an external geodetic GPS antenna to gain more accurate GPS coordinates of land boundaries. The app can also facilitate manual input of distance measurements when the field survey takes place in an awkward location such as in narrow urban alleys. At the end of the survey day, registrars and government surveyors in local land offices can validate survey data. In addition to the function to facilitate first land registration, the app facilitates cadastral map validation. Para surveyors in villages can submit correction and verification on the neighbourhood boundaries, street names and other toponym data. Para surveyors can also draw points, lines and polygons and their corresponding attributes to add new features related to state and public properties in their neighbourhood and upload the data into the land databases. The app design is accumulating lessons-learnt and usability features gained from different previous tools. One of the critical requirements was that para surveyors require minimum complexities for them to complete their participation. The app is written using native Java and implemented various open source platforms, including a search engine server to enable the integration of documents and spatial data. Considering different qualities of internet infrastructure in Indonesia, para surveyors can use functions in the app either in an online or offline condition. In case the network is not available, para surveyors can still collect data, but the data submission will be made automatically by the app when the internet is available.

Traditionally, land registration is delivered solely by government officers and licensed surveyors as a rigid formal procedure. Massive adoption of mobile technology and huge government targets on land certification have pushed the government to adopt the new design of land registration business processes. The government must see digitalisation and public participation as opportunities to speed up the cadastral mapping progress. The solution is expected to bridge community participation and government initiatives to accelerate completeness in cadastral mapping and to increase land information quality. In this work, seamless field survey and verification for land registration are aligned with requirements to store information effectively into LADM-based national land databases. The app is hoped to be adopted well by para surveyors to help the government collect standardised field data and validate the cadastral maps in a collaborative and synchronised way.

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