Improving Road Investments through Mobile Data

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SUMMARY
Local roads that give ‘last-mile’ access to a destination are essential for promoting inclusive growth. But improvements in local road networks typically depend on national financing and involve numerous decentralized projects, making it hard for policymakers and citizens to ensure the development of efficient road networks. In response, this project developed OpenRoads, an interactive multi-media portal and set of digital tools to track nationally-financed projects to improve local road networks in the Philippines. The platform links official road data with crowd-sourced geo-coded video and image data from mobile devices, to validate the state of the country’s extensive road network. It can be used by all stakeholders working to promote better road investments, including ordinary citizens. Leveraging low-cost open-source mapping technology and mobile pictures and videos, it organizes a wealth of rich geo-tagged imagery and feedback contributions, turning fragmented data into timely information. By geo-tagging, processing and analyzing the...
imagery, it captures the state of local road networks and road investment projects. This allows greater digital transparency and feedback, improving results and value for money for public investments in last-mile rural road access.

CHALLENGE

Beyond national highway networks, local roads that give last-mile access to a destination are vital for linking people to economic and social opportunities. But improvements in local road networks typically depend on national financing and involve large and diverse portfolios of decentralized projects. This makes it hard for policymakers and citizens to ensure that such programs are effective in prioritizing, delivering and maintaining efficient road networks.

In the Philippines only 31,000km (15 percent) of an estimated 210,000km of road are designated national roads. Improving last-mile access means upgrading the remaining 180,000km of local roads – a distance halfway to the moon. Several government programs worth almost US$1 billion in 2016 target local roads, ranging from tourism to farm-to-market schemes. However, with patronage politics playing a key role in the country, it is hard to ensure that the right roads get built at the right cost. Traditional monitoring and evaluation systems for road projects cannot quickly and cost-effectively improve transparency and feedback.

Incomplete local road maps compound the problem, but geo-tagged photo and video data offer a reliable approach to mapping and assessing the Filipino local road network. In recent years, government agencies’ collection of such data on public infrastructure programs (including through crowd-sourcing) has exploded. There is a need to effectively leverage this data overflow to provide real-time information on the road network and improvement projects. However, the data is so unstructured that it cannot be systematically analyzed.

In response, this project sought to implement new data mining and evaluation protocols, develop a clear reference model for the road network, and ensure that image and video data can be referenced to this model. With the 2013-16 national budget for improving local last-mile roads at over US$3 billion, the value for money in advancing transparency and feedback could be significant.

Users can see all nationally-financed local road projects and provide feedback by project or location

INNOVATION

The project developed OpenRoads, an interactive multi-media portal and set of digital tools to track nationally-financed projects to improve local road networks. The platform turns fragmented data into timely information, organizing a wealth of rich geo-tagged image, video and feedback contributions over time. Its premise is that visible, mapped information on existing road networks and the physical and financial progress of investment projects will enhance transparency and accountability for public investments in last-mile roads.

OpenRoads leverages innovative, low-cost open-source mapping technology and mobile picture and video imagery. By geo-tagging, processing and analyzing the imagery, it captures the state of local road networks and road investment projects. The platform maps both projects and the road network assets these investments are seeking to improve. OpenRoads Mapping and Network Analytics builds on Open Street Map protocols,
an open-source global mapping platform. This provides for systematic data analytics and validation, as well as public disclosure of information.

**Joining up disparate data sources**
Various Filipino government agencies are financing or implementing local roads projects. OpenRoads is not designed to duplicate these agencies’ tracking systems, but rather to provide a platform for bringing this data together and augmenting it, particularly with rich geo-tagged information. For example, the Department of Public Works and Highways electronic project lifecycle system provides monthly summaries on the financial and physical completion of an estimated 20,000 projects per year. While many focus on the national road network, others benefit local roads. Open Roads augments this information with locational information, as well as videos and images. The system can also scour image and video data from various dates to show the lifecycle of road segments and projects.

The platform allows all stakeholders wanting better roads to create the missing digital road map using Routeshoot, a mobile video application that works on basic smartphones. After simple training, people can upload these movies and maps onto OpenRoads. The platform provides a comprehensive overview of government investments in local roads. It can be used by citizens concerned with the use of tax money, development and private sector partners promoting investments, or government bodies showcasing public infrastructure delivery. OpenRoads offers project updates and virtual tours at different points in time. Users can view national and local road networks, see all mapped nationally-financed local road projects and provide feedback by project or points on the map. This enables stakeholder collaboration in improving road networks.

**Measuring program performance**
The platform's Geostore stores mapped images and videos over time, allowing dynamic project-based review and updates by responsible agencies. Government bodies can map and geotag all projects, which oversight agencies can track systematically. Users can measure program performance by project or local government. The mobile app assigns point- or track-mapping to photos or videos, which geo-processing tools convert to diagrams summarizing project information (such as road length, surface and quality). Users can validate the quality of budgeted road projects against observed progress on the ground. The platform also offers road mapping tools to assess project connections and the extent of local road networks. Through its Dashboard, OpenRoads allocates scores to project portfolios based on the availability of physical and financial information and the extent of basic project mapping.

By bringing projects to life through its dynamic digital maps, OpenRoads deepens information exchanges, allowing stakeholders to assess the road network and prioritize the right improvement projects.

**RESULTS**
OpenRoads is already making a tangible difference to the Philippines’ road network. Local roads in Palawan Province have been surveyed using Routeshoot, and the imagery geo-processed to rapidly summarize their condition by segment. The provincial government is collaborating with 24 cities and municipalities to complete comprehensive road mapping across the province. The Commission on Audit has engaged local civil society to conduct a citizens’ audit of more than 200 Farm-to-Market roads across the country. OpenRoads' Geostore was used to manage the process, resulting in a People's Audit Report based on data analytics.
and visualization. The Tourism Road Infrastructure Program is upgrading over 4,000km of roads across more than 450 projects and 1,000 contracts. The Department of Tourism is using Routeshoot and geo-processing to conduct a rapid appraisal and validation of all these roads.

Under Kalsada, a new public investment financing program, provinces are eligible for national government financing for up to two provincial roads under the 2016 budget. A prerequisite is that agencies submit their proposals to OpenRoads using Routeshot videos. Over 70 provinces have been trained and are submitting projects. Worth nearly US$150 million in 2016, the Kalsada program is set to increase in value six-fold in 2017. This ‘No map, no money’ approach from sponsoring agencies underscores the importance of accountability for taxpayers’ money. The platform’s approach could in future be applied to other decentralized infrastructure investments or special programs, such as re-greening.

OpenRoads is no substitute for major institutional reforms to deliver sustained effectiveness in last-mile roads investments, but better information and stakeholder engagement and feedback enable the country to check whether the right roads are being built at the right time and cost.

LESSONS LEARNED
OpenRoads shows how big data can bring stakeholders together to promote transparency, but technology cannot substitute for institutional reform to guarantee accountability.

• Complement big data with non-digital approaches to deliver change
  Online roads transparency is no silver bullet. Digital technology needs ‘analog’ complements, such as institutions that link transparency to accountability, to improve service delivery.

• Use big data to promote dialog
  OpenRoads promotes a multi-stakeholder conversation about how to improve planning, budgeting and implementation of decentralized road investment programs. Citizens can provide constructive feedback on progress in last-mile access for their communities. Mapping reframes conversations about road investments so they resonate with politicians, policymakers and citizens alike. Goals such as providing every community with road access can be costed, and choices evaluated.

• Be prepared for evolution in system usage
  The Kalsada program institutionalized the OpenRoads platform, linking the mandatory use of geo-tags to receiving performance-based grants. However, this also meant that OpenRoads increasingly needed to serve as a project management system, rather than just a disclosure platform. The major lesson from this evolution was to ensure that the technology was both scalable and able to accommodate specific program requirements (e.g., tracking budget release requirements).

• Make road project geo-tagging comprehensive and mandatory
  The only way to avoid ghost roads is to ensure all local road projects are mapped. It was critical to underscore the need for OpenRoads coverage to be comprehensive. The Commission on Audit is enforcing this principle in the Philippines. Engaging Supreme Audit Institutions in geo-tagging must be an important part of advancing the notion that ‘no road project should be a state secret’.