

Space-Based Property Taxation

Turning urban data into public revenue

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Space Economy Opportunities for Emerging Nations

Advancing Socio-Economic Resilience through Space Technologies and Applications

Property taxation links urban growth, municipal finance and fairness

60%

**of residential property value
can sit in building structures**

Flat land fees miss this wealth and can place a heavier relative burden on modest homes.

FUNDING RAPID URBAN GROWTH

Property and land taxes offer a large untapped source of municipal revenue for infrastructure, healthcare and sanitation. Immovable property cannot relocate and faces less tax competition than income or consumption.

WHY PAPER SYSTEMS ARE REGRESSIVE

Flat lease fees and voluntary reporting ignore differences in building wealth. Owners of luxury villas can pay proportionally less than low-income households on similar lot sizes.

PROGRESSIVITY THROUGH FULL PROPERTY VALUE

Taxing land plus building volume shifts fiscal responsibility toward high-value assets. A broader value base can protect low-income groups while improving revenue adequacy.

Informal registries create a large and regressive revenue gap

40%

of potential land lease fees collected

US\$1.95m collected

of US\$6.74m legally owed

- **Voluntary declarations fail**

Landowners know more than the state. Self-reporting leaves buildings and taxable value outside the registry.

- **Flat fees protect high-value assets**

Owners of multi-story luxury villas pay proportionally less than low-income households.

- **Physical surveys cost too much**

Door-to-door surveying carries fixed costs that weak municipalities cannot sustain.

GLOBAL BLIND SPOT

95% of African and South Asian capital cities lack digital cadastral records

A satellite audit converts visible structures into taxable value

01**TRI-STEREO SCAN**

0.5 m Pleiades imagery covers all 340 km² at once.

02**3D BUILDING MODEL**

Footprints and heights produce built-up volume in cubic metres.

03**MASS APPRAISAL**

CAMA hedonic regressions estimate property values without door-to-door visits.

04**VALUE-BASED TAX**

A 1% tax captures land and structure wealth, including the roughly 60% held in buildings.

10×

revenue potential

~US\$2m

flat lease fees

US\$19.3m

1% value-based tax

~US\$40,000

technical audit cost

Satellite data can expand revenue while improving policy design

10×

revenue potential

US\$2m

flat lease fees

US\$19.3m

1% value-based tax

Imagery: US\$34/km² Processing:
US\$112/km²

COMPELLING RETURN ON INVESTMENT

A 340 km² 3D audit costs about US\$40,000.

POLICY TESTING BEFORE LEGISLATION

Prospective evaluation lets governments simulate exemptions and rates. In Kigali, a proposed RWF 30 million low-cost-housing threshold would have removed about 95% of the building tax base.

LOWER ADMINISTRATIVE FRICTION

Satellite observation and CAMA replace slow physical surveys and voluntary declarations. Automated, repeatable assessments can reduce discretion and standardize treatment across the city.

Satellite and AI systems need legitimacy, capacity and appeal rights

PRIVACY AND SURVEILLANCE BACKLASH

Persistent monitoring can look like intrusive surveillance, especially when authorities search for unregistered luxury assets such as swimming pools. Clear legal limits and purpose restrictions matter.

TECHNOLOGY AND CAPACITY DEPENDENCE

High-resolution processing requires compute capacity, specialist algorithms and skilled staff. Weak local capacity can create vendor lock-in, fragile systems and costly bottlenecks.

OPAQUE VALUATIONS AND WEAK TRUST

Complex models can make tax bills appear arbitrary. Publish valuation logic and property records through a citizen portal so taxpayers can verify and correct their data, following the Netherlands model.

ERRORS, CALIBRATION AND DISPUTES

Outdated imagery or incomplete cadastral maps can misclassify properties. Independent audit trails, routine recalibration and accessible appeal procedures must remain part of the system.

Core safeguard

Technology should support accountable tax administration, with human review and a credible right to appeal.

Technology can strengthen tax capacity before institutions fully mature

Public Administration & Social Equity

ADOLESCENT DEMOCRACIES

A Former Finance Minister's Guide to Policymaking

Ioana-Maria Petrescu

THE INSTITUTIONAL REALITY

Many developing countries must raise local revenue while registries remain incomplete and administrative capacity is constrained. Reform cannot wait for institutions to become fully mature.

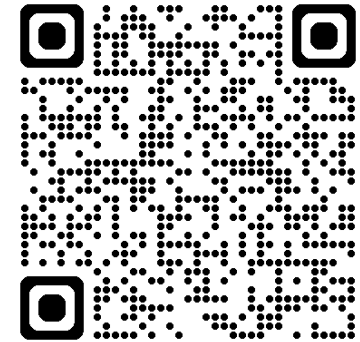
SPACE TECHNOLOGY CLOSES THE INFORMATION GAP

Satellite imagery and spatial AI identify buildings at scale. Automated registries create an audit trail, reduce official discretion and lower the cost of finding taxable assets.

BETTER DATA SUPPORTS FAIRER TAX COLLECTION

Valuation based on land and structures shifts the burden toward high-value property. Recurring local revenue can finance basic services and strengthen trust in government.

SCAN FOR THE BOOK



Emerald Publishing

Adolescent Democracies

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