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Integrated approach to infrastructural development

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ABSTRACT

Sectoral projects funded by the international lending agencies risk concentration of development resources in certain sectors at the expense of others. The authors draw upon experience in Indonesia, reviewing the benefits of the multi-sectoral approach, describing some of the problems which arise and suggesting how these may be overcome.

The principal benefit of the integrated approach is considered to be the capability to direct funding to where it is most needed. However, this requires a practical and rational method for ranking in priority potential projects of widely differing nature (water supply, sanitation, drainage, solid waste disposal and roads). Economic analysis of most infrastructure projects is limited by data deficiencies and absence of easily quantifiable benefits. Perceived needs, revenue generating capacity within the benefiting communities and subjective judgements become the criteria and tools for selecting projects for implementation. This implies a need for decision making and accountability at local level and decentralisation of direct control.

THE INTEGRATED URBAN INFRASTRUCTURE DEVELOPMENT PROGRAMME (IUIDP) IN INDONESIA

The Strategy

The purpose of the IUIDP approach is to increase the coverage of maintainable Local Government implemented infrastructure and services in urban communities. Central government's policies and its contributions to the programme are based on criteria which define "basic needs" levels of services. Local governments are empowered to set their own levels for these services but, where these exceed basic needs, finance must be generated from community and private sector participation. The

formulation of integrated programmes is based on multi-year (usually about 5 or 6 years) capital and operation and maintenance (O&M) investment plans which may cover some or all of the following: urban development planning, water supply, drainage, human waste disposal, solid waste disposal, market improvement, housing and roads. Environmental impact analysis is a requirement for all capital investment plans. Procedures exist for sequential appraisal of plans by municipal, provincial and central governments.

Projects Reviewed

Planning and preparation for funding of two projects are discussed: Surabaya IUIDP, dealing with the second largest city in Indonesia, population 2.6 million (1990); and East Java and Bali IUIDP, covering 35 Kabupatens (districts) in East Java (with urban population of 5 million ranging from 18,000 to 584,000) and 8 Kabupatens in Bali (with urban population 1.8 million ranging from 43,000 to 450,000). The authors' participation in the preparation of the two projects was mainly in the water supply sector and financial analyses.

Surabaya IUIDP. Possible sub-projects for inclusion in the six year Surabaya programme are outlined below:

- Over 190 km of new or improved roads are proposed together with non-routine O&M works and institutional improvements.
- Water supply works will increase coverage of piped service from 53% (1991) to about 87% (1997). A private sector project is expected to provide an additional 2.2 m³/s for the city. The IUIDP water supply component will provide a balanced expansion of the distribution system to allow some 190,000 new connections and the strengthening of the city's water

enterprise.

- Under the programme, over 100 km of new drains will be constructed, new tide gates will be installed and improved procedures for dredging drainage channels will be set up.
- Solid waste disposal services will be improved by rehabilitating collection depots and providing new transfer stations, containers, vehicles and other equipment. It is proposed to expand the waste collection service from 65% (1990) to 90% coverage by 1997.
- Sanitation and wastewater disposal improvements may include a pilot sewerage project - at present there is virtually no sewerage in Surabaya. Beyond the pilot area, additional public bathing, washing and toilet facilities will be provided in the more densely populated parts of the city.

The IUIDP approach also includes for environmental assessment (AMDAL) for all sub-projects. Institutional development and revenue improvement action plans set down the practical steps to be taken by agencies to handle the programme and achieve revenue collection targets. Technical assistance (TA) is proposed to manage and coordinate implementation of the project.

Preliminary estimates of investment and O&M costs amount to about \$640 million for the six year programme.

East Java and Bali (EJ&B) IUIDP. The scope of the project covers infrastructure development, rehabilitation and O&M in seven sectors (water supply, roads, kampung improvements, market

infrastructure, solid waste, drainage and sanitation). The programme cost is estimated at approximately \$330 million.

REAL DEMAND SURVEYS

In both projects "real demand" surveys were conducted to assess the perceived needs of households for urban services. About 5% of households were interviewed in the EJ&B project towns (0.5% in Surabaya) on a sample basis to discover if existing services were adequate or in need of improvement and to assess ability and willingness to pay for services.

Demands for water supply were estimated for EJ&B primarily from the answers to three simple questions - whether a piped supply was wanted or not, whether it was wanted "now" or "later" and the household income level. It was assumed that a house connection would only be affordable by households with an income over about \$60 per month. The process of estimating the number of connections is shown in Figure 1.

Whilst this simple approach had its failings with regard to people's real ability and willingness to pay, it was clear that the number of people with a desire for a piped water supply reflected the availability of alternative sources - the percentage indicating an interest in piped water supply varied from 20% in the plains with good shallow wells to near 100% in areas where good quality water was scarce.

Demand for improvements in sanitation facilities and solid waste disposal were estimated in a similar way.

Demands for improvements in other sectors were assessed by asking people to indicate

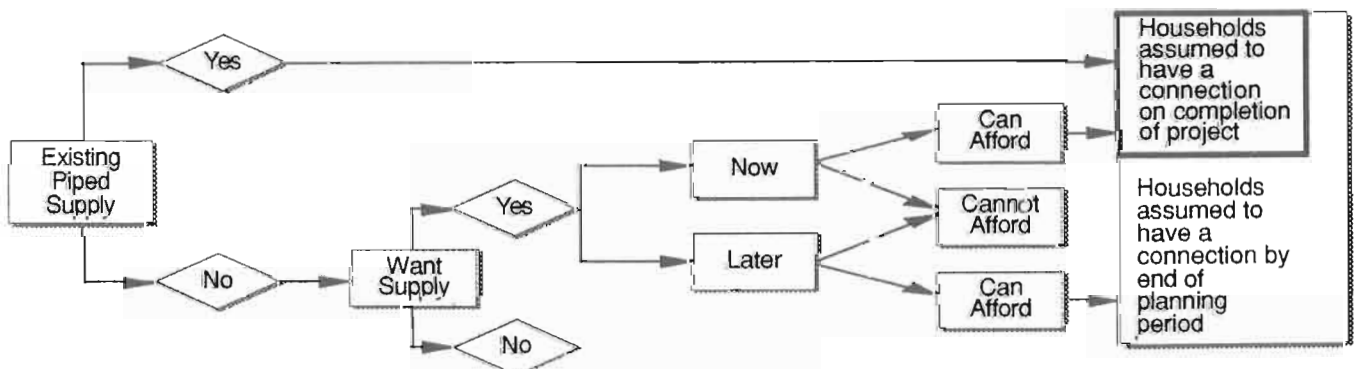


Figure 1 - Estimating Water Demands from Survey Results

the relative priority they gave to improvements in the different sectors.

Real demand surveys gave much useful information at little cost. For EJ&B it was possible to discard schemes for which there was little demand and give a basis for sizing works for which a demand had been shown. Survey results for Surabaya city were used in a similar way but here one of the main objectives was to assess the rate at which proposed new supplies would be utilised.

ECONOMIC ANALYSIS

The IUIDP approach

Economic justification of IUIDP projects is based on methodologies designed to test the economic rate of return (EIRR) of sub-projects against a 10% cut-off rate. Government guidelines classify sub-projects as small (under \$200,000), medium (between \$200,000 and \$2 million) and large (over \$2 million). Economic viability of small sub-projects is assumed provided these comply with IUIDP planning and design criteria; medium sub-projects are subjected to a simplified viability test; and large sub-projects are analysed in detail.

Road projects were accepted provided previously established minimum traffic levels required for various road classes and types of project could be demonstrated. Surveys showed all projects had traffic flows above the minimum needed for an EIRR of 17.5%

Drainage projects were assessed according to their effect on property values, which in turn were established by interviews with local officials and "informal real estate brokers". The one project analysed had an EIRR of 46%.

Water supply projects were acceptable if the average incremental cost of water was below existing tariffs. Otherwise they were analysed using the World Bank's "ECOWAT" program. This assesses benefits according to the costs of existing supplies replaced by the project and the additional water consumed. The costs of existing supplies included: water purchased from vendors; private fixtures - wells, pumps, etc; time for

drawing and carrying water.

Ten projects were analysed using ECOWAT and the EIRR ranged from 2.6% to 27.5%. Five projects failed to meet the minimum requirement of 10%.

Sanitation and solid waste schemes were regarded as having intangible benefits which accrue to the community as a whole and were exempted.

Given the results, the overall conclusion might be that there should be more investment in roads and drains than water supply. However, that would be a premature judgement since the approaches to the sectors differed so markedly and, as will be shown below, results are dependent on the quality of initial assumptions.

Re-appraisal of Water Supply Economics

Generally low EIRRs were associated with towns with good existing supplies, but the scheme for Paciran, a poor coastal town with severe saline intrusion in shallow wells, had a calculated EIRR of 5.9%. A review of the analysis suggests that use of an alternative, but equally reasonable, set of assumptions could increase this to 13.75%.

Compensating for low incomes in Paciran, by assuming 6 rather than 4 litres per capita per day (lpcd) of costly (\$2/m³) vendor water would be replaced by the project, raises the EIRR to 10.1%. The analysis costs the time spent drawing water from a public tap, but not from a home tap. This is inconsistent and if time waiting at a public tap is not charged, the EIRR is further raised to 11.1%. The model predicts that if less water is allocated to standpipe users and more to house connections the calculated benefits are increased. Reducing the allocation to standpipe users from 20 to 10 lpcd and transferring water to house connections raises the EIRR to 13.75%.

Other benefits resulting from improved water quality could also be added.

Given the large variation in the result obtainable by varying the assumptions and including non quantified benefits, it is clear

that care is required in the use of an EIRR cut-off test, particularly since the method appears to be insensitive to needs of the poorer urban communities.

INVESTMENT PLANNING

Financial analysis contributes to the process of IUIDP programme definition by balancing needs with affordability to the community and its willingness to pay.

Greater delegation of responsibility from Central to local governments is crucial to IUIDP. Necessary steps towards this aim are to decrease dependency on central grants and to increase local revenues through improved administration of local taxes and cost recovery on trading and semi-trading undertakings, for example water supply, markets, solid waste and sanitation services. In progressive areas such as Surabaya these aims have been met quite successfully.

The nine IUIDP sectors appear under only two of local government's twenty expenditures categories. Increased use of local funds for IUIDP programmes implies the need to prepare a financial plan to cover all of the Local Government services, over the full programme period. However, the present yearly budgeting cycle is inflexible and broad assumptions need to be made on the level of investment in non-IUIDP categories for which there is no programme longer than one year.

Decisions on the size of investment in the trading and semi-trading sectors were based on the capacity to generate revenue and

service borrowings, while in other sectors a more subjective approach was used. Planned investments on the two projects are as shown in Figure 2.

CONCLUSIONS AND SUGGESTIONS

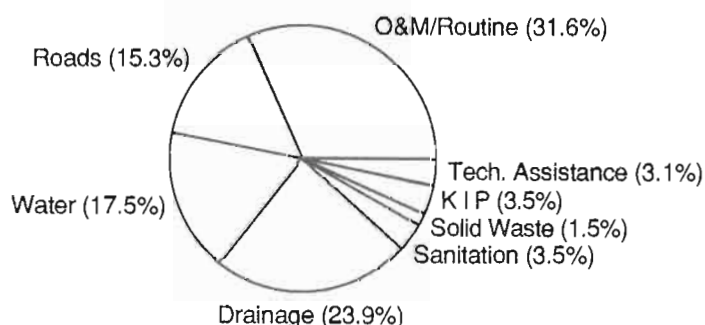
The attempts at an integrated approach to infrastructure development have overcome the excessive concentration on one sector, but have resulted in a series of parallel sectoral programmes rather than one integrated programme.

EIRR values, or benefit/cost ratios, might have been seen as a means of ranking projects for various sectors. However, differences in approach to the analyses between sectors means that no objective method of prioritising sub-projects exists unless an inordinate amount of work is undertaken. Such a study may have value in establishing guidelines for future integrated programmes. Simple demand surveys and consultation with local officials, on the other hand, appear to give a generally reliable assessment of relative priorities. The simple nature of the surveys made it easy for appraisal bodies to understand and accept the results.

Decentralisation of planning will often ensure that resources are channelled into priority projects and will minimise the time spent on detailed assessment of projects. It will also encourage commitment to the future operation of the schemes.

Further development of a goals achievement matrix may assist in the essentially subjective sub-project ranking process.

City of Surabaya IUIDP



East Java and Bali IUIDP

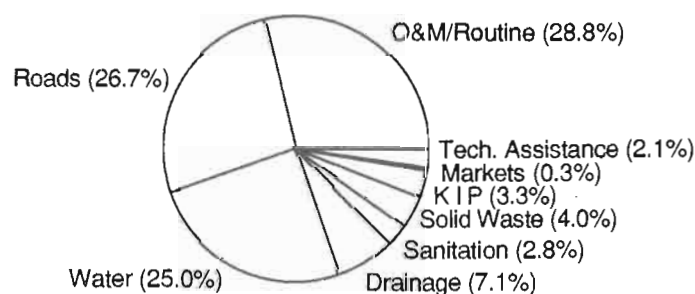


Figure 2 - Infrastructure Investment Programme