Sustainable operation and maintenance of urban infrastructure—myth or reality?

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ABSTRACT

It has become increasingly apparent that a paradoxical situation is emerging with respect to urban services in less developed countries. On the one hand a huge demand for urban infrastructure has resulted from rapid urbanisation; on the other, existing infrastructure is falling into disrepair before completing its design life. Operation and maintenance (O&M) has been identified by commentators as the key to enhancing the sustainability of existing infrastructure and assets. However, there is a general lack of understanding by stakeholders about the role of operation, maintenance and sustainability in the context of good governance.

The aim of this paper is to explore the constraints to operation, maintenance and sustainability of urban services. The findings are based on case studies from India, Pakistan and Sri Lanka. In each of the case locations, projects were completed more than three years ago. Data collection tools included document review, interviews and

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participant observations. Forums and workshops were also held. In order to distinguish between the different constraints acting upon urban services, the term ‘sustainability’ has been separated according to its technical, financial and institutional aspects. This paper demonstrates how findings from community involvement in service delivery in developing countries can be of benefit to engineers or NGOs working with communities to improve the operation and maintenance of urban services in developed countries.

Traditional centralised systems for O&M, which are the responsibility of municipalities and utilities, are not delivering. Recently there has been a search for alternatives such as community-based approaches. Internationally it seems services users are being encouraged to ensure the infrastructure in their neighborhood is kept in good condition. It is hoped that getting service users involved will lead to increased efficiency, benchmarking, raise awareness/ debate, contributed to national growth, reduced waste, improved resource allocation and improved competitiveness. However, evidence of the success of such schemes is rather patchy. It has been recognised that neither community nor government alone can ensure the sustainability of infrastructure; a partnership approach is needed. The keys to improving operation and maintenance—and hence sustainability—are the availability of information and the attribution of clear roles and responsibilities. Operation and maintenance can be seen to be the most important determinant of citizens’ satisfaction with urban services; this in turn leads to better governance.

Introduction

Many urban service improvement projects promote community participation in the planning, implementation and management of those services. Increased participation in operation and maintenance (O&M) is usually assumed; however, the authors did not know the extent to which such participation actually occurs. This work therefore sets out to review both consumer (urban poor) perceptions and municipal performance of O&M, including the sustainability of community-based processes.

The key question that the authors address is '***How to improve the performance and sustainability of the O&M of services for the urban poor***?' The work centres on exploration of relationships (contracts), and roles and responsibilities in the context of urban service projects. The authors carried out a series of case studies involving:

- Utility- and community-managed water supply and sewerage in Colombo (Sri Lanka), Faisalabad and Karachi (Pakistan); and
- Integrated urban services for poor communities in Cuttack (India).

The case studies reviewed completed urban projects in order to investigate: O&M performance; relationships and contracts between stakeholders; roles and responsibilities; and consumer satisfaction. A key feature of this work was the prominent role that our partners in the South played in the planning, implementation and analysis of the case study material; this formed the basis for developing the project outputs.

Through these case studies the authors have been able to:

- learn more about operation and maintenance routines;
- assess the performance of O&M and the capacity of local actors to manage the processes;
- integrate learning from the research into future O&M strategies to improve local capacity to address urban challenges; and
- share experiences of O&M between local stakeholders.

The authors attempt to draw out lessons learned. In doing so they:

- report the challenges faced and the opportunities created by different management models in poor communities, namely: management by municipalities, by user groups and by individual households; and
- identify key issues that are central to promoting the needs of the poor and the sustainability of systems in the future development of O&M strategies.

Some basic concepts

Some basic terms are described below for easy reference.

Operation and Maintenance (O&M)

For the purposes of this paper, the O&M of urban services can be said to be sustainable if urban infrastructure realises its anticipated service life, as defined by engineers. Proper operation of services refers to the activities involved in the delivery of a service; it depends on both users and providers using the facilities and equipment with care in order to ensure the long life of services and to reduce maintenance needs. Maintenance refers to the activities that ensure infrastructure remains in a serviceable condition; it covers

preventative maintenance, corrective maintenance and crisis maintenance (Davies and Brikke, 1995).

Sustainability

Sustainability is an increasingly used term; it has a number of meanings depending upon the context. For the purposes of this study, urban services can be said to be sustainable if the benefits of the service are realised over a sustained period of time. Problems with operation and maintenance are recognised as key constraints on the sustainability of urban services.

The concept of sustainable development in the context of urban infrastructure becomes pertinent in the context of imbalances of supply and demand. Parkin (2000, a & b) discussed the issues relating to sustainable development and came up with the notion of 'capacity for continuance'. The implication of the concept to the current research is that urban infrastructure—along with its wider impacts on social development—is a key contributor to 'capacity for continuance'.

Community participation

There is no consensus as to what participation is or should be, what its characteristics are and what factors affect it. However, participation is seen as a critical component of project 'success'. Despite this fact, only some forms of participation lead to sustainability. A number of writers and practitioners have devised scales of participation to highlight the different levels of community engagement, ranging from instrumental participation, a means to increase the effectiveness and efficiency of investment, to the other end of the spectrum where participation is regarded as an end; that is, it is seen to be strengthening civil society and governance. The shift from participation as users of a new service to the

participation of the beneficiaries as owners, partners and managers is thought to be an important contributory factor to the sustainability of a project. Participation in O&M is likely to be affected by earlier levels of participation in the instigation and setting up of the project. This means that the authors could not simply isolate O&M aspects of urban services from how projects were initiated if they were to understand the critical success factors in promoting sustainability.

The fundamental challenge currently facing the management of infrastructure is how to make suppliers of services more efficient, environmentally sustainable, more demand driven and responsive to the needs of the users. Internationally it seems service users are being encouraged to ensure the infrastructure in their neighborhood is kept in good condition. It is hoped that getting service users involved will lead to increased efficiency, improve the physical condition of assets, asset performance and reliability, asset utilisation and capacity, benchmarking, raise consumer awareness/ debate, assess life cycle cost and community expectations of services, reduced waste, improved resource allocation, predict future demands for services to repair, analyse alternative treatment options and improved competitiveness. Tools and methodologies, such as report cards, have been developed to increase the knowledge of level of service required by customers and thus facilitate an evaluation of infrastructure performance by government, private sector and civil society.

Governance

An improvement to the governance aspect of service delivery entails partnerships between the policymakers, administrators, politicians and the public, and involves

private and community sectors in demand identification and service delivery. Such an improvement requires redefining the role of government involvement, from its actual provision of services to its management of voluntary and private sector activities. It also necessitates decentralisation and institution building, facilitated by managerial techniques from private sector and development of market mechanisms. Citizens need to be given choice in the services that they use, and the opportunity of complaint and redress. Better governance in service provision means emphasis on both the rights and responsibilities of communities in service provision. At the same time, municipalities may delegate responsibilities to other stakeholders—such as the private sector and citizens. Analysis must also go to identification of (formal and informal) vested interests and the effect they have on policy formulation, decision-making and service delivery in practice. In addition, it is important to assess who is excluded from these processes, which are essentially political decisions.

Methodology

The purpose of this research is to revisit infrastructure procurement projects completed three to five years ago in order to gauge whether operation and maintenance has been sustained. Whilst illustrating and communicating the impacts of these projects, it is anticipated that this research will have some wider relevance outside the debate on operation and maintenance. At the time these projects were implemented, the discourse operating at the policy level included urban management, decentralisation, participation and partnerships and efficiency/ service standards. This research attempts to ground these debates by providing empirical material; this material implicitly tests how well these

concepts have been put into operation.

Because of the complexity and qualitative nature of the issues under investigation, a case study approach was used to explore the problem of sustainable operation and maintenance of urban services in low-income urban settlements. The following city-based case studies were conducted:

- Colombo, Sri Lanka: Utility and Community Managed Water Supply and Sewerage;
- Faisalabad and Karachi, Pakistan: Utility and Community Managed Water Supply and Sewerage; and
- Cuttack, India: Cuttack Urban Services Improvement Project.

The urban services illustrated in the case studies are provided at the household, community and municipal levels. These different forms of service provision determine who is or should be responsible for O&M. The authors provide an assessment of how each case study performed in terms of technical, institutional and financial sustainability. This in turn gives a basis for determining key lessons to be learnt in order to improve systems of O&M when planning and implementing future projects and programmes.

The use of case studies allowed the research team to understand the factors that influence the sustainability of operation and maintenance in an in-depth way; it also deepens the understanding of how the various programmes and projects contribute to governance. Guidance on the case study method was provided through works such as Yin (1994). Data collection tools included document review, interviews and participant

observations. Forums, focus groups and workshops were held in order to crosscheck findings with different stakeholders and to communicate results; they also helped to generate new insights. In order to assess both the successful and relatively unsuccessful impacts of the projects and the reasons for good and bad performances, the study team developed criteria for the selection of case studies. In the identification of case study settlements, consideration was given to: variety of policy contexts; types of settlements; geographical distribution; size of settlements; and availability and age of urban infrastructure (see Figure 1; The Process of Setting the Research Methodology).

Variety of policy contexts

For example, in the Sri Lanka case study the following government policies were represented in the choice of settlements.

1. Pre-Million Houses Programme (prior to 1984)—a provider-based approach, with direct construction of houses and self-help methods.

2. During the Million Houses Programme (1984–1994)—a participatory process in housing, using Community Development Councils (CDCs). This made a significant contribution towards improvement of low-income settlements; it gave leasehold tenure to the urban poor, and so established a sense of permanency of occupation and motivated investment in housing.

3. Post-Million Houses Programme (1995–2000). This encompassed all sectors (i.e. urban housing, rural housing, fisheries, the plantation sector and private sector housing) through projects such as the *Clean Settlement Programme* and the *Sustainable Township Programme*. It aimed to improve basic amenities in urban poor settlements and resulted

in a change of government policy to one of direct provision of housing by introducing the Real Estate Exchange Limited (REEL) urban redevelopment programme.

Types of settlements

The following categories of settlements were represented in the case study selection. However, it is acknowledged by the authors that there are many overlaps between these categories, and in some cases the boundaries between them become indistinct.

Slum settlements

Old, deteriorated residential houses located mainly in the inner city areas.

Shanty settlements

Clusters of residential units built mostly on marginal lands; such units are mainly huts.

Upgraded settlements

Site and services projects, upgraded shanty settlements and relocated low-income projects are included in this category.

Low-income flats / low-cost flats

Low-income flats are those constructed by the government mainly for blue-collar workers as well as for low-income families in the city.

Geographical distribution

The settlements were selected according to their distance from the central business district and to representative administrative units in the cities concerned.

Size of the settlements

The size of low-income settlements in the case locations varied from 10 households to over 500 households per settlement. For example, the case study settlements that were selected in Colombo incorporated between 100 and 200 households.

Availability and age of urban infrastructure

Settlements were selected where the installation of urban infrastructure was completed between three and five years ago.

Improving operation and maintenance of urban services

Systematic approach to maintenance

There is very little evidence of a systematic approach to O&M in any of the case studies. This is especially clear in the Karachi case study where water supplies rapidly began to fail following the completion of the utility- and community-managed water supply project; the expected benefits have not materialised, so in effect the investment has been wasted.

This is particularly surprising in case studies where communities have been involved in the construction of systems, since such involvement is aimed at developing a strong sense of ownership and responsibility for systems, and thus at promoting O&M. Low-income communities, in general, consider the maintenance of services to be the responsibility of either the municipal council or the service provision institutions concerned. Having said this, the case studies also highlighted the patchy success of institutionalised procedures of maintenance. The study indicates both the wide range of activities that can be undertaken by communities, and the degree of ownership and care afforded by such communities,

provided that householders and communities are clear about their responsibilities and those of the municipality (see table 1 on the roles and responsibilities for operation and maintenance). Figure 2 summarises the constraints to community partnering found in each of the case studies.

The constraints common to all the case studies are:

- Overlap of responsibility, duplication of functions, and lack of coordination between different government agencies, private sector and communities.
- Full capacity of community not exploited both because the potential of low-income communities was underestimated and due to inadequate training of service users
- Lack of resources for O&M (money, data, skills, technology, safety equipment, trained personnel)

These kinds of constraints are not only specific to developing country contexts. Internationally urban service delivery is hampered by a lack of public sector resources, poor management, inefficiency, and unaccountability, leading to inadequate services. Attempts to ensure quality outcomes of service delivery in developed countries have resulted in an emphasis on 'doing more with less' through performance targets and benchmarks, increased private participation in service delivery, as well as the involvement of users in order to improve service delivery.

Willingness to Pay for Services

Some O&M activities are financed by users making direct payments to obtain specific

services—for example, in the Cuttack case study there are instances of residents paying for operational services such as latrine cleaning. However, the norm is that communities prioritise the upkeep of water supplies over sanitation. Households are not typically willing to pay for sanitation services. This in turn reflects local concepts of sanitation, hygiene and disease, and how these affect health. In the Karachi case, the Orangi Pilot Project social organisers spent time in hygiene promotion with households as part of the mobilisation process prior to the commencement of the project.

Community institutions

Success was found where CBOs (Community-based Organisations) involved in service provision have clearly defined responsibilities, formulated in conjunction with municipalities. This ensured that CBOs were not in competition with official service providers, but complement the providers' roles and responsibilities. In Faisalabad, where the Water and Sewerage authority (WASA) had abdicated some of its responsibilities to local NGOs, and where those NGOs installed infrastructure in co-ordination with the municipality, sought its technical know-how and used good quality materials, it was found that these NGOs were more sustainable than NGOs that operated independently.

CBOs with a formal legal and permanent status and a permanent source of finance were shown to be more capable of negotiating with municipalities and more sustainable and accountable in their operation. These institutions are further advantaged if they have strong leadership and support from the community. In the Sri Lanka case, the use of Community Development Committees and the Community Action Planning process meant that roles and responsibilities were clearly defined. In this case, municipalities were responsible for

main pipelines and other major works whereas communities were responsible for minor repairs on an ad hoc basis. Similarly, under the Cuttack Urban Service Improvement Project the responsibilities of the municipality for the O&M of infrastructure created under the project were clearly defined, as was the requirement that it make provision for a specific budget line for O&M from the outset. In both these cases, attention was paid to women's participation in CBOs and O&M activities.

The Orangi Pilot Project model does not fund service delivery; rather it provides social and technical guidance whilst households manage and finance their own sanitation.

Key points in this respect are as follows:

- Those setting up urban services (municipalities, planners, NGOs and so on) should involve communities at the planning stage and should define roles and responsibilities, so that these institutions complement each other rather than compete;
- Municipalities or alternative service providers should develop guidelines for the execution of these tasks in conjunction with local communities;
- Municipalities must be accountable and responsive to communities' demands/ problems, particularly those of low-income communities. There should be a dialogue taking place between the municipality and users; and
- Community institutions may lobby to de-link land tenure and the provision of services, so that those squatting on municipal land can also receive urban services from municipalities.

Commitment

Above all, there is a need for genuine commitment at the municipal, community and household level for improved upkeep of services. This commitment is typically demonstrated through local consultation and dialogue between planners and community representatives. There is then a trade off between what the community wants and what the construction body is prepared to supply. Commitment on the part of households and the community depends on people's awareness of the health, social and economic benefits of improved urban services, their willingness to contribute to the development and maintenance of water and sanitation facilities, and the opportunity costs of doing so. The need for a particular level of service may be encouraged, then, through mobilisation, health promotion, literacy programmes and micro-enterprise, as for example in the Orangi Project. Above all, the case studies showed that residents were happier to pay for services if they felt that they had a direct say in decisions regarding those services. The implication is that residents should be treated equally by service providers.

The commitment of municipalities to upgrading low-income areas was shown to be patchy in the case study locations. The case studies reflected the view among those who were interviewed that municipal services typically reach those people of greatest influence rather than those of greatest need. Unfortunately, areas that should be of high priority in terms of service provision are those with least political significance. The case study in Karachi revealed that householders take common action only in cases of emergency—i.e. crisis management rather than routine maintenance; when, for example, a drain or manhole overflows a private contractors may be hired.

It was found that if communities don't have a strong sense of ownership then—in addition

to deterioration of the infrastructure due to age/ inadequate maintenance—vandalism of services might also be a problem. Vandals can be curtailed by public opinion; so the time, effort and expense incurred in gaining support is worth the investment.

Commitment to the proposed projects can be ascertained once the following are taken into account, these are summarised in Figure 3.

Supportive environment

There is a role for partnership in service delivery; this requires a desire by NGOs/ CBOs and the municipality concerned to work with communities. Partnerships can be reinforced by demonstration of successful projects. The attitude of the community is vital in accepting the ownership for services, and hence for the operation and maintenance of the services received. The Faisalabad case study revealed that more attention should be given to adjusting community behaviour to prevent blockages in sewers; however, municipal officers typically lack the resources to engage in public awareness and education activities. In Cuttack, it was found that the general effectiveness of O&M depended on how matters were managed by the ward councillor and his oversight of municipal workers. Yet it is also vital that municipal workers are aware of the mechanics of how services work. For example, in Sri Lanka municipal workers operating the gully emptier didn't know the purpose of the filter bed of stones in community septic tanks, and so had removed them.

These partnerships can be created at the planning stage when there may be a need for the following exercises.

- Participatory information gathering (public meetings, formal surveys, consultative committees, PRA etc.) to find out users' perceptions on the following: first, if any O&M activities are already carried out in the settlements (contributions for street cleaners, community buildings, collecting money for maintenance of existing facilities etc.); second, is there a misuse and lack of care for existing facilities/ illegal connections; third, how do communities perceive the municipality; and finally, whose responsibility is the current state of facilities?
- Demand Assessments. These may be required to assess: the willingness and ability of users to pay for services; what services are on offer; the recurrent costs and the labour requirements; and the O&M tasks that would make infrastructure viable in terms of long-term service delivery.
- An assessment of whether or not demand exists, can it be generated through community mobilisation, or is it unexpressed? Also, is there potential for promoting increased ownership and care of facilities/ methods for empowering communities?

Expertise

The technical skills required to carry out the necessary operation and maintenance tasks may be present within the community—i.e. through the small-scale private sector; self-employed plumbers/ mechanics, for example—or wherever skill gaps exist they can be developed by municipalities or NGOs. In Sri Lanka this was done through the selection of volunteer trainees, who were then trained in technical drawing and received guidance in local languages. This created: local capability to carry out simple repairs and scheduled, preventative maintenance; the financial skills required to manage funds; the organisational

skills to mobilise the community and manage conflict; participatory methodologies for planning and evaluation; and the skills necessary to deal with politicians and local government.

The O&M activities performed by communities included replacement of taps, reporting leaks, cleaning toilets, pit emptying, sweeping drains, minor patching of roads/ paving, reporting defective lights and depositing household waste in bins, as well as management of community buildings. The expertise and support that was offered through the Orangi Pilot Project in Pakistan provided a backstop for the communities installing sewerage systems. However, it is said that in time residents become less dependent on the NGO for advice and technical guidance, having acquired the necessary skills and expertise themselves. Under the Cuttack Urban Service Improvement Project, residents have received some training to undertake minor repair works, yet there is relatively little evidence of commonly managed O&M of services.

Level of service

Technology must be appropriate to the socio-economic and technical context, so as to enable ease of maintenance with the available skills, use of locally available spares etc. Communication with communities is important so that they understand the implications of alternative service options. For example, in the Sri Lanka case residents preferred the installation of household rather than communal latrines. Similarly, in the Karachi case communities were presented with options for different levels of service delivery by the Orangi Pilot Project (OPP), which could be selected according to affordability. In the

Cuttack Urban Services Improvement Project, the community was initially resistant to raise funds for activities that didn't result in new infrastructure; however, ownership was promoted by donors and NGOs through community participation in the design of services. Communities could chose higher standards of service than those costed in the project budget if they met the additional expense themselves. The maintenance implications of each option were explained to the communities and set out in Community Action Planning in the form of Memoranda of Understanding.

The level of service delivered to low-income communities is typically a result of the following factors:

- Existing institutional and regulatory frameworks/ design standards and norms;
- The construction quality standards selected and ensuing O&M burdens;
- The community's willingness and ability to pay for services;
- Research and consultation with the communities themselves and NGOs to provide workable norms and standards; and
- Municipal attitudes, customs and standards.

Resources

The necessary resources should be available in order to carry out repair work, operation and maintenance of the service concerned. 'Resources' refers not only to money but also to materials and equipment. For example, the Orangi Project had a stock of tools available for use. It was anticipated in the Cuttack Urban Service Improvement Project that communities would make a small contribution in cash or kind to the O&M costs of the slum infrastructure. The purpose of this was to generate some sense of ownership towards

the services delivered. In the Sri Lanka case, CBOs raised money for repairs of services only when specific repairs were needed; a regular O&M fund couldn't be collected because of the level of community trust. However, in Karachi, communities cover about 80 per cent of the costs of sanitation. That is, the Orangi Pilot Project promotes the principle that communities use their own finances to construct and maintain facilities, while the OPP reduces costs by simplifying the design of sanitation. The services in this case were delivered on a 'lane' basis (see below) and so collection of funds for maintenance was facilitated by the high degree of social cohesion and pressure for all community members to make payments.

Where services are delivered by municipalities, billing systems are characterised by weak management and record keeping and there is little incentive for users to pay their bills; this means reduced resources available to the municipality for O&M. In Faisalabad, the municipal sewer men tend to have the expertise to conduct O&M, but usually lack the resources to perform their work well. This case study revealed some kind of corruption and misuse of funds within municipal agencies. Furthermore, expenditure on O&M was typically difficult to determine because municipal accounts don't normally distinguish between capital costs and operation and maintenance.

Community management of urban services has generated local employment opportunities for communities. Under the Cuttack Urban Services Improvement Project, community members renovated the water supply under a community contract and in Sri Lanka, community funds were raised for operation and maintenance through renting out the community centre. Nonetheless, the perception remained within communities that it is

government's responsibility to bear maintenance costs.

Support services

An effective support service is needed so as to ensure the regular availability of funds, equipment, spare parts and staff to carry out O&M. There should be responsibilities assigned for community-based maintenance—for example, the monitoring and supervision of operation and maintenance tasks, as well as a preventative maintenance programme developed in conjunction with community caretakers. Where operation and maintenance is performed by municipalities, preventative maintenance should be complemented by a customer service department that takes prompt action on complaints, as well as improved billing systems and penalties for non-payment. Local politicians may hinder the process of community involvement in the operation and maintenance of services; for example, they may reinforce the community perceptions about municipal responsibility and make promises with regard to urban services in order to secure election.

The following actions/ changes are necessary in this regard:

- A change in community priorities regarding O&M;
- The development of institutions for financial support; these must be tailor-made to low-income groups for infrastructure development;
- The promotion of technical support to communities for carrying out O&M i.e. municipal staff must be available in an extension role, or NGOs must be facilitated so that they are able to carry out this task;
- Better municipal maintenance is important since it will increase the life span of infrastructure and reduce the O&M burden on communities;

- Targets need to be set for municipal staff performance, with on-going training being provided to all stakeholders; and
- Rules need to be set for infrastructure O&M including formal agreements of responsibilities being made for all stakeholders.

Difficult questions remain

Internationally it seems services users are being encouraged to become involved with the infrastructure in their neighborhood in order to ensure facilities are kept in good condition. In less developed countries like Sri Lanka, Pakistan and India services users in low-income communities have more of a hands-on role in maintaining their infrastructure. Whereas in developed countries users are expected to express concerns to public officials, attend meetings held about infrastructure problems, become involved in advocacy groups, demand continuous and timely maintenance, become involved in infrastructure decisions, planning and long term investment. The USA and Australia, in particular, have made use of report cards as a mechanism to gather and disseminate information on services like drinking water, wastewater, solid waste, and energy.

This section moves on, in more general terms, to suggest how these research findings from developing countries can be used as a tool to improve service delivery for those experimenting with community involvement in service delivery in both the developed and developing countries. As a result of critically engaging with the way community based O&M mechanisms work in practice a number of key questions have been

identified which have relevance for any engineers or NGOs working with communities to improve the operation and maintenance of urban services. The questions for consideration are:

- Is scaling up community-based approaches realistic?
- Responding to crises?
- Who cares?
- Where will the capacity come from?
- The key: change management in utilities and municipalities?

O&M: Is scaling up community-based approaches realistic?

As discussed above, the case studies reveal numerous examples of good practice where community groups are maintaining the services in their neighbourhoods. However, care should be taken to distinguish between instances of good practice that are:

- Basically done by households; for example, users are making small repairs. The authors expect no problems with failure of O&M at household level, where there is a strong incentive to rectify faults to individual service connections or on-plot facilities; and
- Cases of shared or communal services being operated and maintained collectively; this aspect of service maintenance is more problematic. Despite the evidence of cases of good practice, many initiatives are basically still 'isolated'; they are islands of good practice in a sea of neglect of urban services. The authors found no evidence of a community-based approach for O&M being mainstreamed and rolled out across a city.

This in turn leads to a further two questions:

- What is the potential—realistically—of scaling up the community-based approach to O&M of urban services; or is community-based O&M a model that works well only on

a local, ad hoc basis?

- Do community-based approaches offer a serious way ahead in the long term?

O&M: responding to crises?

The authors found substantial evidence of maintenance activities being carried out in response to situations that have reached the point of being a crisis or emergency; something has to be done, so community groups do it. However, it must be remembered that maintenance is not only about crisis management; planned periodic maintenance programmes are essential if assets are to last. This aspect of O&M is missing from community perspectives.

On the other hand, an interesting finding is that some community halls are well kept and maintained. It would appear that more 'obvious' things are the first to be cared for; for example, the community hall has a direct financial link to the community as it is hired out in order to generate funds. The perceived importance of this is higher than for (say) cleaning drains or repairing access roads.

O&M: Who cares?

The underlying principle that has emerged from this research is that procurement and construction of urban services is a priority for municipalities, NGOs and communities, while O&M of those services is not. Whilst this is not a new finding, it also means nothing has changed. Despite the on-going and widespread nature of problems with O&M, it still seems that there has been relatively little progress in this area.

Perceptions of O&M responsibilities are important. The authors found that a lot of NGO effort has gone into the development of community participation in relation to the construction of new works; however, very little participation relates to O&M. This may be a result of an 'awareness gap'. If community groups are not aware of the need for O&M of services, the demand for O&M is not articulated and so many NGOs will simply not respond. Alternatively, communities are aware of the need for effective operation and maintenance but are not prepared to take responsibility for it, instead looking to municipalities.

Behaviour change, on the part of both of users and providers of basic services, is likely to be a key long-term factor if there are to be significant improvements to O&M. Such behaviour change could be a key focus for NGOs, one that would involve promoting attitude change among municipal workers and planners as well as low-income communities, promoting better use of facilities, and creating civic pressure on municipalities to perform better.

O&M: Where will the capacity come from?

Community-based approaches have worked in a coherent fashion when support has been available. This raises issues of cost and capacity, as outlined below:

- What are the costs of supporting a community-based approach? There are the support costs of NGO staff, and the financial costs of household and community financial contributions. However, the latter costs in particular can be offset against the benefits of having usable infrastructure over an extended life cycle.
- It is difficult to establish how much effort has been put into those community-based

schemes that do work.

- What level of support is needed to scale up successful community-based schemes; how realistic is it to replicate this level of effort? Are these resources for support realistic, and where can they be found?

O&M The key: change management in utilities and municipalities?

Traditional centralised systems for O&M, which are the responsibility of municipalities and utilities, are not delivering. However, the case studies have shown that alternatives exist, such as community-based approaches to service delivery, even though the evidence of the success of such schemes is rather patchy. A key finding of the research is that there is a lack of planned maintenance, there is no evidence pointing to strategic approaches; nor have the city institutions taken the necessary lead. The very limited cases of interaction between community groups and a utility over O&M reaped substantial benefits for low-income communities. Examples here include the Orangi Pilot Project model in Karachi and Faisalabad, as well as partnerships with the municipality in Colombo, Sri Lanka.

So the question remains, can there be anything other than local, ad hoc responsive activities without serious municipal reform taking place? In this regard, the following points must be addressed:

- Why should these city institutions bother with new approaches? A major problem is lack of incentives on the part of the utilities/ municipalities.
- The interface between local neighbourhood and city systems remains undefined; the link between communities and local government is not in place, which is key to the governance relationship; so neither is there any effective system of O&M.

- How realistic is it to link these local initiatives to the utility/ municipality on a wider scale? And finally
- Municipal/ utility reform needs to tackle the way these institutions work; this may be a prerequisite for any significant change. Otherwise projects are attempting to improve around the edges only, with communities doing bits and pieces here and there.

Conclusions

The following are some of the key recommendations for developing sustainable operation and maintenance of urban services.

1. Partnerships; Developing a partnerships between communities and service providers to co-manage the O&M of urban services depends on a number of factors including the community awareness of O&M issues, extent of user care for facilities, local capacity for action, presence of intermediaries between service providers and users such as local action groups or local elected political representatives, the commitment and responsiveness of service providers, mechanisms for reporting problems and participatory information gathering (such as user satisfaction surveys) amongst other aspects.
2. Roles and responsibilities. Stakeholders' roles and responsibilities in performing and financing key tasks in the operation and maintenance need to be clarified: There might be a need to formalise these activities in the form of a Memorandum of Understanding. Attention should also be paid to how households/ community leaders/ NGOs/ politicians will become aware of their role.
3. O&M Plans. Develop a community or municipal management plan which sets out

O&M procedures, rather than O&M being a simple reaction to breakdowns in systems or complaints because of lack of staff, skills, funds etc.

4. Attitudes to O&M. O&M should be viewed as critical to the sustainability of systems as well as an integral part of the planning process for the medium- and long-term. Thus staff/ communities should be trained, regular maintenance scheduled in plans, co-ordination among sectors, user education and sufficient resources allocated in budgets or collected through revenue. Staff must be provided with incentives to perform O&M and trained in the latest knowledge, skills, attitudes and documentation of systems.
5. Setting out effective monitoring and evaluation systems. A reporting/ information system should be set up for expenditure, use of resources, monitoring of staff and technical and progress reports. Performance can be evaluated (either by civil society groups or by service providers themselves) in terms of user opinions, and the use of personnel, resources and finances to meet the required level of service, establish performance targets; and to assess what functions are missing in O&M. Key information for such tasks includes database of plans, completed works, technical reports and the age and functioning of systems, book-keeping systems, work logbooks, stock registers and contract files.
6. Improved Governance; Community linkages can strengthened by increasing the opportunities for citizens to access service providers and local government. This can be done through consultations, user surveys, frequent joint meetings to involve the community in planning O&M and monitoring; such feedback would ensure that services are meeting their objectives and that governance is improved within the city.

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APPENDIX 1: TABLE OF ACRONYMS

CBO	***COMMUNITY BASED ORGANISATION***
CDA	***CUTTACK DEVELOPMENT AUTHORITY***
CDC	***COMMUNITY DEVELOPMENT COUNCIL***
CUSIP	***CUTTACK URBAN SERVICES IMPROVEMENT PROJECT***
OPP	***ORANGI PILOT PROJECT***

List of tables and figures

Figure 1; The Process of Setting the Research Methodology

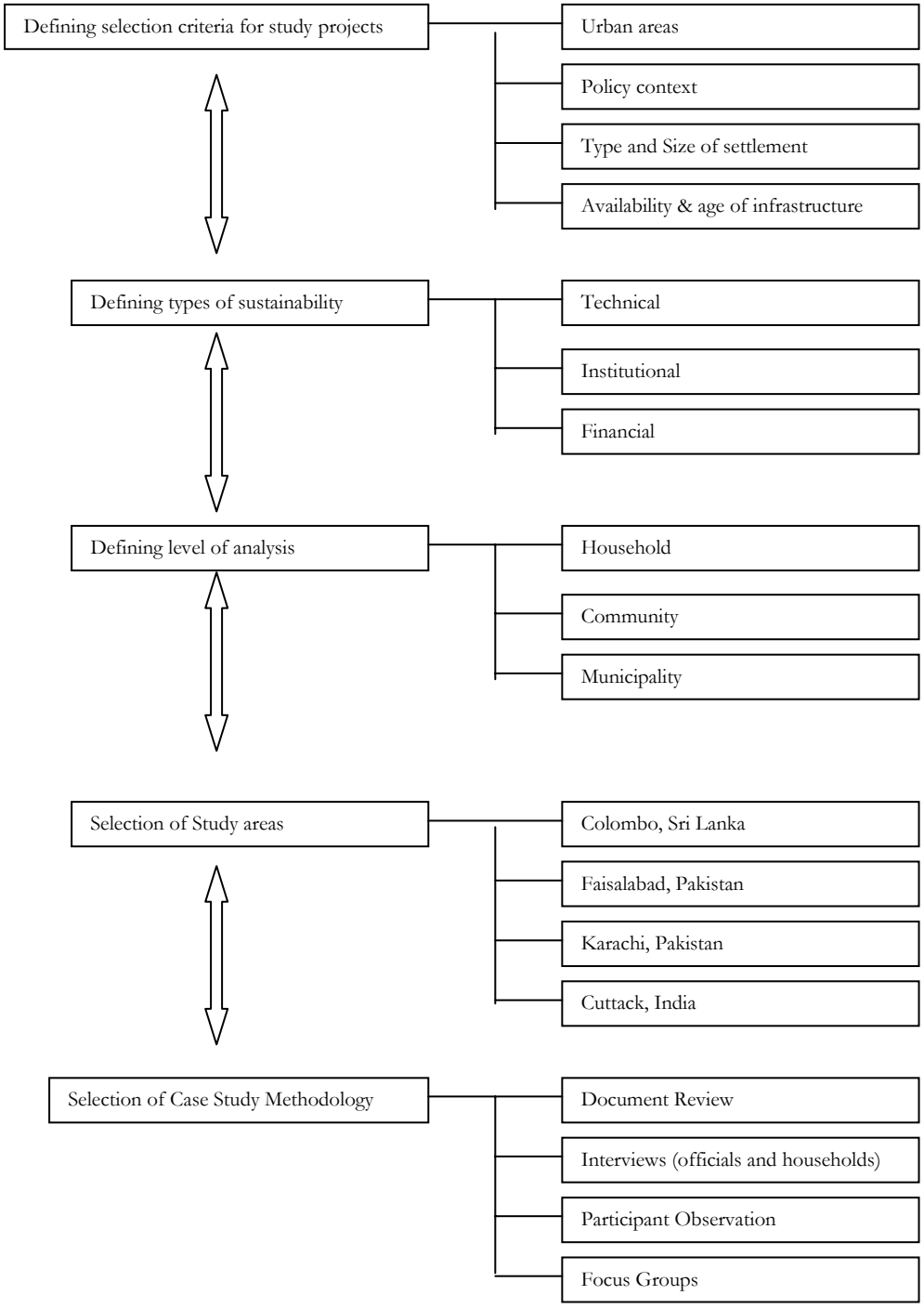
Defining selection criteria for study projects
Urban areas
Policy context
Type and Size of settlement
Availability & age of infrastructure
Defining types of sustainability
Technical
Institutional
Financial
Defining level of analysis
Household
Community
Municipality
Selection of Study areas
Colombo, Sri Lanka
Faisalabad, Pakistan
Karachi, Pakistan
Cuttack, India
Selection of Case Study Methodology
Document Review
Interviews (officials and households)
Participant Observation
Focus Groups

Figure 2: Constraints to community partnering

Cuttack	• Lack of guidelines for community partnering • Passive community involvement in management • Shortage of sufficient funds for finance • Inadequate training of the community for management • Overlaps in responsibility between the stakeholders involved • Many actors involved • Lack of skills and capacity • Funding O&M is a problem • Community not aware of its role in community management

Karachi	• Centralised management • Problems with land ownership • Inadequate water supplies • Community has little trust in utility • Communities are not trained for management • Breakdowns of services are frequent • Unsustainable environment for O&M • Lack of clear strategy • Inadequate health education • Poor management • Lack of trained municipal staff • Insufficient funds for recurrent expenditure

Faisalabad	• People used to policy of government intervening in all O&M • Inappropriate technology • High technology with high O&M costs • Shortage of funds for O&M • Inadequate priority setting by WASA (Water and Sewerage Authority) & government • Centralised management • Poor data for O&M • Lack of official involvement of communities • Lack of trained personnel • Breakdowns common • O&M budget not responsive to needs • Policies do not continue for a reasonable period • Poor monitoring system • Complicated billing system • Lack of safety equipments for sanitary workers • Shortage of staff • Negative behaviour of users/ users reluctant to pay for services/ illegal service connections • Low quality material used for construction • Lack of ownership at all levels

Colombo	• Policy and /or changes in priority regarding low-income settlements • Community participation declined • Investments in poor communities are not viewed in wider perspective of development • Overlaps in responsibility • Lack of co-ordination • Political interference • Communities responsible for minor repairs and government takes main repairs • Training aspects declined • Lack of capacity and legal framework for provision and O&M to low-income settlements due to resource constraints • Legal limitations in promoting community contracts • No proper system for developing public, private and community partnerships in O&M of services • Full capacity of CDCs are not exploited • Inadequate regulatory mechanism for promotion of community-based O&M • Insecure land tenure

Figure 3: Commitments for O&M

Community	Satisfaction with existing services. Is there a perceived need?	Ownership issues are resolved	Roles for O&M are clearly defined	Interaction with committees/ NGOs/ authorities	Problems/ complaints -- systems for dealing with them
Labour	Labour contributions to system; willing and able?	Hiring labour to O&M system -- willingness to hire people	Expense to household (payments/ days off work)	Conflict resolution	Increases in workload
Costs	Payment of water bills -- registering connection and paying user charges	Costs to household of installing community infrastructur e	Costs to household of paying for individual connections/ toilets	Previous costs of water from vendors/ communal toilets -- indicates a willingness to pay when these costs are annualised	Operating and Maintenance costs - payments to skilled people - spare parts
Level of Service	Functioning/ adequacy of existing facilities, benefits of existing supply -- discontinuous service	Desirability of shared facilities (cleanliness) / the need for privacy	Access to existing facilities	Piped water/ water quality and individual latrines	Affordability (willingness to pay and ability)
Repairs	Lack of spare parts means that the system doesn't work	Travel / inconvenien ce incurred when buying spares	Training of community members to make repairs	Community activities to reduce the amount of time system is out of action	Dealing with municipality and following up the complaint
Institutions	Setting up a community development council	Identifying a maintenance team	Community-based training	Training at the municipality level/ providing enough staff	Monitoring and evaluating O&M performance (average time to repair, leakage repairs and illegal connections)

Table 1: Roles and responsibilities for operation and maintenance

Management	Responsibilities	Constraints
Local government institution	▪ Main lines with piped water ▪ Trunk sewerage	▪ Lack of long-term planning ▪ Little capacity for O&M ▪ Consumers don't pay bills ▪ Illegal connections ▪ Rent-seeking politicians
Community-managed	▪ Stand posts ▪ Lane lines of sewerage ▪ Communal latrines ▪ Taps at communal latrines ▪ Manholes ▪ Storm water drains	▪ Collection of funds for O&M ▪ Hiring local people with necessary skills/ or to remove solid waste ▪ Need for specialist skills ▪ Willing/ able to manage the system; systems for reporting/ repair of serious faults? ▪ Community spirit / creation of institutions to manage services ▪ Separation of responsibilities means added risk if municipality doesn't fulfil its obligations ▪ Clear definition of roles -- no grey areas
Individually managed	▪ Own latrines ▪ Emptying individual septic tanks ▪ Individual water lines ▪ Individual water connections ▪ Common bathing areas ▪ Water bills	▪ Can the household carry out the O&M themselves? ▪ Can they finance the spare parts/ hiring of skilled people? ▪ Impact of bad management practices on community i.e. removal of septic tank waste onto street ▪ Incentives to pay for water/ sewerage and not to make illegal connections