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REACHING THE UNREACHED: CHALLENGES FOR THE 21ST CENTURY

Non-governmental refuse collection systems

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ALTHOUGH URBAN ADMINISTRATIONS in low and middle-income countries increasingly acknowledge the importance of adequate refuse collection and disposal, it is mostly beyond their resources to handle the growing amount of solid waste generated by the rapidly expanding cities. Inadequate waste collection coverage is thereby one of the most important problem areas (Schertenleib and Meyer, 1992). Many administrations still fail to provide this basic public service to a large section of the population, leaving often more than 50 per cent of the households underserved. As a result, refuse is indiscriminately dumped on roads, into open drains, rivers and surrounding areas. This practice poses a serious health risk to the population and leads to a general degradation of the living environment for millions of people. The problem is most acute in low-income peri-urban areas where access with collection trucks is difficult and / or the population cannot afford the conventional door-to-door service. This situation, however, impairs in the long run not only the quality of life of the poorer communities, but is likely to affect the welfare of the entire urban population, with negative impacts on the national economies.

Alternative approach

One approach to improve this situation is for the population of unreached areas to assume the responsibilities of the municipality with regard to handling of its waste, and to set up a collection system appropriate to its economic standing. This can take different forms; i.e., the community either pays private collectors from within or outside the neighbourhood to bring the waste to communal collection points or the households will have to carry out part of the work. Such types of non-governmental primary refuse collection schemes have been initiated and operated over the past few years in different cities of Asia, Africa and Latin America. Owing to the limited amount of literature on the experience gained so far, and due to the great number of people and institutions looking for alternatives to improve solid waste collection, SANDEC (formerly IRCWD) decided to review a number of selected cases and assess the potentials and limitations of such non-governmental approaches based on practical experience. The reviewed approaches thereby range from more community-based schemes in China, Indonesia and some parts of Africa, to schemes in Peru and Colombia which are operated and managed by small private enterprises. This paper summarises some technical, organisational and financial aspects, and the conclusions which can be drawn from the review of 18 operating systems (Pfammatter and Schertenleib, 1996).

Operational options

The main options for primary collection and communal storage facilities observed in the selected cases are presented in Figure 1: communal storage or "bring-system" (I); tricycles as "mobile" collection points (Ia); door-to-door collection with manually operated hand or donkey carts (II); and house-to-house collection with trucks (III). The "bring-system" is certainly the cheapest alternative in terms of cash requirements and is therefore an option to be seriously considered. However, it requires considerable contributions from the households and thus an increased awareness of the population. The truck-system, on the other hand, appears to be the most efficient but can only be applied where access roads are adequate.

The most widespread and most promising option among the reviewed cases is the door-to-door or kerbside collection with hand or donkey carts (II). In serving households door-to-door, this system is likely to prevent people from throwing the garbage elsewhere. Use of handcarts has also proven most suitable for conditions generally prevailing in low-income areas, such as narrow streets, low generation rates and low wages. Manually operated carts are cheap in manufacture and operation, quite simple in

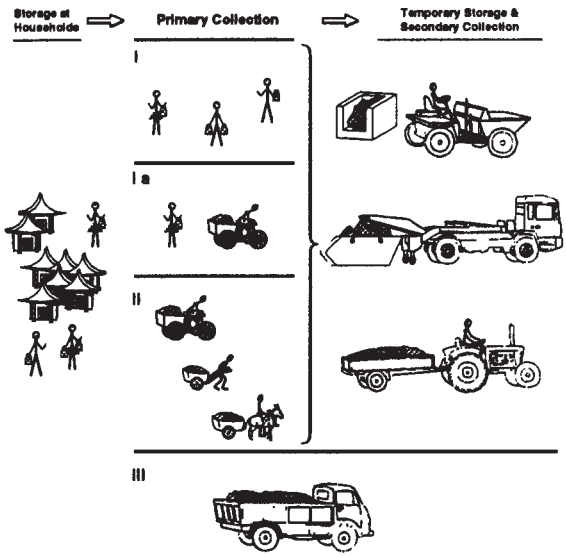

Figure 1. Options for primary collection

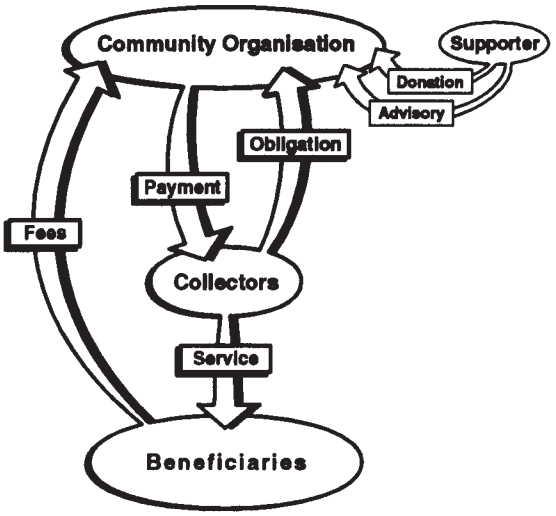

Figure 2. "Community-based" model

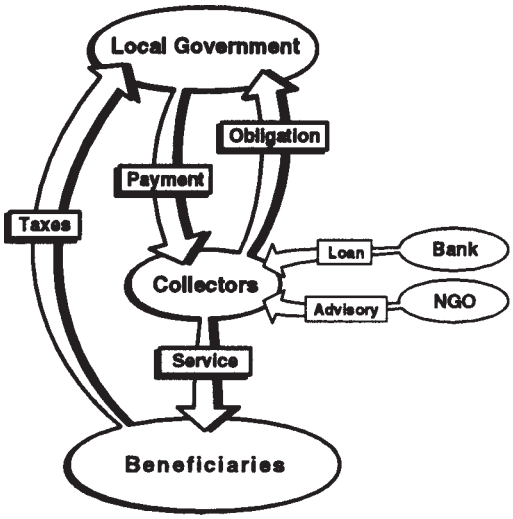

Figure 3. "Micro-enterprise" model

design, and can be produced and maintained locally - which are all important prerequisites for a sustainable technology. With regard to the cart design, attention should be paid to easy handling. The review suggests that the volume should not exceed 1.5m^3 and that the carts must be operated in a team of two. The frequently observed dumping of the waste on the ground for transfer to a container or larger transport vehicle should be avoided as it is messy, tiring, and exposes the operators unnecessarily to health risks. Where households may be convinced to use plastic bags for storage, the problem is less significant. Another cheap solution to overcome the handling problem is to place containers (bins, large bags) in the carts which can then be lifted out for transfer and / or unloading. According to the review, about one collector hour is necessary to serve around 200 inhabitants with handcarts. However, coverage of participating households is often low which hinders such high efficiencies. Besides being dependent upon the topography of the area, analysed data indicate that collector's productivity is also influenced by the income of the collectors (Hawkins, 1995). The income is often too low to offer an incentive to do a good and reliable job. As a result, many of the collectors perceive their job as a temporary source of (additional) income, and most of them would change it immediately if given another opportunity.

Technical interfaces

Primary and secondary collection are interdependent systems (as shown in Figure 1) and evidently do not function properly one without the other. The studied cases indicate, however, that the interfaces between (community-level) primary collection and (municipal) secondary collection are very critical elements in most schemes. The waste is often not regularly picked up at the collection or transfer sites by the secondary collection system. The resulting waste accumulation and mess at the collection points thereby discourage residents and collectors from using the primary collection system. Although such interface problems may occur irrespective of the chosen collection method or transfer facility, the use of passing trucks as transfer points is likely to be the least appropriate option. Truck delays force the collectors to waste their time in waiting for the truck or make them dump the collected refuse elsewhere. In any case, cooperation between the involved actors as regards timing of container collection or emptying of storage facilities is a pre-condition for successful interfaces. Another widespread source of problems are the activities of waste pickers looking for inorganic recyclable material at collection points. Although these recycling activities have undoubtedly important advantages since valuable resources are recovered, waste quantities to be transported and disposed of are reduced, and income for the poorest is generated, a potential conflict exists with an efficient and safe collection and transfer process.

Organisational models

Different institutional arrangements with inherent advantages and disadvantages have been identified. Despite the great variety observed, two main models can be distinguished: a more "community-based" and a "micro-enterprise" model.

The first model includes systems operated and managed at community-level by community groups or individuals as applied quite successfully in Indonesia for several years. There are varying arrangements according to the level of community involvement (Meyer and Schertenleib, 1992), however, most schemes may be described by the organisational chart given in Figure 2. The collectors are paid by the community organisation which recovers the service costs via a fee collection system (alternatively, fees are recovered by the collectors themselves). Financial and managerial support is often pro-

vided by formal and informal community leaders who mainly work on a voluntary basis. The responsible municipality is active only as initiator of such a scheme or as supporter in terms of providing access to handcarts or loans. This model is thus not entirely reliant on a cooperating municipality and might prove advantageous where authorities are unable or unwilling to cooperate.

The second model refers to a specific "micro-enterprise" approach which finds increasing application in Latin American cities (Giesecke et al., 1993). As shown in Figure 3, the service is contracted out by the local government to a small private enterprise and is based on a written agreement which defines the tasks and duties of both actors. While the investment capital is covered by loans, operating costs are recovered through municipal taxes. Technical and financial assistance is provided by financial institutions and consulted NGOs. As the contract with the municipality is the key element of this approach, successful implementation is dependent on the good cooperation between the small private enterprise and the local authority. However, once successfully established, this institutional link appears to facilitate dialogue between the actors and may have a positive impact on technical interfaces.

Although both models are operating, the review indicates that the business management approach of the "micro-enterprise" model is likely to be advantageous with regard to providing an efficient and reliable service. The "community-based" models, which are operated without a commercial approach and dependent on voluntary management or external assistance, have failed or are bound to fail. However, the models can be combined and micro-enterprises may also be contracted in a similar way by strong community organisations.

Service costs

Figure 4 presents the service costs per served inhabitant as identified for the studied schemes operated with handcarts. They range between US$ 0.03 and 0.14 per capita and month (max. US$ 0.70 per household). As a rule of thumb, about US$ 100 are necessary to cover the monthly operating costs of a manually operated house-to-house collection service for 1,000 inhabitants (US$ 0.10 per capita and month) - a sum which seems affordable. The figures are, however, only rough approximations since the cost structures of the studied schemes are not transparent enough. Many of the schemes have received capital and/or equipment in the form of grants from donors and municipal sources, "expenditures" which are not accounted for.

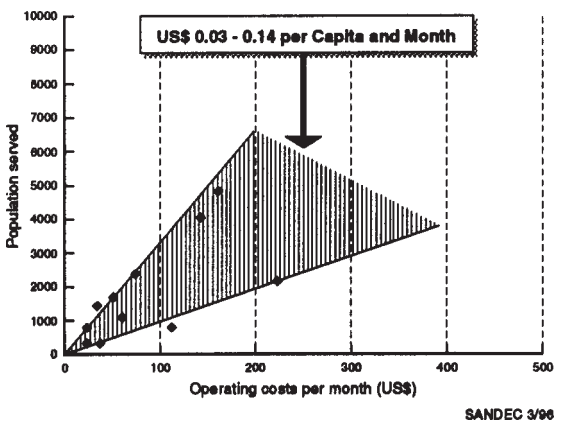

Figure 4. Served inhabitants vs. operating costs

The fact that solid waste certainly does not receive highest priority within a low-income household should also be borne in mind. Particularly where the population is not aware of the problems related to inappropriate solid waste handling, households are rather reluctant to use their limited financial resources for solid waste services. Survey results from Indonesia suggest that in typical low-income areas about 60 per cent of the income is expended for food, 20 per cent for housing and education, 15 per cent for transportation, clothing and electricity (Dian Desa, 1993). The remaining 5 per cent have to be shared between water, hygiene, etc., and solid waste services. Assuming that an average household income is US$ 150, and that 1 per cent can be spent for SWM, the theoretical ability to pay is around US$ 1.5 per household and month. Although this is an estimate, it clearly indicates that low-cost solutions are a pre-condition for successful approaches.

Conclusions and recommendations

This review of selected schemes revealed that non-governmental primary refuse collection is basically a suitable approach to increase service coverage in low-income urban areas. Small private enterprises and community organisations have a great potential in easing the responsible public authorities of part of their burden. However, most schemes are far from being self-sustainable and face problems which can and do lead to a break down of operation. The following are the most important conclusions which can be drawn from the reviewed schemes:

Collaboration between public authorities and non-governmental actors

A common denominator of most schemes is the absence of a municipal framework which adequately integrates community groups and the private sector in SWM services. Lack of cooperation between the actors, however, results in operational difficulties, particularly at the interface between non-governmental primary collection and the required municipal secondary collection. Promising initiatives of motivated community organisations, NGOs and individuals are bound to fail if activities are not supported by and coordinated with public authorities. Establishment of a service-oriented partnership between the key actors involved in such systems is urgently needed.

Information of the users and their involvement in decision-making

Primary refuse collection, particularly alternative approaches, require considerable participation of the households. Besides involving the future users in decision-making; i.e., in the choice of a system, peoples' capacity and willingness to contribute in cash or kind are thus important factors to be considered. However, willingness to contribute is strongly dependent on the felt need of the population for solid waste collection and disposal, which often appears to be low. Enhancing awareness with regard to problems related to inappropriate solid waste handling, and providing information on possible improvements are consequently crucial elements.

Assessment and transparent recovery of incurred costs

Lack of cost assessment and insufficient cost recovery are the major causes which lead to a dependency on external financial assistance. Although donations and voluntary management can be a valuable contribution, particularly during the initial phase, operation and maintenance are likely to cease as soon as support is withdrawn. While required investment capital may be covered through donations or loans, calculated operating costs should be fully recovered from the beneficiaries via a simple fee collection system. A more commercial approach in managing non-governmental schemes could lead to the required accountability and improved motivation of its actors.

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