

Integrating the Informal Sector in Solid Waste Management Systems

Basic Aspects and Experiences

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Abbreviations

ASMARE	Name of a Brazilian waste pickers' association based in Belo Horizonte, Minas Gerais State
CBS	General Services and Transport Corporation
CYMA	Program Competitividad y Medio Ambiente
FS	Formal Sector
ILO	International Labor Office
IS	Informal Sector
IT	Information Technology
IWB	Itinerant Waste Buyer
MEZ	Mactan Economic Zone
MDG	Millennium Development Goals
MNCR	Movimento Nacional de Catadores de Recicláveis
NGO	Non-Governmental Organization
OSCIP	Organization of the Civil Society for the Public Interest
PEZA	Philippine Economic Zone Authority
PRESOL	Plan de Residuos Sólidos de Costa Rica
KKPKP	Kagad Kach Patra Kashtakari Panchayat, name of an association of self-employed waste pickers and itinerant waste buyers based in Pune, Maharashtra State, India
SWaCH	Solid Waste Collection and Handling Cooperative
SWM	Solid Waste Management
TV	Television
UNICEF	United Nations Children's Fund

0. SUMMARY

The daily produced quantities of waste are permanently increasing in urban areas of developing and transition countries. But the formal sector (FS) cannot provide sufficient collection and recycling services. Developing and implementing strategies for improving urban solid waste management systems are required. These strategies have to be based on concepts of integrated SWM systems which consider the services of the formal and the informal sector (IS).

The study presents - with help of empirical data and case studies - the situation of the IS in urban SWM. The IS provides employment to a large number of women, men and children who work as paid labourers, self-employed persons or owners of micro-enterprises and small enterprises. They carry out activities from collection and transportation of waste, up to activities which are directly related to recycling, distribution of recyclables and recycled raw materials and the use of recycled raw materials for manufacturing of new products. Corresponding to his income the average IS worker does not belong to the poorest part of the population. But income generation opportunities in the IS depend on various factors as access to capital and know-how which is required for the specific activity, negotiations skills, access to information, social norms and perceptions. Hence the generated incomes are very heterogeneous and badly equipped, (self-employed) women waste pickers may well be part of the urban poor. Living and working conditions of IS workers and their social status are not at all satisfying. Informality restricts the potential for growth of IS enterprises. Most of the activities in the IS lead to high health risks and social stigmatisation.

The activities of the FS and IS are partly interrelated and complementary. The IS partly works in parallel to services of the municipalities and fills gaps which result from non-consideration of specific areas by the FS. But the two sectors also compete. The analysis of the waste flow chain of a town or a quarter allows to identify in detail the individual activities of the IS, but also the fields of collaboration of the FS and the IS. With help of such an analysis the contribution of the IS to the urban SWM can be calculated in monetary terms. The IS is mainly oriented towards recovery of recyclable materials and recycling activities. It provides finally more employment than the FS.

The IS in SWM is influenced by a large number of different factors. National IS enterprises are affected by price fluctuations for raw and recycled materials in the national and the international market. National legislation generally does not consider the IS. But depending on governance structures (federated states, decentralization) there is often scope for promoting the sector at the level of the municipality. A large number of different actors, municipalities, private (formal) collection enterprises and their workers, IS workers and IS enterprises, and waste generators as households and industries, are involved in the SWM systems. Their interests diverge

considerably. The actors of the IS, however, do generally not have the tradition to collaborate and organize for representing their interests. In most of the towns the IS in SWM is hence "invisible". Only in some countries and towns (strong) IS organizations have come into existence and succeeded to considerably improve the overall situation in the sector. Ready-made solutions, however, cannot be provided. Each town has its own SWM system. The generally applied strategies for improving urban SWM-systems affect the IS mostly negatively.

The IS and its activities lead to a large number of positive direct and indirect impacts, as creation of employment, generation of income, reduction of costs for municipalities related to collection and transport of waste, reduction of depletion of natural resources and energy use. But the activities of the sector also result in negative impacts, as health risks, social stigmatisation of IS workers and pollution of soil, water and air (poor recycling technologies).

Based on empirical examples from Asia, Africa, South America and Eastern Europe important aspects which are related to the integration of the IS in urban SWM systems are presented in the last chapters: explicit consideration of the IS in planning and policy formulation, development of IS organizations, strengthening of relations between municipalities and the IS, and establishment of network relations between the IS and the FS. Elaboration of scenarios which refer to the extreme cases among the available options (the IS ceases all its activities vs. the IS increases the scale of its activities) allows to make municipalities aware of the usefulness of the sector at the level of their towns. Municipalities can support the integration of the IS in two, often combined ways. They can be facilitators of the process by supporting the formation of IS organizations and/or they can directly participate in implementing the integration process (provision of infrastructure for sorting etc.).

The available experiences finally led to the conclusion that the following factors are essential regarding integration of the IS: explicit integration of the IS in national SWM-plans and decentralized governance structures, the political will to make use of the existing scope for collaborating with and integrating the IS in the formal SWM-system, consideration of the specific situation and needs of the IS, conclusion of formal partnerships between municipalities and IS organizations, support for establishing and developing formalized IS membership organizations and sensitizing political decision makers and the general public, and access to information about trends and demand for recycled material in the national and international market.

1. INTRODUCTION

1.1 Solid waste management systems need to be improved

1.1.1 Quantities of waste are increasing

The daily produced quantities of waste are permanently increasing in urban areas of developing countries and transition countries. This is only partly the result of still continuing growth of population; it can mainly be explained by the increasing rate of urbanization of these countries. In the year 2000 around 42% of the population of middle and low income countries lived in urban areas; corresponding to previsions of the UN and the World Bank around 57% of the population of these countries will live in towns and cities in 2030. This means that the urban population will increase by 92% during the period 2000-2030. Consumption patterns of the families are modified by their shift to urban areas. Urban households consume considerably more packed and wrapped (food) products (PET-bottles, plastic bags, aluminium cans etc.) than families which live in rural areas; farm households produce a large part of the food on their own, goods of daily use are partly produced by local artisans and traditional containers as baskets are used for transportation. Developing countries and transition countries, however, attach only subordinate importance to solid waste management in their political agendas.

1.1.2 The formal sector cannot provide sufficient collection and recycling services

Municipalities and private (formal) service providers of towns and cities are mostly not in a position to provide sufficient collection services for covering all the households in the city and for recycling all the recyclable solid waste. They do not have the required financial and organizational capacities for carrying out overall collection of solid waste, recycling and environmentally sound disposal at landfills through mechanization and highly capital intensive equipment. The used trucks do partly not allow entering narrow streets and alleys of densely populated (slum) areas. Only half of the urban population in developing and transition countries has access to sufficient and regular waste collection services. The generally applied method of mixed collection makes recycling very difficult; solid waste is often disposed at uncontrolled dump sites and or openly burnt. On the other hand, demand for recycled raw materials is considerably increasing in the international market.



Photo 1: Open dumping in the Philippines

1.1.3 The informal sector, too, provides services for solid waste management

Labourers of the informal sector (IS) often collect solid waste in the quarters of the towns which are not covered by public and private (formal) service providers, and in peri-urban or densely populated slums or squatter areas. These labourers are involved in collection of waste, in sorting and trading of recycled raw-materials, and - to a lesser extent – also in processing of recycled raw material. These activities are important sources of income generation for the urban poor and generally a large number of women, children and elderly persons work are involved.

1.1.4 The informal sector should be considered for improving SWM-systems

Development and implementation of strategies for improving urban solid waste management systems require consideration of the potential but also of the limitations of the formal sector as service provider: the necessity of relatively high capital investments, the use of standard equipment which is not appropriate for all the parts of the town, the often observed underutilization of large recycling plants etc.

In towns and cities of developing and transition countries the IS in SWM generates employment and income for a large part of the poor population through the use of labour-intensive technologies. Alternative employment and income generation opportunities are not available in sufficient number. Exclusion of informal workers from urban SWM would lead to considerable social problems and unrest. On the other hand, however, the IS already proves its capacity for providing appropriate SWM services f. ex. in areas of quite difficult access.

1.1.5 Concepts for integrated SWM systems are required

Improvement of SWM should be based on services which are provided by the formal sector (FS) and the informal sector, too. Only in this way it will be possible to increase the coverage of the urban households within the framework of the available budgets of the municipalities and the given (social) scope for action.

1.2 Objectives of the study

The study aims at informing about the IS in urban SWM by presenting the situation of the IS under consideration of economic, technological, social, medical, organizational and ecological aspects and the different relationships of the sector at national and international level. Furthermore, based on empirical examples and case studies, the potential of that sector is shown. The importance and contribution of the informal sector to SWM, its collaboration with the formal sector and the resulting direct and indirect impacts are highlighted. The short presentation of appropriate instruments facilitates first steps for explicit consideration of the sector in analyzing urban SWM systems and in planning their improvement. The study finally aims at supporting explicit integration of the IS in formulation and implementation of policies for improving SWM-systems in developing countries and in transition countries.

1.3 Content of the study

Within the framework of the above presented topics the study

- presents basic definitions and background information (chapter 2);
- gives information on basic aspects of the IS, its labour forces and enterprises, their activities, the generated incomes, working conditions and the relations between the IS and the FS (chapter 3);
- deals with factors at the international, national and local level which influence the IS in SWM (chapter 4).
- Direct and indirect impacts of the IS are presented in chapter 5;
- chapter 6 highlights practical integration of the IS in the SWM system with help of empirical experiences and case studies and
- important conclusions are shortly presented in the last chapter.

2. BASIC DEFINITIONS AND BACKGROUND INFORMATION

The used working definition of the IS in SWM and the boundaries of the study are presented in this chapter; furthermore the various destinations of solid waste are shown and the meaning of "e-waste" is explained.

2.1 How can the informal sector in SWM be defined?

Corresponding to the definition of ILO the informal sector shows the following basic characteristics:

- Existence of no or very low entrance barriers;
- use of local resources;
- mainly family enterprises or self-employed individuals;
- mainly small enterprises;
- use of relatively labour-intensive and adapted, local technologies;
- acquisition of required skills outside of the formal schooling system;
- unregulated markets with high competition;
- no access to (public) social security schemes and
- low income and low level of organization (unions)

The term "informal sector" is used in this study only in relation with activities which are connected to SWM. IS refers to individual, self-employed persons, micro-enterprises and small (family-based) enterprises with less than 10 workers who generate their income in one way or another from solid waste. They are not formally charged with the provision of the services which they provide. No contract does exist between self-employed workers and enterprises of the IS and the local government. These enterprises are not registered and they work without licenses; their operations are outside of the legislative framework. IS enterprises do not pay commercial, income or any other type of taxes and they do not consider legislation on employment and environmental protection.

2.2 Where are the boundaries of the SWM system?

Analysis of the IS in SWM and formulation of promotion and integration policies require to define the boundaries of the SWM-system. (Final) use of recycled waste, is this part of the SWM system? Feeding of recovered organic waste to pigs and use of recycled plastic as input in manufacturing, these activities are they part of the SWM-system? Collection and recycling of waste require equipment as bags and (simple) processing equipment which is partly produced by the IS. The IS artisans and traders who sell the bags, have they to be included in the analysis of the IS related to SWM?

There are no generally correct answers to these questions; the way of dealing with them and defining the boundaries of SWM system depends on the objective of the analysis to be carried out and the policy to be formulated. Narrowly defined boundaries of the SWM system limit the results of the analysis by “cutting off” parts of the “value chain” of (solid) waste.

The present study focuses mainly on IS workers and enterprises which are directly involved in collecting, recycling and selling of solid waste, and the related organizations, as self-help organizations of the IS and NGOs. A large number of aspects of the IS in SWM, as child labour and health problems of IS workers, are considered by the study. Appropriate support measures and project approaches, however, cannot be presented in detail; this goes beyond the goals of the study.

Special types of waste, as hospital waste and industrial waste, are not dealt with by the study. Only e-waste, as new type of waste, is explicitly considered. Resulting from modified consumption patterns in developing countries and transition countries the quantities of e-waste have considerably increased during the last years and this trend will continue in future. Informal recycling of e-waste, however, leads to extreme environmental and health hazards.

2.3 What happens to solid waste?

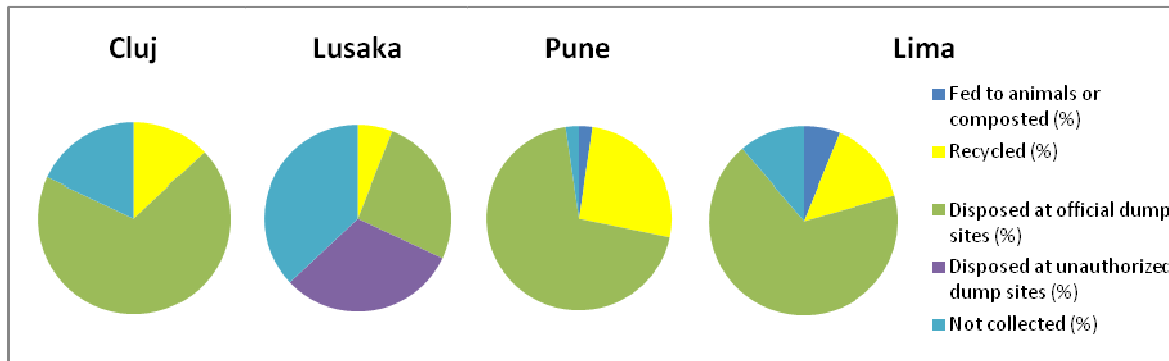
Solid waste contains organic waste (leftovers of food, vegetables etc.) and un-organic waste (glass, paper, tins etc.). Only a part of the generated waste is collected by workers of the formal sector or the informal sector. Organic waste is fed to animals or composted. Composting is a natural, in a large number of regions traditionally applied method for transforming organic (bio-degradable) waste into so-called “compost” with help of bacteria. This is a type of rich soil without any smell and to be used for improving and enriching the soil in the garden etc.

(Un-organic) waste which is not collected, as clothing, items which can be repaired, are either given away (to IS waste pickers) or illegally disposed or burned by the households. Illegal dumping and burning has a large number of negative effects as pollution of air, soil and ground water, blocking of water drains etc.

The term “recycling” as used in the study refers to any activity that allows transforming waste in such a way so that benefits can be generated. Hence, recycling includes reuse of bottles, clothes and bags etc. for their original purpose or in another way. Waste can also be transformed by recycling into a material or an object that can be used or sold, for its original purpose or for a new purpose. Processes that allow generation of energy from waste can also be considered as recycling activities.

Empirical investigations on the destination of solid waste show that - depending on the level of development of the SWM system of the town - there are great differences regarding the part of waste which is collected, recycled and disposed on official sites or unauthorized dumps (see graph 2).

Graph / Table 1: Destination of solid waste



Source: Economic aspects of informal sector activities in solid waste management, p. 37

The presented data show that the uncollected part of waste varies considerably (Pune, India: 2%; Lusaka: 37%). Recycling of (organic and un-organic) waste is of only limited importance in all towns. The largest part of waste is disposed at dump sites; hence, it can be assumed that the existing potential for recycling is not used to its full extent.

2.4 What is e-waste?

E-waste or WEEE (Waste of Electrical and Electronic Equipment) consists of any broken or unwanted electrical and electronic appliance as IT equipment and telecom equipment, large and small household appliances, consumer and lighting equipment, electric and electronic tools, toys, leisure and sport equipment, medical devices and monitoring and control instruments. Due to changed consumption patterns e-waste becomes increasingly a problem in industrialized, developing and transition countries, too.

3. THE INFORMAL SECTOR IN SWM

In this chapter basic aspects of the IS in SWM are presented, i.e. the labour forces, enterprises and activities of the sector, the relations between the FS and the IS, and the incomes and working conditions of the IS workers.

3.1 Who is working in the informal sector?

3.1.1 General aspects

Men, women and children are found to be working in the IS, partly also elderly people; some of them may work there only seasonally or temporarily. They work as paid labourers, self-employed persons or (self-employed) owners of micro-enterprises and small enterprises. These persons often have a migrant background, belong to specific social groups or are from the surrounding rural areas. Waste pickers of Pune/ Maharashtra f. ex. are mostly "Dalits" (social outcasts), women and migrants from outside of the state of Maharashtra. The waste pickers of Lucknow, an Indian town of 3.2 millions inhabitants, are not residents of Lucknow city but of near-by villages. Hence, they are not eligible for a number of support schemes. The micro-enterprises which are involved in Delhi in recycling of e-waste employ mainly illiterate youth, women and children who have migrated from the neighbouring states of Uttar Pradesh and Bihar; in Delhi illegal Bangladeshi immigrants are among the waste pickers.

Box 1:

The labour forces in the informal sector of SWM

In the informal sector work ...

- *(self-) employed women and men, children along with their parents or alone, illiterate youth, elderly people, paid labourers and owners of informal (micro-)enterprises and junk-shops;*
- *... they are often migrants from near-by countries or regions and /or belong to specific ethnic groups, castes, tribes etc.*

The labour forces of the informal sector work as ...

- *itinerant waste buyers, street pickers, dump pickers and truck pickers (collection of waste);*
- *small dealers (middle men), workers and owners of medium sized junk shops and large junk-shops (trading, sorting, recycling) and*
- *owners and workers of manufacturing enterprises which use recycled waste as input.*

3.1.2 (Self-) employed women

The number of women who are involved in the IS of SWM depends on different factors. Most important are the specific activity and the considered country/ region. In Pune until the late 1990s waste pickers and traditional itinerant waste buyers were rather exclusively women; men only focused on buying of used newspapers. In 2000, however, men increasingly started to do waste picking. Also in other countries the number of women is not negligible. Studies indicate that around 25 % of the IS workers are female. But the available statistics often under-represent the part of (self-)employed women; the data generally refer to the "main earner" of the household, usually the man. Women who work together with their husbands in sorting, processing, packing etc. are not taken into consideration. It seems, however, that employment of women is of considerably more importance in the IS than in the FS, independently of the town and country.

The graph below indicates that the part of women in the FS is very low (0% - 5 %). The case of Lusaka is not considered, as these women mainly work as street sweepers in community based enterprises. In the IS, however, the part of women workers varies between 24% and 42%.

Graph /Table 2: Employment of women in the informal and the formal sector of SWM

City	Cluj	Lusaka	Quezon	Pune	Lima
% of women in workforce of FS	5	56*	2	5	0
% of women in workforce of IS	37	39	24	42	24
* These are mainly women who are working in community based enterprises as street sweepers					

Source: Economic aspects of informal sector activities in solid waste management, p.49

3.1.3 Child labour

Child labour is common in the IS. Exact data on the numbers, age and sex of children who work in the IS, however, are very difficult to access, but the participation of children seems to vary considerably from town to town. As shown in the table below, the part of working children varies between 1% (Pune) and 30 % (Quezon). In Tanzania mainly boys (88%) are involved in activities of SWM. The children partly start to work at the age of 4 to 5 years. They are mainly employed in dump/ street picking and in processing of collected waste. Children accompany their parents and work together with them at the dump site; but they also work in groups under a leader or intermediary at dump sites. The most invisible types of child work are the activities at home, when children sort the waste which has been collected by their parents, and prepare it for selling.

Graph / Table 3: Income of working children in the informal sector of SWM

City	Cluj	Lusaka	Quezon	Pune	Lima
Children as % of workforce	14	18	30	1	3
Average earning of a child (€/day)		1.6	2.9	1.0	1.4
Average earning of an adult (€/day)	6.3	2.0	4.6	3.3	5.7
Child's earnings, % of the earnings of an adult		80 %	63 %	30 %	25 %

Source: Economic aspects of informal sector activities in solid waste management, p. 50

Poor families or women headed households need the additional income which is generated by their children. Adult waste workers, however, often fear competition with experienced children; junk dealers cheat children because of their low position in the social hierarchy and pay them lower prices for the collected waste.

Working of children in the IS of SWM is not only unhealthy, it also hinders their physical and intellectual development; these children generally do not go to school and their activities directly on the dump sites are considered as inhuman. Different projects, as non-formal education classes for children, special scholarship schemes for child waste pickers etc., have been implemented in Pune for several years; this has led to a considerable reduction of the number of working children. There are hardly any data available regarding the number of children who work in the FS related to SWM. Child work in the FS, however, can be supposed to be very low, as prohibition on working of children is effectively enforced in the FS of many countries.



Photo 2: Waste picker on dump in Maputo

3.2 Which activities are carried out by the informal sector?

The IS in SWM covers a large number of different activities. They are carried out in parallel to services of the municipalities and fill gaps which result from non-consideration of specific (slum) areas by the FS. Waste management activities of the IS are partly in competition with government financed activities. IS organisations also

provide collection services on behalf of the municipality; these activities, as partly formalized activities of the IS, are not considered in this chapter.

The IS activities can be divided into different categories:

- provision of services which are related to collection and transportation of waste;
- activities which are directly related to recycling of non-biodegradable and biodegradable waste; such activities include selecting of (still usable) items and materials from deposits of mixed waste, advanced sorting of materials that have already been roughly sorted, cleaning, cutting, and baling of recyclables. Activities for recycling of bio-degradable waste include providing of food waste to animals, as pigs and cows, composting of waste and sieving of decomposed waste from disposal sites;
- distribution of recyclables and recycled raw materials (storing, buying and selling);
- in some cases IS-enterprises use recycled raw materials for manufacturing of new products.

3.2.1 Collection of recyclable materials

Itinerant waste buyers (IWB) move from street to street and collect recyclables from households or businesses. They get the items "as a donation", but possibly they also buy the items with cash or exchange them for households goods. Itinerant waste buyers are often specialized in one or two kinds of materials. A few days of training are sufficient for getting the required technical skills. IWB generally sell the collected materials to a dealer; he may be the owner of the cart which is used by IWB for collection and may also give cash advance to the IWM for buying the items from the households.

Door-to-door collection: Waste pickers also collect to a limited extent mixed waste from households against payment and in parallel to private and public collection services.

Street pickers collect materials which have already been discarded by households or shops; eventually they pick up selected items of waste (as beverage containers which can be refilled or because there is a "pledge" on them), extract material from bags or containers which have been put in front of the house for emptying by the formal sector waste collection service, or remove materials from litter bins, community containers in the streets, unauthorized dumping areas or secondary

collection sites. Street pickers pick for sale and for their own use. Street picking is often a casual activity of teenagers, elderly and unemployed persons who move in and out depending on their financial requirements.

Truck pickers inspect the waste when it is loaded onto the truck (by workers of the FS) and separate out what can be sold. They are generally outsiders of the formal sector waste collection crew who have gained the right to work alongside the crew as they have relatives in the formal garbage collection crew etc.

Dump pickers and transfer station pickers climb in and around heaps of waste that are discharged from collection vehicles for extracting materials; they tend to be highly specialized as to the material they extract. Some days of training are sufficient for getting the required technical skills for selecting appropriate material. Frequently dump picking is competitive and socially stratified, with “dump-bosses” and “coordinators” that control particular materials. Many dump pickers live near or on the dump site. In some countries dump picking is a family based or/ and a seasonal activity.

The IS collects and recycles considerable quantities of material; in the following table the quantities of the different materials are presented which are weekly collected at the dump site of Tanger/ Morocco.

Graph / Table 4: Quantities and types of material collected at the dump site of Tanger/Morocco (per week)

Type of material	Collected quantity	Type of material	Collected quantity
Soft plastic (packing material)	6.0 tons	Plastic (containers for liquid etc.)	3150 kg
Paper	2.7 tons	White glass (bottles)	3080 kg
Cardboards	2.5 tons	Colored glass	1000 kg
Textiles	2.0 tons	Bier bottles (24 cl)	1000 bottles
Aluminum and copper	200 kg		

Source: Etude Socio-Economique des Chiffonniers de la Décharge Publique de Tanger, p. 26/27

Paper and cardboards which are mixed with household waste are not sorted out; they are too dirty when collected together with other waste. Collected wood mainly comes from palettes of industries; but only small quantities are brought to the dump site. The composition of the collected waste is strongly influenced by (urban) living patterns as the very high part of plastic shows.

3.2.2 Trading, sorting and processing of recyclables

Sale of compost: Composed waste from disposal sites is sieved and sold as soil conditioner. But only a very small part of solid waste is composted; selling of compost is, hence, of only very minor importance regarding employment and income generation in the IS.

Many of the small dealers ("middlemen") who buy and sell recyclables belong to the IS; their "junkshop" may be only a parcel of land with a scale where the materials are received and stored. Small junkshops which are often family enterprises are usually located in the communities, near the dump site or directly at the site itself. These middlemen buy small quantities of waste directly from waste pickers. Carrying out of that activity requires a small amount of capital for buying material on a daily basis and for arranging "a pack". A short apprenticeship is also necessary for getting to know the retail value of the different materials.

Medium sized junkshops are often situated in the commercial district of the town, near the centre or the market, or at the outskirts of the city. Successful wholesaling of scrap metal and non-ferrous metal requires substantial financial funds and (technical) competences. Hence an "apprenticeship" of 1 to 3 years can be observed. That type of junkshop employs casual labour, has generally a business license and owns a baler and one or two trucks. Medium dealers are often the link between informal and formal collecting and recycling activities.

Some of the large junkshops, as scrap-yards, depots of intermediate processors, as paper packers, auto shredders, plastic pelletizers etc., may belong to the IS, but usually they are registered businesses of the formal sector. They are engaged in substantial processing and trading, which are supplemented by brokering and export activities. Typically they include grading and baling of paper, disassembly, cleaning, shredding or baling of metals, agglomerating, flaking and pelletizing of plastic, colour-sorting and crushing of glass. Large junkshops generally only buy from small(er) junkshops and sell to formal large scale processing enterprises at the end of the waste flow chain.

3.2.3 Manufacturing and export

Recycled waste is also used as input for production and manufacturing of goods, as household goods of low quality. These products are generally consumed by the local population of lower income strata. Recycled waste is partly exported, too.



Photo 3: Artisanal recycling objects

3.2.4 Recycling of e-waste

Significant growth in consumption of electronic items in the last few years and the high rate of obsolescence of these products lead to generation of considerable quantities of e-waste. In developing and transition countries e-waste has become an attractive business due to low incomes and loopholes in the law and its enforcement.

Apart from the quantities which are generated in the domestic market, dumping of e-waste from developed countries further increases the quantities of e-waste in developing and transition countries. Around 330000 metric tons of e-waste are generated annually in India; while additional 50 000 metric tons are imported illegally through wrong declarations. Corresponding to available forecasts computer waste will be of around 19000 metric tons in Chile in 2020; no computer waste officially existed in the country in 1998.

Graph / Table 5: Generated and recycled e-waste in India

Type of e-waste	Quantities annually generated (metric tons)	Quantities available for recycling (metric tons)	Quantities processed
Computers	56 324	24 000	12 000
Mobile phones	1 655	143	negligible
TV-sets	275 000	70 000	7 000
Imports		50 000	
Total quantities	332 979	144 143	19 000

Source: E-Waste Assessment in India – A Quantitative Understanding of Generation, Disposal and Recycling of Electronic Waste in India, p.60

Computer desk-tops, TV and mobile phones constitute a considerable part of e-waste. In spite of being the main generators of computer e-waste, the large majority of businesses does not have an explicit policy on disposal of obsolete IT-products or e-waste. Large enterprises are somehow aware of the problem of e-waste; in depth knowledge, however, is lacking. 80% of the replaced computers enter the e-waste stream through (informal) scrap dealers, second hand markets and exchange/ buy back schemes.

The largest part of e-waste is segregated, dismantled and recycled by IS workers who work in urban and peri-urban slums. These back-yard recycling industries use very simple and extremely hazardous processes (open burning of wires, soaking of circuit boards in open acid baths, manual scrapping of boards for extracting copper without any safety precautions, disposing of leftover sludge and ashes which contain toxic heavy metals on the open ground etc.). Compared to the recycling methods which are used by the formal sector the efficiency of the IS processes is significantly lower.



Photo 4: Electronic waste recycling in India

The present situation is finally characterized by hardly developed formal channels for providing formal recyclers with e-waste and very limited capacities for recycling of that type of waste. The potential of e-waste (income generation, recycling of raw materials) is, hence, not at all used neither by the IS, nor by the FS.

3.3 The formal sector and the informal sector, how are they interrelated in SWM?

IS workers and FS workers are both involved in waste collection and recycling. But the focus of the IS and the FS differ. Empirical investigations indicate clear differences of the kind of waste which is mainly collected by the workers of the two sectors. The FS collects the main part, around 80%, of the available waste, but it recovers only a small part, up to 5%, of the recyclables. The IS, however, recovers a considerably larger part of the recyclable material (up to 25%).

Graph / Table 6: Focus of informal and the formal sector on recyclables

	Cluj	Lusaka	Quezon	Pune
% of waste not collected	18	37	1	2
% of waste collected by FS	79	30	79	78
% of recyclables recovered by FS	5	4	2	0
% of recyclables recovered by IS	8	2	23	22

Source: Economic aspects of informal sector activities in solid waste management, p. 37

Studies indicate that the number of IS workers who are involved in recycling is considerably higher than the number of workers of the formal recycling industry. The examples which are presented below differ considerably. But even in the town of Lusaka where this difference is the smallest one, the number of IS workers in recycling is 4 times higher than the number of FS workers.

Graph / Table 7: Value of recycled material and related employment

	Cluj	Lusaka	Quezon	Pune	Lima
Total annual sales for recycling and reuse (€)	2 500 000	500 000	7 100 000	15 800 000	55 700 000
No. of IS workers involved	3 200	390	10 100	8 800	17 600
No. of workers of formal recycling industry	70	90	n. a.	1 500	n. a.
Ratio IS workers : FS workers involved in recycling	46 : 1	4 : 1	n. a.	6 : 1	n. a.

Source: Economic aspects of informal sector activities in solid waste management, p. 43

The value of the material which is recycled by the IS and the FS can be of considerable importance. Managers of solid waste management systems in the FS, however, often have other priorities than recycling; large scale formal recycling facilities often fail to achieve the expected outputs and standards, and they are underutilized which leads to increased costs. The largest part of the added value and created employment results from recycling activities of the IS. Maximizing recovery of recyclable material, of added value and of employment hence often requires explicit consideration of the IS.

The differences in behaviour and interest result from the fundamentally different situation and working conditions of the workers of the IS and the workers of the FS. The latter are generally employed by the municipality or a private company and get a monthly salary. Depending on the (perhaps) applied incentive system, the focus of FS workers is on the provision of collection services, i.e. the quantity of collected waste and the number of covered streets and households. For IS workers, however, provision of waste collection services is of only minor importance. These workers are mainly interested in recovery of waste which they can reuse themselves or sell after sorting or a first treatment. Workers of the IS and the FS, thus, often have different motivation and objectives.

But the formal and informal sectors are also interrelated and they cooperate all the long of the waste flow chain, from collecting up to disposal and recycling. Recyclable materials that have been collected by IS pickers are sold, after cleaning and balling, to formal exporters or national FS factories which use these materials as inputs for manufacturing. Workers of the formal collection service who are employed by the

municipality make business with the IS. When loading waste into their trucks the municipal employees often separate recyclables goods which they sell then to informal junk dealers. Waste pickers can be members of a registered cooperative which is contracted by the municipality for collecting waste from households. For increasing their income, however, these waste pickers may also be involved in informal waste collection and picking.

For getting a clear picture of the situation in a town it is required to analyze in detail the waste flow chain. The individual tasks which are carried out respectively by the formal and the informal sector can be presented with help of a flow chart and the importance of each sector in waste collection and recycling can be analyzed. The waste flow chain should indicate the estimated tonnage which is respectively handled by the FS and by the IS. Based on these data the percentage of the overall waste which is collected and recycled by the IS can be calculated and compared to the activities of the FS. Taking into consideration the collection costs/ton in the FS, it is possible to calculate f. ex. the contribution of the IS to the urban waste collection in monetary terms. The type of linkages which exist between the different actors of the waste chain can also be presented and analyzed with help of the flow chart (f. ex. dotted lines for mutual, not formalized agreements and full lines for formal contracts).

More detailed data allow presenting the waste flow chain of a specific quarter of the town. Its analysis contributes to identifying existing bottlenecks and opportunities for improving the SWM system of the quarter. Organisations which provide support services (training, credit etc.) to IS actors and FS actors (meso-level), and framework conditions (macro-level) - specific laws and regulations etc. which influence collection, recycling or transformation - can also be presented in such a flow chart.

Box 2:

Use of the waste flow chain

The presentation and analysis of a waste flow chain of a town or a quarter of a town allow ...

*... to identify the **fields of activities of the IS** in the town or the considered town quarter (in comparison to the FS);*

*... to get information about the **capacities of the IS** (no. of workers, quantities of waste) also in comparison to the FS;*

*... to get information about the **contribution of the IS** to the local SWM-system in monetary terms;*

*... to identify **fields of collaboration** (complementarity) and **fields of competition** (potential conflicts) between the IS and the FS in SWM;*

*... to identify **bottlenecks and problems** at the different parts of the waste flow chain;*

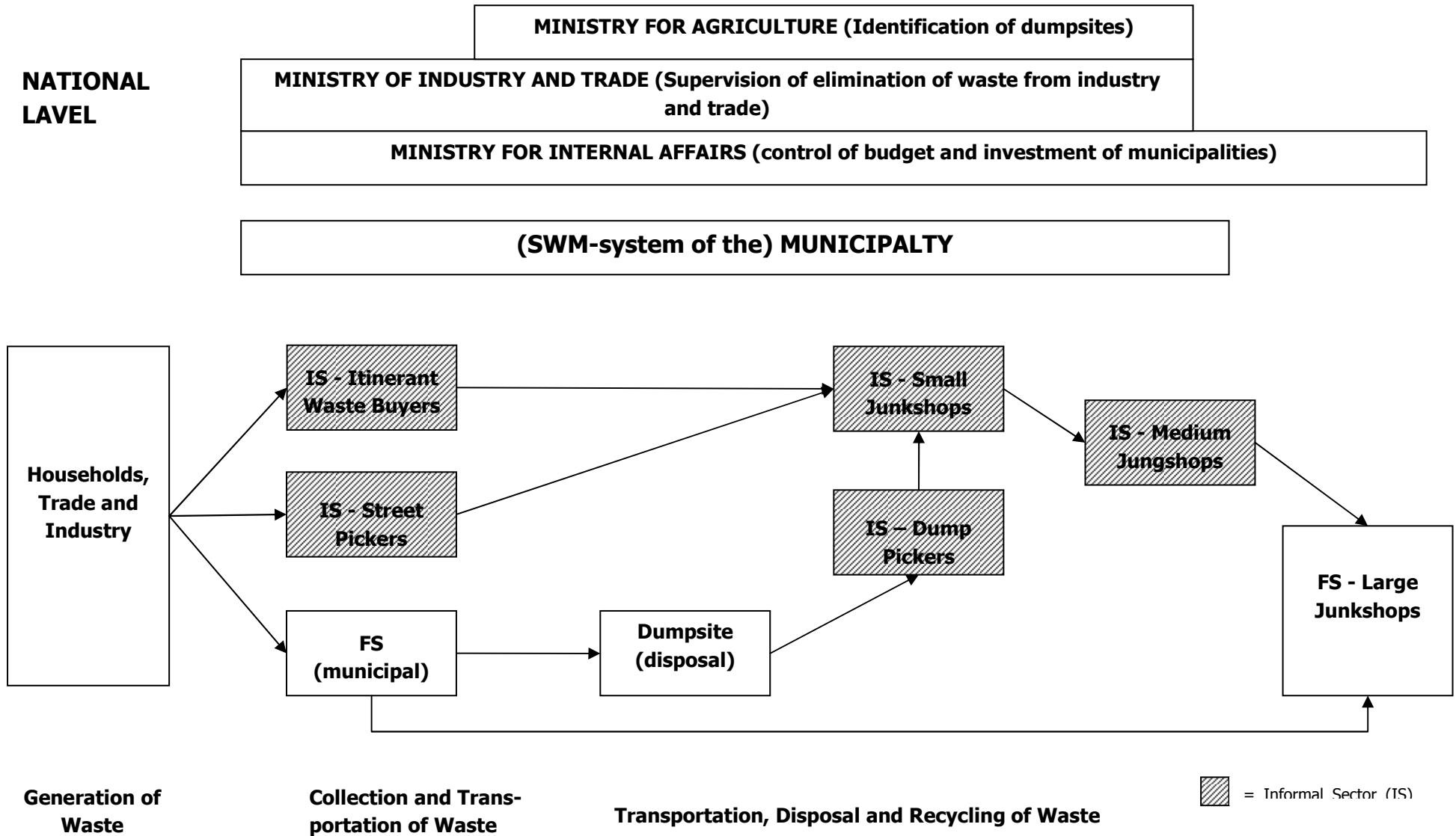
*... to identify the **type of relations between the IS and FS actors** of the waste flow chain (formal contracts, informal agreements etc.);*

*... to identify **organisations and the support services** which are provided by them to IS actors at the different parts of the waste flow chain;*

*... to get information about and analyze the **framework conditions** at the different parts of the waste flow chain and*

*... to identify potential **fields for intervention** for improving the concerned SWM-system.*

SOLID WASTE FLOW CHAIN



3.4 What are the incomes in the informal sector?

The incomes in the IS are generated in different ways: self-employed (women and men) waste pickers sell what they have collected to small junk shops and dealers. Sweepers who work for residents are paid for the services which they provide. Labourers who are employed by owners of junkshops or processing enterprises get salaries for their work. A large part of the IS workers are employed in the informal business of their families; women and children often sort, clean etc. "at home" the waste which has been collected by other (adult, male) members of the family. These women and children are generally not explicitly paid for their labour.

Graph / Table 8: Employment and income in the informal and the formal sector

	Cluj	Lusaka	Quezon	Pune	Lima
Ratio IS workers : FS workers	9,8:1	0,6:1	1,8:1	1,9:1	1,3:1
Average earning in the IS (€/year)	2070	590	1670	1200	1770
Average salary + benefits in the FS (€/year)	2420	720	1000*	1900	2190
Average salary of unskilled labor in industry (€/year)	1360	610	820	550	960
*There are some indications that formal waste collection workers are deliberately paid less to compensate for "side" earnings as truck pickers					

Source: Economic aspects of informal sector activities in solid waste management, p. 47

SWM related activities in the FS allow realizing of higher incomes than corresponding activities in the IS. Average earnings in the IS are clearly lower than average income in the FS. But the presented data also indicate that the (average) income of an IS worker is – with exception of Lusaka – higher than the average salary of an unskilled industrial labourer. (Self-employed) workers of the IS have generally only very low levels of skill formation and education (large number of illiterates). Hence, only jobs for unskilled labourers are accessible for these persons in the FS. An activity in the IS finally allows these labourers to earn a clearly higher income than an (accessible) occupation in the formal sector.

Taking into consideration these data, it can also be concluded that the average IS worker in SWM does not belong to the poorest of society. For getting a clearer picture of the level of incomes which are realized in the IS of SWM, income determining factors are dealt with in the following.

3.4.1 Factors that determine the level of income within the IS

The study “The Segmentation and Growth Factors of the Informal Solid Waste Recovery Activities in Dakar (Senegal)” has shown that - even without consideration of gender – the incomes which are generated in the IS vary considerably from one actor to another. Influence of different factors as legal access to land, participation in self-help groups, professional experience and pluri-activity, has been taken into consideration. The know-how (apprenticeship) and capital for investments which are required for carrying out a specific activity (“difficulty of access”) have been finally identified as most determining factors of the heterogeneity of the generated incomes.

Box 3:

Factors that influence the level of income in the IS

Incomes in the IS related to SWM are influenced by

- *access to capital and working equipment*
- *negotiation skills and level of education/ formation*
- *specific know-how related to the different kinds of collected waste and junk (type of metal etc.) and access to information*
- *social norms and perceptions (discrimination of women regarding access to capital, work opportunities etc.)*

Corresponding to that study itinerant waste recovery and waste recovery at the dump site are of easy access as no or a relatively small amount of capital, and only few days of training are needed. Hence, the generated incomes are low. But waste recovery, which was carried out by using a cart or a rickshaw allowed incomes which were higher than the minimum wage of the FS.

Resale on the dump site and in the city is of more difficult access, as a small amount of capital and a short apprenticeship are required. The income which can be realized through these activities is clearly higher than subsistence income and minimum wage of the FS.

Wholesaling of scraps and non-ferrous metal was found to be of very difficult access. It requires substantial financial funds and (technical) competences. Wholesalers of scraps and non-ferrous metal realize very good incomes; they generated an income which was 25times the local minimum wage.

Access to wholesaling of plastics, however, is of only medium difficulty. Access was protected by a network of lineage, affinity and denominational affiliation; but only very small incomes could be realized.

The results of that investigation confirm that IS workers on the average do not belong to the poorest section of the population. But the study also shows the great heterogeneity of incomes in the IS. (Self-employed) women waste pickers who use only simple equipment as baskets or bags have only very low social status and their income will generally not reach that of an unskilled industrial worker.

3.4.2 Income by gender

The data which are presented below are not representative; they refer only to a small number of cities. But they indicate that there are most probably considerable differences between the incomes which are generated by women and men. Only in one town, in Quezon, women earn the same average income as men. Detailed information on the situation in Quezon, however, is not available. In all the other towns there are very clear differences. Women get on the average only 56% up to 87% of the income of the men.

Graph / Table 9: Income by gender in the informal sector of SWM

City	Cluj	Quezon	Pune	Lima
Average earnings of men (€/day)	6.3	4.6	3.4	5.7
Average earnings of women (€/day)	5.5	4.6	1.9	3.4
Earnings of women as % of earnings of men	87 %	100%	56%	60%

Source: Economic aspects of informal sector activities in solid waste management, p. 49

Women concentrate on activities which allow generating of only low incomes. This can be explained by a large number of different factors.

Difficult access of women to capital and equipment: Women in the IS are generally excluded from access to (formal) credits as they do not have any guaranties or securities to offer (ownership of land, house etc.); even family members give or lend much more rarely money to a woman than to man, for supporting her in establishing a business/self-employment. Indian women use baskets for collecting and picking of waste. Male waste pickers of Pune, however, use handcarts for collecting; this allows them to collect, to transport and finally to sell much larger quantities and other types of waste than women waste pickers; men can collect heavy or bulky waste. Women do not have access to the kind of waste which allows generation of relatively high income as metals and paper; they focus rather on textiles and plastic which allow only low income /per unit.

Limited (negotiation) skills and lower level of formation of women compared to men:

In West-Africa women are successfully involved in intermediary trading. In a large number of countries, however, women are discriminated when involving in trade. They often do not have the (necessary) skills and self-confidence for negotiating successfully with male junk dealers and traders. Even when collecting the same kind of waste, women tend to be paid less when selling their material to junkshops. Women labourers in junkshops are often discriminated, too; they are not paid on a daily/weekly basis as male workers, but on "piece rates", i.e. corresponding to the quantity of their output.

Social perceptions about male and female occupations: Access of women to income generating activities is also limited by perceptions of supporting institutions and organizations as ONGs; they may classify (income generating) waste related activities as "typical" occupations of men and hinder access of women. In a large number of societies it is also more difficult for women than for men to access (male dominated) public institutions and authorities. Women are then considerably hindered in presenting and expressing their needs, points of view and in getting access to important information, as the procedure for registering a (women) cooperative.

3.5 What are the working conditions in the informal sector?

3.5.1 Living and working conditions

Waste pickers and recyclers of the IS use technologies which require only low capital inputs and they operate generally on a small scale, often at the level of the family or as micro-enterprise. Waste pickers on dump-sites may not work every day or during the whole year in spite of permanent use of the site by the municipality. They decide themselves on their working days and working hours. IS workers often live near to their working place, f. ex. near to the dump site or directly on the dump side. Structures and activities may develop at the dump site which are similar to that of a township and are independent of SWM.

Box 4:

The municipal dump side of Tangerang: Living and working (Case study)

The municipal dump site of Tangerang is used by the communes of Charf, Tangerang-Medina and Fahs Beni Makada. All types of waste, without any selection, are deposited: households waste, industrial waste, waste from hospitals etc.

Around 48 waste pickers work on the disposal site at present. 30 of them live on the dump site itself, 28 live outside. 16 of the waste pickers are children (boys only) ; they are between 7 to 15 years old; only 2 women are involved in waste picking. Corresponding to local traditions women do not participate in collecting material when it is brought by the trucks; women are involved in sorting the material in the storing place near to their homes (on the dump site) when it has been brought there by other family members. Working time at the dump side is of around 7 to 9 hours; it depends firstly on the arrival of the trucks which bring new waste.

21 families with altogether 87 members live on the dump site; 22 of them are children. Most of the resident families live there since quite some time. 5 of the families live more than 24 years on the dump site. Only 5 families live there since less than 10 years. 6 years ago the last family has shifted to the place.

At the time of their construction the houses have been only near to the dump site which has been slowly growing and extended. The houses are constructed with help of material which has been found at the disposal site it-self; they do not have any infrastructures or access to public services. These houses do not officially exist; the majority of the families does not have official (registration) papers as birth certificates etc. Every family has a stocking place near to its house and sells the collected waste at the end of the week. Waste pickers who do not live there, have their individual stocking place and they daily sell the material which they have collected. .

6 families which live on the dump side are not involved in waste related activities. The head of household of one of these families works as a potter at the dump site. For firing the kiln he uses mainly wood and tires which he finds at the dump site. The men of the other families which are not involved in waste related activities work as baker, worker, driver and musicians (2).

All together 140 animals (cows, sheep and goats) are kept inside of the dump site by the resident families; the animals live on available household waste. Around 480 other animals as cows come every day from the surrounding areas for getting their food at the dump site.

Source: Etude Socio-économique des Chiffonniers de la Décharge Publique de Tangerang, p. 17 -24

People involved in collecting, transporting and recycling of solid waste generally suffer a social stigma of being associated with waste. Trade of scrap metal is considered as dirty as scrap is collected from garbage and involves daily interaction with people like waste pickers. Scrap traders are generally excluded from membership in professional associations like chambers of commerce and industry. Well organized collecting and recycling activities (use of uniforms for collectors, clean sorting and storing places, appropriate equipment etc.) and visible and efficient IS organizations, however, will contribute to increase the social status of the involved workers.



Photo 5: Polluted living conditions

3.5.2 Differences in negotiation power and economic position

Availability of a place for carrying out first sorting activities and for stocking the collected waste is of considerable importance for an (itinerant) waste picker. Street waste pickers and dump pickers who do not have any storing place are obliged to sell the collected material daily to a (small) dealer (who has some place for storing). But the prices of the dealers fluctuate and depend on the demand in the (international) market. Street pickers and dump pickers, furthermore, do not have the required financial reserves for being able to hold back the collected material and wait up till prices go up again. Itinerant waste buyers even borrow money from "their" dealer in the morning for buying material from households. In the evening these itinerant waste buyers "sell" then the collected goods to the junk dealer; living from day to day as a "daily labourer" these IS actors do not have any possibility to postpone their selling operations.

3.5.3 Informality of enterprises

The informality of the enterprises (middlemen, small scale recyclers etc.) of the sector does not only influence the working conditions of their workers, but it also restricts the potential for growth. Unregistered enterprises do not pay any taxes or license fees. In daily life, however, their owners may be harassed by the police and public officials and be threatened that their equipment will be taken away. IS enterprises often have to make different types of informal payments (bribes etc.) so that their business can continue its operations.

Owners of informal enterprises are excluded from official support schemes for promotion of SME (small and medium enterprises) and they are not eligible for formal credits of banks or financing institutions. These enterprises are dependent on financial support from family members, friends, or informal money lenders. This often leads to insufficient working capital and liquidity, so that they cannot stand falling prices in the market of recycled raw materials.

Owners of small informal enterprise may be illiterate; business relations are then not based on formal contracts, but on mutual trust. These entrepreneurs generally do not have the required self-confidence, information, connections and financial capacities for legal enforcement of agreements with other enterprises. Large scale recycling enterprises may exploit this situation – which also results from the different size and financing capacity of the enterprises - and may delay payments or lower prices.

Informality also influences the relationship between the owner of the enterprise and his/her workers. Labour laws and regulations are not observed. The number of employed workers generally varies according to the season or the quantity of work; unskilled or low-skilled workers are often only employed on a daily basis.

3.5.4 Health and safety

All waste related activities lead to high risks for having an accident. IS workers generally use basic equipment and very simple methods of protection. Dump pickers with their unprotected hands and feet are at particular risk of injury from needles in health care waste, broken glass and projecting nails. They often contact skin and eye infections and respiratory diseases as they work in dusty and smoky locations; they are also bit by dogs and rats which are in or around dump sites and waste bins.

Recycling of e-waste considerably increases health risks in the sector. E-waste contains toxic materials as lead and mercury. The workers - often without being aware of the danger – are exposed to these materials when dismantling computers and other electronic equipment and they breathe in smoke from melting of metals which contain arsenic and cyanide. IS workers need time for learning how to handle these materials safely.

3.5.6 Social status and perceptions

The urban administrations do generally not consider the benefits of the activities of the IS for the overall city. The “general” inhabitant of the town, too, is often embarrassed by the sight of waste pickers who work with simple equipment and

vehicles. The attitude of members of municipal administration and cleaning services (public sweepers), police, private security services and the overall population towards waste pickers and junk dealers are mostly characterized by disgust and discrimination.

Social consideration by the IS workers themselves is clearly related to the earning potential of the individual activity. Waste picking and waste recovery which allow generating only low incomes, are of lowest social status. Activities which are related to resale and whole-selling of scrap metal and non-ferrous metal, allow earning of good incomes. These activities are considered as "normal" by IS workers and provide even a very positive self-image to the dealers. Trade of scrap metal provides only very low status in the overall society regardless of the profitability.

Box 5:

Social status of waste picker women

... a rag picker woman is not respected by society. We work in filth, garbage bins and dumping grounds from morning to evening. We have no water or other sanitary facilities on the dumping ground or in our community. We smell of dirt. Nobody from the society likes to touch us or give us respect and dignity. They call us dirt – even worse than garbage itself ...

Source: Recycling Livelihoods – Integrating the informal sector in waste management in India, p. 31

The attitudes of the population and municipalities are based on emotional reactions, as waste workers wear dirty clothes etc., or on prejudices, mainly when waste workers are migrants or from a different ethnic group. But negative attitudes are also based on perceptions as the belief that informal sector workers are always to blame when waste is scattered around containers; in fact it may have been done by dogs or cats, or even by the residents who have not deposited their waste inside the bins.

But negative attitudes of the population may also result from the behaviour of IS workers; f. ex. when they sort waste in public places and leave their discards behind. Recycling practices as burning of tyres or setting fire to waste at disposal sites causes unacceptable pollution. Disposal sites are sometimes dominated by gangs of recyclers who intimidate drivers of FS collection trucks and hinder load off operations.

Box 6:

Lessons Learnt – THE INFORMAL SECTOR IN SWM

The activities of the FS and the IS in the SWM-system are partly interrelated and complementary. But the IS and FS also compete as they carry out the same activities from collection up to recycling of waste. Opportunities which are provided by the productive use of recycled materials are generally not used to full extent by IS enterprises. There are hardly any IS enterprises which are involved in manufacturing and use recycled raw materials.

The activities of the IS are mainly oriented towards recovery of recyclable materials and recycling activities. They give employment to a large number of urban poor. Income generation in the IS is mostly directly related to selling and recycling of such materials. The FS is firstly oriented towards provision of (collection) services. Formulation and implementation of a strategy for improving the local SWM-system has hence to be based on an analysis which considers both the sectors - their respective structures (main fields of activities) and present capacities and potentials - if conflicts and (inefficient) competition shall be avoided and potential synergies shall be used.

Average income in the IS is relatively high, but the generated incomes are very heterogeneous: The average IS worker does not belong to the poorest of the population. But the incomes in the sector are very heterogeneous covering rich (medium and large) IS wholesalers of scrap metal up to (badly equipped, self-employed) women waste pickers who may well be part of the urban poor. When analyzing the IS (income distribution by) gender should hence be a topic of explicit consideration. A part of the IS actors as wholesalers (of scraps, non-ferrous metal etc.) may not be eligible for support schemes because of their high income. Taking into consideration their specific roles in the waste flow chain, however, they should be explicitly considered in formulation and implementation of strategies which aim at improving the local SWM-system.

The IS provides more employment than the FS, but living and working conditions are not satisfying: The IS related to SWM provides considerably more employment than the FS and it contributes considerably to urban poverty reduction. Working and living conditions of IS workers and enterprises, however, are generally bad. Difficult access to working capital partly limits income generation and hinders the IS actors to make full use of the existing potential for growth.

Working relations are unequal: Bargaining power and working relations between the different IS actors are unequal and they follow different (business) approaches. Owners of (medium and large) IS junk-shops manage their activities corresponding to business criteria and profit orientation which leads to high incomes. Street waste pickers or dump pickers, however, are often obliged to sell the collected waste daily (missing storing place) independently of the offered price; thus, they do not get the opportunity for business planning and entrepreneurial decision making. (Membership) organizations contribute to improving of working conditions of waste pickers and small dealers by supplying support services and representing their interest. Such organizations, however, exist only in a small number of towns and countries.

4. FACTORS INFLUENCING THE INFORMAL SECTOR IN SWM

Framework conditions of the IS are determined by different factors at the international level, the national level and the local level; the most important factors are presented in the following chapter and their importance for the IS is analyzed.

The workers and (micro-) enterprises of the IS do not work in isolation; a large number of relationships and connections exist between the IS and the different levels of the formal economy and society. The framework conditions for the activities of the IS are shaped by the international market, national rules and regulations on SWM, the characteristics of the individual towns and the strategies and policies that are implemented by the municipalities for improving their SWM-systems.

Box 7:

Framework conditions of the informal sector in SWM are shaped by...

- ***(inter-)national demand for and supply of raw materials*** which are collected and recycled by the IS
- ***rules and regulations and institutional / governance structures*** at the national level and the level of (federated) states and municipalities
- ***characteristics and development trends of individual towns*** and
- ***strategies of municipalities*** for improving their SWM-systems

4.1 The international market, does it influence the informal sector?

Trade with recyclable material takes place in a buyer driven market. Formal national recycling industries of developing countries are integrated into the international market for recyclables and recycled raw material; these enterprises are in competition with other internationally operating recycling industries. National enterprises import recyclables and recycled raw material from the international market and they also produce for that market. Depending on international supply of and demand for recyclables and recycled raw material the corresponding prices will increase or decrease. Waste flow chains link the national IS and the formal economy. Through these chains price fluctuations trickle down to the national IS. Important short term price fluctuations are considered as common events by most IS actors.

Box 8:

The international market and the Kenyan market for recycled paper

(Case study)

The Kenyan formal paper recycling industries supply mostly large Asian processing factories. In 2006, because of decreased energy costs North African, mainly Egyptian, paper recycling industries, reduced their selling prices for recycled paper. The Kenyan market for recycled paper broke down within one week. Prices in the Kenyan market decreased considerably within days and Kenyan formal re-cycling industries finally stopped to buy any paper. IS middlemen and collectors were left with their paper stocks. The first rains in December 2006 destroyed their hopes for increasing prices as their paper stocks were soaked and could no more be sold.

Source: Livelihoods in the Informal Economy. The Informal Solid Waste Management Sector in Low-Income Settlements in Nairobi; shortened version, p. 35

Formal recycling industries which operate in the international market follow different short term and long term strategies. If in the international market prices for recycled waste are lower than in the national market, these enterprises import the cheaper raw materials. This reduces national demand for recycled waste and finally leads to decreasing prices in the national market. These price reductions are also transmitted to the IS. But such fluctuations make it difficult for IS enterprises to plan their activities (business planning); they generally do not have sufficient access to information about international trends and developments.

Within the framework of their long term strategy enterprises which operate in the international market reduce their operational costs by out sourcing of certain activities to informal suppliers. In Kenya. (large) formal recycling companies f. ex. buy only large quantities of clean and well sorted materials. Cleaning, sorting and stocking up to the required quantity have to be done by waste dealers. IS dealers who do not have the required technical (cleaning, sorting) equipment and the needed (large) storing capacities are excluded from selling their material to these companies.

4.2 What is the importance of national rules and regulations?

4.2.1 Fragmentation of institutional responsibility

Institutional responsibility for SWM is often insufficiently defined, shared by a number of ministries and implemented and executed with insufficient coherence and complementarities. Missing coordination influences negatively management efficiency of the sector in spite of considerable efforts of the responsible authorities. Scattered responsibilities lead to overlapping when policies are formulated, standards are set and guidelines are elaborated. In Morocco f. ex. 6 different ministries are in one way or another responsible for and dealing with SWM. This situation makes lobbying for

the IS difficult as a large number of authorities has to be sensitized and informed about the situation and role of the IS in SWM. Because of missing coordination and harmonization, policies and standards of a ministry who explicitly considers the IS may be contradictory to the policies and guidelines of other Ministries who do not consider the sector. Implementation of IS-friendly guidelines may then not be possible in practice.

Box 9:

Institutional responsibility for SWM in Morocco (Case study)

- *Ministry for Internal Affairs is responsible for the municipalities; they are autonomous regarding the management of households waste, but their budget and investments are controlled by the Ministry for Interior Affairs.*
- *Ministry of Health is the competent authority for management of hospitals and health centres. Hence it is also responsible for management of waste which is produced by these institutions.*
- *Ministry for Agriculture and Rural Development intervenes in identification of disposal sites, mainly in forestry regions and in the establishment of unites for composting.*
- *Ministry of Industry and Trade supervises trade and industrial activities. It is, thus, an advisor regarding elimination of waste from trading and industrial activities and the establishment of corresponding validation mechanisms.*
- *Ministry for Spatial Planning, Water and Environment / Department of Environment is mainly involved in coordination, collection of data, realization of studies, elaboration of laws, rules and norms related to environment.*

Source: Etude Socio-économique des Chiffonniers de la Décharge Publique de Tanger, p.4

4.2.2 Missing legislation on e-waste

E-waste is quite new in the solid waste stream. Hence, there is still very little awareness (among IS-workers) on the risks which are related to its handling and recycling. Information and know-how regarding its safe management are practically missing. At the macro-level of the countries generally neither a regulatory framework exists which deals with proper collection and recycling of e-waste and sets related rules nor a corresponding (implementation) body has been established. There are often laws which deal with health and safety standards and emissions to the environment but the required guidelines which explain their application for recycling of e-waste do not exist. IS actors generally do not have access to any advice regarding safe handling and recycling of e-waste.

4.2.3 Missing consideration of the IS at the macro-level

Even when laws and regulations of the (central) government deal with recycling, they generally do not mention the IS; this is the invisible sector. When reviewing the framework conditions of SWM the Indian Government acknowledged f. ex. the importance of waste segregation and recycling in the “Municipal Solid Waste Rules Act” of the year 2000. This act emphasizes the importance of technology, monitoring and conformance to standards in SWM. Recycling is described as a process of transforming segregated solid waste into raw materials for producing new products which may not be similar to the original products. But in spite of the fundamental role of the IS in collection, sorting and recycling of solid waste, the sector is not mentioned at all.

4.2.4 Governance structures and scope for consideration of the IS

Governance structures of a country influence considerably opportunities for consideration and promotion of the IS. Within the framework of centralized structures laws and resolutions of the central government have to be implemented at all the different levels. In a country with decentralized institutional structures, however, laws of the central government often define only the framework conditions for the activities of the governments of the federated states. Laws of the central government are then not prescriptive but they offer a range of options to be further defined by the individual state. Resolutions of the state governments are then executable orders. They can contribute to create an enabling environment for integrating IS into urban SWM systems. In India the Government of Maharashtra explicitly mentions IS waste pickers in one of its orders of the year of 2002. The Government of Maharashtra states that unorganized waste pickers should be organized with help of NGOs and should register as cooperatives. These organizations should be employed in collecting of waste in the different quarters of the cities with support of NGOs.

Thus, even when the IS is not explicitly considered at the national level, its promotion and integration may be possible and politically supported at the level of the federated states and their municipalities. Cooperation between the IS organization KKKP and the municipality of Pune, Maharashtra, (see box 4) takes place under such institutional and legal framework conditions.

Box 10:

Support of the trade union of waste pickers KKPKP by the municipality of Pune

(Case study)

The Kagad Kach Patra Kashtakari Panchayat (KKPKP), a trade union of self-employed waste pickers and itinerant buyers, was established in 1993 at the initiative of 800 pickers. At that time waste pickers were not recognized as "workers" and scrap collection activities were not considered as "work". Every member of KKPKP filled out a registration form and was issued a photo-identity card asserting her/his identity as scrap collector. These cards were membership cards, but they did not have any legal meaning. After demonstrations, protest marches etc. the municipality finally recognized these cards and it accepted to issue official identity cards to all members of KKPKP. The card holders were authorized to collect scrap in the town. But they were not employed by the municipalities and the issued cards only served for identification.

In 1998 KKPKP and the municipality of Pune opened together the scrap store "Kashtachi Kamai" (Fruits of Labour) as fair trade shop. The waste pickers of the town sell their collected waste to the shop and they get a part of its annual profits. In 2002/03 the municipality of Pune established a scheme for medical insurance for all the registered waste pickers. The payment of the premium is included in the annual budget of the municipality.

In 2005 the Municipality of Pune officially authorized KKPKP to organize door to door collection of waste in the city; it agreed to provide the required equipment and space and to declare it as official municipal policy. KKPKP only promoted the waste collection service. The waste pickers sell the collected scrap through their usual channels and deposit organic waste in municipal containers or compost pits. Apartment blocks contracted the waste pickers and pay them a user fee per apartment. By the end of 2006 almost 1200 waste pickers worked as door to door collectors and they got user fees from over 150000 households.

In 2007, after intensive lobbying of KKPKP, the Municipality agreed to establish an official partnership with a co-operative of waste pickers for provision of doorstep garbage collection services across the city. The Solid Waste Collection and Handling (SWaCH) Cooperative is conceived as a professional service delivery organization for collection, resource recovery, scrap trading and waste processing. It is an autonomous entity but it is financially supported by the municipality for 5 years. The SWaCH Cooperative is supposed to be financially sustainable after that period.

Source: Recycling Livelihoods – Integrating the Informal Sector in Waste Management in India, p. 54 – 56

4.3 What do local factors mean for the informal sector?

Macro-economic framework conditions and national legislation and regulations are the same for any city or town of a specific country. Individual towns, however, are not only different regarding the number of their population; there are a large number of other factors which influence the SWM-system that a town requires. Differences in economic activities (manufacturing, commerce or education), the number of population, climate (range of temperatures, quantity of rainfall) affect the types and quantities of waste which are generated and the area to be serviced. Manufacturing enterprises generate large quantities of inorganic waste for recycling, as glass and

metal. In a mainly commercial town, however, waste will be mainly composed of paper, packaging material, wooden boxes etc.

In towns where the population mainly lives in small individual houses, the area to be covered is relatively large and collecting teams have to do great distances. In comparison to a town with the same number of inhabitants but with mainly high buildings, a larger number of collecting teams is required for reaching every day the same number of households. Low temperatures hinder fast decomposition of organic waste. High temperatures require frequent collection as they lead to rapid decomposition of (organic) waste.

Locally specific conditions do hence influence the overall SWM system of a town; they do not have effects only on the FS, but also on the IS in SWM. In towns which cover a very large area, the largest number of households may be covered by collection services of the IS and only a small part of households by the FS.

Box 11:

Important factors which influence the SWM-system of an individual town

- **Economy:** importance of agriculture, trade and manufacturing, type of existing manufacturing enterprises as producers of waste, existence of recycling enterprises as clients for recyclables.....
- **Institutional factors:** applied regulations for the collection system; political will to integrate the IS in SWM.....
- **Demographic and social factors:** number of population, rate of population growth, ethnic composition of population, consumption patterns of the local population, social norms and habits (acceptance of centralized collection schemes).....
- **Infrastructure:** individual houses with gardens, large houses with multiple floors, large/small streets (slum areas), type and distance of transfer stations and disposal facilities.....
- **Geography:** area (no. of square kilometers to be covered by collection services), topography of the area ...
- **Climate:** maximum/ minimum temperatures, duration of seasons ...

Composition and quantities of generated solid waste vary from season to season. Important seasonal factors are f. ex. burning of solid waste (paper, wood) for heating in winter, harvest of agricultural products ("urban agriculture") and demand for compost. Long terms trends which require modification of the existing SWM-system mainly result from economic and demographic factors, as changes in diet, growth of population etc. Solid waste management systems must, hence, be flexible and able to respond to changes of quantities and qualities (types) of the generated waste, of required frequency of collection etc. Empirical experiences have shown that

the IS has often more potential for adjusting to changing circumstances than the formal sector.

Empirical investigations have shown that the respective importance of the IS and FS, too, varies considerably from one town to another. The IS and FS provide their services partly in different areas. The IS often works in poor or slum areas; wealthy residential quarters may be firstly serviced by FS workers.

Graph / Table 10: Importance of the informal and the formal sector in different towns

City	Cluj Romania	Lusaka	Quezon	Pune, India	Lima, Peru
FS workers per 1000 inhabitants	0,87	0,65	2,25	1,52	1,78
IS workers per 1000 inhabitants	8,4	0,3	4,1	2,9	1,4
Ratio IS workers : FS workers	9,7 : 1	0,5 : 1	1,8 : 1	1,9 : 1	0,8 : 1

Source : Economic aspects of informal sector activities in solid waste management, p. 21

The cities which are considered in the graph above differ considerably regarding climate, size of population, growth rates etc. But they also show significant differences regarding the respective importance of the IS and the FS. In Lusaka the importance of the IS seems to be relatively low (0,3 IS workers/1000 inhabitants). In Cluj the corresponding ratio is 28 times higher with 8,4 IS workers/1000 inhabitants. The part of the FS in the SWM-systems of the towns, too, varies considerably. In Quezon 2,25 FS workers are employed per 1000 inhabitants. In Lusaka the FS has considerably less importance; the corresponding ratio is less than a third.

Every town is finally a "micro-cosmos" with its own characteristic economic, social, geographic etc. factors. This leads to specific requirements which have to be satisfied by the SWM-system of the town. The situation in a town may undergo modifications in the course of time: its population may grow, small houses may be replaced by multi-store buildings etc., and the SWM-system has to develop accordingly. Each town finally has its own specific SWM-system. Elaboration of a ready made solution for improving urban SWM-systems is thus not possible; approaches for improving urban SWM-systems have to be elaborated and conceived "tailor-made" for every individual town.

4.4 How important is municipal policy for the informal sector?

The methods which are applied for waste collection by municipalities differ partly; waste collection can be carried out by a private enterprise which gets a license for several years or directly by employees of the municipality. The stated problems, however, are often very similar. The number of employees, technical staff and workers is not sufficient. Trucks which are used for collection are only partly appropriate; they are old and mostly badly maintained. The municipality generates only low incomes through its SWM-system and the available budget is not sufficient. This situation leads to inadequate provision of collection services and large parts of the town are finally not covered by formal collection services. Municipalities generally have some scope regarding the applied methods for improving their SWM-systems. But the processes which are initiated are often based on very similar policies; they show common trends and the political will for considering the IS is mostly missing.

Municipalities generally aim at changing the methods of waste collection and street cleaning and, hence, they often shift from labour-intensive to mechanized methods. In this way a larger number of households and enterprises shall get access to the services of the formal collection system and a greater part of the generated waste shall enter the (formal) SWM-system. Increasing the number of households which are covered through the use of mechanized collection methods means, however, that IS workers are now excluded to a large extent from the collection activities.

Recycling and composting by the formal sector often receive increased consideration. Cleanliness of collected waste is of considerable importance in view of recycling. Prices for clean waste are considerably higher, as is it often hardly possible to clean mixed waste or the necessary cleaning activities are very costly. Segregation of waste at the moment of its collection from households is, thus, of considerable importance for efficient recycling, also by the IS. Waste which is generated by better-off households generally contains more recyclables than waste from poor households. Municipalities, therefore, often introduce different waste collection methods in the individual areas of the town (segregation of waste in residential areas with better-off households and industrial zones etc.).

Recovery of collection costs from households and enterprises becomes then generally a topic, too. Application of appropriate methods for fixing the amount of collection fees (higher fees for collection of mixed waste than for segregated waste) can motivate households to separate their waste. Collection fees may be raised either directly in form of fees from the concerned households or indirectly through taxes.

Box 12:

Characteristics of common strategies for improving SWM

Improving SMW-systems generally means ...

... introducing mechanized collection methods (without transfer stations) which excludes IS actors from waste collection;

... introducing segregation schemes which support recycling activities and create additional options for collaboration with the IS;

... increasing the coverage, i.e. increasing the percentage of the generated waste which enters the formal SWM-system (percentage of covered households, enterprises etc.); this reduces the quantity of waste which can be collected by the IS;

... discussions about or implementation of cost recovery either in form of direct fees or taxes from the different actors (households, enterprises etc.) who generate waste;

... improving the standards of waste disposal (establishing new sanitary landfills at considerably greater distance from urban areas, construction and use of additional transfer stations, closing down of old dumpsites, introduction of payment for disposal based on the weight of the disposed waste) which make access to waste more difficult for IS actors;

... consultation of and /or communication with users of the SMW-system;

... interest in involving the formal sector in composting and recycling which leads to competition between enterprises of the formal private sector and IS actors;

... planning or implementation of institutional reforms for creating autonomous SWM units or divisions in the public sector or involving the private sector in SWM;

... review of the framework conditions of SWM (formulation of a SWM plan, regulations or laws)

Other measures of municipalities for modernizing urban SWM-systems concern improving the standards of waste disposal f. ex. by closing of old dumpsites near to the town and establishing new sanitary landfills at a considerably greater distance from the urban area.

The aim of municipalities to increase coverage of solid waste collection creates scope and opportunities for explicit integration of the IS in the formal SWM-system. But within the framework of the generally implemented modernization processes neither requirements nor contributions of the IS are considered. The opinions about the IS and its integration into SWM often differ considerably between politicians, technicians and the local population. The IS is looked at as a negative factor which is harmful to city life and hinders work of the municipal employees at the dump site. Hence, the initiated processes for improving SWM-systems finally have mostly negative impacts on the IS.

Box 13:

Improving SWM and criminalizing the Zabbaleen, Cairo, Egypt (Case study)

In the "Environment Report, 2005" the Egyptian Ministry of State for Environmental Affairs officially recognized that in Cairo "existing conventional waste management methods have become incapable of meeting society needs with its different groups in terms of maintaining a reasonable level of cleanliness, controlling health hazards and adverse environment impact and providing a generally civilized appearance of the country". The level of provision with collection services was very different among the individual quarters of the town. Government accepted the need for reforming the existing SWM system and decided to "privatize" the SWM in Cairo.

The licenses of IS micro-enterprises (Wahis/ Zabaleen) which had carried out these services before, have not been renewed and an international bidding procedure has been initiated. Contracts have been finally made with international and (formal) local enterprises. These contracts were based on the concept of integrated SWM and they covered collection, transport, cleaning of streets and disposal of the waste at dumpsites. The role of the government was reduced to monitoring, direct payment of the service providers and the collection of user fees from the households. The citizens should be charged with the costs for the cleaning services through adding a small percentage to their electricity bills.

Earlier the Zabbaleen had collected the waste directly from the households. Corresponding to the concluded contracts only one of the firms had to assure door to door collection; the other enterprises had to collect the waste from containers which had been put into the streets. The inhabitants, however, considered the task to carry their waste into the street and to put it into the containers increasingly as (socially) unacceptable (old and ill persons, children, houses with 8 to 12 stories and often not functioning elevators). Furthermore the inhabitants complained about the increased collection fees compared to the earlier situation and more and more they refused to pay. The international firms have been increasingly considered as incapable; they got problems to get workers and one of the enterprises even stopped its activities.

The traditional IS waste pickers, the Zabbaleen, continue partly - as they did not find any other sources of income - to collect waste from households, but now without licenses and collection fees. The Zabbaleen know that their activity is illegal; the waste in the containers is propriety of the enterprises which are officially charged with collection. Taking waste out of the containers means to steal it; this is a criminal activity that can be punished. The officially engaged enterprises have the right to stop the Zabbaleen to work. But the enterprises mostly accept the activities of the Zabbaleen as this is often the only way to collect the waste from the homes. The population welcomes the activities of the Zabbaleen and partly pays them; but on the average their income has decreased.

Source: The informal sector in waste recycling in Egypt

Private (formal) firms which are charged with solid waste collection ("privatization") through contracting or franchising employ their own workers who are generally not recruited among the IS. Increased use of mechanized collection equipment, contracting of private firms, establishment of new landfills at considerably greater distance from the urban area finally make access of pickers to waste finally more difficult and reduce employment opportunities for IS workers. Access to waste gets more time-consuming for IS recyclers which leads to reduced income and also increased social tensions (conflicts).

Growing interest of industry in recyclables improves income generating opportunities for the IS. But it may also induce municipalities/ local authorities to set up their own formal recycling facilities. Ownership of the recyclable materials gets then an important consideration. Waste picking now means to “steal” the waste and access to waste is made more difficult for the IS.

4.5 The level of organizing, how does it influence the informal sector?

A large number of different actors, as municipalities, private collection enterprises and recycling enterprises of the FS, workers of these enterprises and workers employed by municipalities, IS workers, IS recycling and trading enterprises and finally households and industries which generate waste, are involved in SWM. The interests of these different actors, however, diverge considerably. Households demand low collection fees, municipalities are interested in high cost recovery from households and recycling enterprises of the IS and FS aim at paying low prices for materials and waste which they buy from waste pickers.

IS workers in SWM do not have a tradition to organize for collaborating or defending their interests. They generally work individually or with their families; often they even distrust collective labour and activities. Scrap dealers sometimes intensify these fears by disseminating misinformation about organizations. On the other hand scrap dealers are generally not accepted as members by formal professional organizations as chambers etc. In most of the towns the IS in SWM is, hence, often “invisible” and organizations which represent its interests and support its integration into the (formal) SWM-system do not exist. But in some towns and countries strong IS organizations have been established; they now contribute to considerable improvement of the overall situation in the IS.

Box 14:

Lessons Learnt - FACTORS INFLUENCING THE INFORMAL SECTOR IN SWM

National IS-enterprises are affected by international price fluctuations and development trends for raw and recycled materials. But these enterprises mostly benefit from positive trends only with delays. Decreasing (international) prices, however, generally lead in the short run to losses (unsold material, insufficient storage capacities). The current international financial crisis leads to decreasing production activities in industrialized countries. The resulting decreased international demand and prices for (specific) recycled raw materials will finally have negative impacts on IS-enterprises related to SWM in developing countries.

The IS is mostly not explicitly considered by national legislation, but nevertheless there may be scope for promoting the IS. Certain governance structures (federation of national states, as in India, decentralization), however, allow explicit consideration and collaboration with the IS at the level of the municipalities and the states. IS actors generally do not have access to any advice regarding safe handling and recycling of e-waste. Regulatory framework which deals with e-waste does generally not exist. Making use of the existing scope for considering the IS, however, requires a corresponding political will and an in depth analysis of the existing legislation.

Ready-made solutions for improving urban SWM-systems cannot be developed. Each town has its own SWM-system which corresponds to its specific situation resulting from economic, social, spatial, geographical, demographical etc. factors. Policies and strategies for improving the SWM-system have hence to be "tailor-made" for allowing considering the locally specific situation and assuring the expected outcomes.

Generally applied strategies for improving SWM-systems affect the IS negatively. Increased mechanization of waste collection, increased competition for recyclables, establishment of new, very distant landfills etc. reduce and make access of IS workers to waste more difficult; this leads to reduced employment opportunities and income, and increased social tensions (conflicts, criminalizing of waste picking). Insufficient analysis of the present overall SWM-system and non-consideration of the services provided by the IS may even lead to less performing SWM-systems. The IS and its activities have hence to be explicitly considered when elaborating and formulating a policy and strategy for improving the SWM-system.

5. IMPACTS OF THE INFORMAL SECTOR

The following chapter deals with direct and indirect impacts of the IS on its workers and enterprises, i.e. employment creation and the impacts on health and social status. Furthermore direct impacts as cost reductions for municipalities and pollution of water, air and soil, are taken into consideration. In the last part of the chapter indirect impacts of the IS are presented.

5.1 Direct impacts

5.1.1 Employment creation

The activities of the IS in SWM provide employment for a large number of urban poor, often several thousands, who do not have any other income generating opportunities. Integrating the IS into the formal SWM system will improve their working conditions and income. Large additional employment effects, however, can not be expected. The urban IS related to SWM is often the entry point for rural migrants from the surrounding areas. Improved working conditions and income in the sector may attract even more labour forces. Efficient integration of the IS related to SWM cannot solve the overall employment problem of developing countries.

5.1.2 Impacts on health

The effects of the activities of IS workers on their health represent a large hidden cost. Injuries and diseases are a cause for losing income and for lower productivity. Specific health risks which result from exposition to toxic materials, as lead or mercury (recycling of e-waste), become partly obvious only after a long time. Exact impacts which result from exposure to these toxic materials and the related occupational risks of IS workers have been analyzed up to now only in selected cases. The unsatisfactory bad working conditions of IS workers lead finally to shorter life expectancies. The average life expectancy is of 67 years in Mexico; for waste workers, however, it is of only 39 years.

Integrating the IS in the formal SWM system can considerably contribute to reducing health risks of the workers of the sector. Supported recycling centres can be provided with toilets and drinking water and the IS worker can get access to protective clothing and vaccinations (hepatitis, tetanus, typhoid etc.). Organized IS workers can also be provided with training in view of reducing the encountered health risks (daily hygiene, first aid measures, handling of toxic materials etc.).

5.1.3 Costs reduction for municipalities

Activities of the IS directly reduce directly the costs of municipalities which are related to SWM. Analyzing the waste flow chain allows to identify the contributions of the IS to SWM of a specific town. The percentage of waste which is collected and recycled by the IS can be calculated and be compared to the corresponding activities of the FS. Conversion of that information into monetary terms allows to identify the direct effects on the municipal budget.

Costs for collection and transportation: Waste material which is recovered from households and enterprises by the IS through door-to-door collection, does not need to be collected by the services of the municipality. In this way the costs of the municipality for collection, transport and disposal of waste are (depending on the quantities which are recovered by the IS) reduced. The amount of the reduction of the transport cost depends (among other things) on the point from where the IS workers remove the material from the waste stream. Within the framework of a partnership agreement with the municipality IS workers may collect waste directly from bins in the streets (without payment of the municipality and households). The IS workers will not spread the waste all over; additional sweeping and cleaning by municipal workers (which leads to costs for the municipality) are hence not necessary. Transport of the corresponding quantity of waste to the disposal site by the municipality is, thus, not required and transportation costs of the municipality are reduced correspondingly.

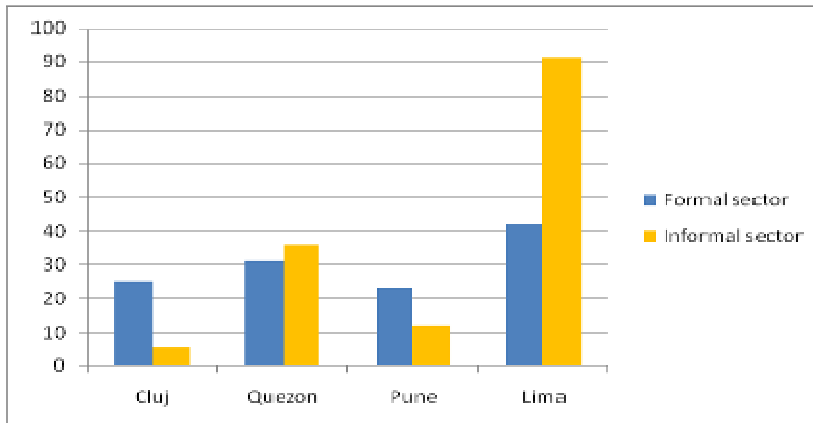


Photo 6: Waste picker with sorted plastic waste

Costs for cleaning, recycling and disposal: Costs related to management of waste depend on the quantity/volume and the type of waste. The space which is available at the disposal site of the municipality can be used for a longer time, when the volume of waste to be disposed is reduced (through recycling). This will, furthermore, postpone the required capital investment of the municipality for establishing a new disposal site. Empirical investigations suggest that the costs related to recycling by the IS (use of labour intensive technologies etc.) are generally

lower than corresponding costs of the FS. Improving of working conditions in the IS may, however, result in higher recycling costs.

Graph/ Table 11: Recycling costs in the informal and the formal sector (€/t)



Source: Economic aspects of informal sector activities in solid waste management, p. 45

Some types of waste cause more pollution than bio-degradable material and they may generate pollutants which have to be cleaned up. (Thin) plastic bags for example easily block water drains. The required cleaning activities are additional costs for the municipalities. Reduction of (the quantity of) particularly polluting waste through (collection and recycling) activities of the IS leads hence to further cost reductions for municipalities.

5.1.4 Impacts on water, air and soil

The IS recovers and recycles large quantities of material, and this sector contributes in this way to clean streets and cities. The IS, furthermore it collects waste of a large number of households which are not covered by formal collection services. But the activities of the IS have also clearly negative effects as pollution of air through unpleasant and persistent smell of decomposing garbage and smoke from burning waste. Pollution of water and soil may result from small scale recycling and processing operations.

Graph/ Table 12: Importance of the informal sector in recycling

		Cluj	Lusaka	Quezon	Pune
% of recyclable material recovered	by the IS	62	33	92	100
	by the FS	38	67	8	0

Source: Economic aspects of informal sector activities in solid waste management, p.37 and 43

E-waste recycling contributes significantly to pollution and environmental (water and soil) degradation because of the very poor processing technologies of the informal sector.

5.2 Indirect impacts

5.2.1 Provision of employment and income

Recycling activities of the IS lead to production of inputs for formal local, regional and international recycling and manufacturing industry. In this way the IS indirectly supports creation of employment and income in the formal industrial sector. Processed recycled raw materials are used as inputs for production of consumer goods for low income groups; a part of the recycled raw materials is exported. Recycling activities of the IS, thus, also support employment creation and income generation abroad.

5.2.2 Protection of natural resources

Recycling lowers the rate of depletion of natural resources, reduces resource and extraction impacts of industrial activities and the land area which is required for waste disposal. Use of compost replaces chemical fertilizers. Other effects of recycling are mainly related to the use of energy in collection, recycling and disposal of solid waste. The technological processes which are applied by the IS for recycling recovered materials usually consume generally less energy than extraction and processing of virgin materials.

Recycling reduces the amounts of green house gases from waste disposal facilities, and allows to reduce energy consumption in transport and industrial production processes. Decomposition of waste in disposal sites leads to production of methane and carbon dioxide, both greenhouse gases. These gases cause climate change. Recycling activities of IS waste workers reduce the volume of material which reaches legal or illegal disposal sites, and reduce hence the quantity of these potential emissions from disposal.

If less waste needs to be transported to disposal sites - as it is recycled (by the IS) near to the households where it is generated - energy is saved and less carbon dioxide is produced. Extraction, refining and processing of raw materials, too, require energy and lead to greenhouse gases. If products can be manufactured from recycled materials, lesser quantities of raw materials are needed and the quantity of greenhouse gases which is produced by extraction industries is reduced.

5.2.3 Contribution to achieving the MDG

The UN Millennium Development Goals focus on main social and environmental challenges and refer hence to poverty, education, gender, child mortality, health, environment and global partnerships. Regarding their achievement 18 sub-targets have been defined which shall be met by 2015.

Graph / Table 13: UN Millennium Development Goals

1. Eradicate extreme poverty and hunger	5. Improve maternal health
2. Achieve universal primary education	6. Combat HIV/AIDS, malaria and other diseases
3. Promote gender equality and empower women	7. Ensure environmental sustainability
4. Reduce child mortality	8. Develop a global partnership for development

Source: Solid Waste management and the Millennium Development Goals, p.6 - 22

Waste collection and recycling activities of the IS give employment to a large number of people in developing and in transition countries. IS workers partly achieve incomes which are considerably higher than the minimum salary of unskilled industrial worker in the FS. Activities of the IS are hence an important source of income for the urban population and contribute to achieving of MDG 1 "Eradication of extreme poverty and hunger". These impacts can be further increased by improving productivity of the activities of the IS and integrating the sector in SWM systems.

Working and living conditions in the IS are only partly dependent from the generated incomes. Improving of solid waste collection methods, rising of awareness about the risks which are faced by pregnant women and children from contact with waste, and upgrading of waste disposal sites will also contribute to reducing child mortality and improving maternal health (MDG 4, MDG 5).

Depending on the considered country around one third up to more than half of the IS workers are women. Organizing women in waste picker organizations gives them a voice, allows representation of their interests and facilitates access of women to capital for increasing their income generating opportunities (MDG 3: Strengthening and empowering of women)

Waste collection and recycling of IS workers contribute already at present to reduction of environmental contamination; these activities reduce water induced diseases and illnesses which are caused by pollution and disease carriers like rats or flies. Additional information and awareness raising activities will contribute to reducing breeding locations for mosquitoes by keeping solid waste out of drains, avoiding formation of stagnant water and preventing collection of rain water in discarded containers left in the open (MDG 6). Uncontrolled disposal of waste causes

pollution and degradation of natural resources as water, air and soil. Through its recycling activities the IS contributes to environmental sustainability and resource efficiency (MDG 7). By improving SWM related activities in the sector, i.e. by avoiding dumping of waste into channels and water bodies that pollute water, contribution of IS to achieving that MDG can be further increased.

It can be concluded that the IS in SWM contributes - even without being integrated into the formal SWM system - to achieving the MDG which are related to poverty reduction, fight against illnesses caused by pollutants and environmental sustainability. Integration of the IS in formal SWM systems will allow to make further use of potential of the sector for contributing to gender equality, to reduction of child mortality and to improvement of maternal health (MDG 3, 4 and 5).

Table 14: Direct and indirect impacts of the informal sector in SWM

Direct impacts	Indirect impacts
<ul style="list-style-type: none"> • Creation of employment • Generation of income • Unsatisfying living and working conditions (high health risks, social stigma, unequal working relations between different IS actors, discrimination of women, child labor) • Provision of waste collection services (clean towns and cities) • Pollution of soil, water and air (poor recycling technologies) • Reduction of costs of municipalities related to SWM (collection and transport of waste, establishment of dump sites) 	<ul style="list-style-type: none"> • Creation of industrial employment and generation of income at the national and international level • Reduction of depletion of natural resources through recycling activities (reduction of extraction activities and production of resources as industrial inputs, reduction of area needed for waste disposal, of production of chemical fertilizers) • Reduction of energy use (recycling vs. extraction/processing of virgin resources, reduced transport of waste) • Reduction of green house gases (reduction of energy use) • Contribution to achievement of MDG

6. SUPPORTING INTEGRATION OF THE INFORMAL SECTOR IN SWM

The following chapter deals with the practical integration of the IS in SWM-systems; basic aspects of the related planning process are presented first; in the second part of the chapter key issues and success factors of integration are discussed with help of empirical case studies.

Collaboration with the IS is often a challenge for municipalities; IS actors, generally miss experience in dealing with public authorities and the capacities of IS organizations are still limited. Municipal staff of the municipality who is involved in establishing and implementing of that collaboration, hence, generally needs (access to) corresponding knowhow and experiences.

Cooperation between the municipality and the IS has to be considered as a process. Individual IS workers and organizations are charged by the municipality with provision of specific tasks as collection and recycling of waste. But at the same time these IS actors are also supported by corresponding advice and training for increasing and strengthening their capacities for carrying out these tasks.

6.1 Considering the informal sector in planning and policy formulation

Improving SWM systems can affect the IS positively or negatively. It can lead to elaboration and implementation of strategies which finally threaten the generation of income of IS workers through their traditional activities. Strategies for improving SWM-systems, however, can also support the integration of the IS in the (formal) municipal SWM-system; contribution of the IS to SWM is recognized and IS actors are formally charged with SWM activities.

In view of its integration in the formal SWM-system, the IS has to be considered already in planning. Elaboration of scenarios is an efficient instrument for analyzing the importance of IS activities for the functioning and improvement of the SWM-system. Scenarios can be used for making municipalities aware of the usefulness of the IS and for supporting its integration in the formal SWM-system. Elaborated scenarios should highlight extreme cases among the available options. The "subtraction scenario", hence, presents the case when the IS ceases all its activities. The "addition scenario", however, reflects the situation when the IS is integrated into the formal SWM-system and (even) increases its scale of operations.

Use of the corresponding data allow to estimate the quantitative impacts of the two different scenarios, as the quantities of collected, recycled and disposed solid waste, the resulting benefits for the IS workers etc. A dynamic analysis of the scenarios will

provide an idea about the future development of the SWM-system (with and without the IS). The impacts on the IS and the FS which are related to the different scenarios, however, do not only depend on the initial situation of the SWM (fields of activities of the IS, capacities of the IS and FS, methods of disposal etc.) and the selected methods for improvement. The identified impacts result also of the assumptions which are (explicitly) made when elaborating the scenarios.

Within the framework of the strategy which was implemented in Cairo for improving the local SWM system the inhabitants had to put their waste in containers in the streets. Before, traditional waste pickers had collected the waste directly from the doors of the apartments on the different floors. The implemented strategy was based on the assumption that the families will accept and agree to go down into the street for emptying their waste bins. That assumption, however, did finally not correspond to the behavior of the households and the success of the introduced collection system has been considerably questioned.

Box 15:

Subtraction scenario and addition scenario in Cluj-Napoca, Romania (Case study)

The elaboration of the subtraction scenario and the addition scenario has been based on the present situation of the town of Cluj-Napoca. Based on the answers to these questions in the specific context of Cluj-Napoca and available quantitative data, outcomes and effects which will result from the implementation of the two scenarios have been identified and analyzed.

For elaborating the subtraction scenario the following questions have been asked:

- *Metals, paper and food are collected at present by the IS: How and by whom will they be collected without making use of the services of the IS? What will be the impacts of these modifications (quantities to be deposited at the landfill)?*
- *What will be the impacts on dump pickers who will no longer be allowed to work? What will be happening with mixed waste (sorted by machines, deposited at a landfill...)?*
- *Has the present waste collection system to be changed f. ex. through introduction of segregated waste collection (PET, paper, cardboards, cans, glass etc.) from households, industries etc.? How will the present recovery rate be affected by such a modification?*

The addition scenario was based on the assumption that the IS will be integrated in the formal SWM-system through contracts and arrangements with IS enterprises and associations.

This led to the following questions regarding the development of the SWM-system:

- *Organizations of street pickers, can they provide door-to-door collection of mixed waste and segregated recyclables? Are they able to organize themselves the provision of these services? Which level of recovery rate can be expected in that case?*
- *Dumpsite pickers can they be organized? Will they agree to do sorting on a special platform which will be provided by the local sanitation company? How many dump pickers can be*

provided with better equipment, vehicles and storage place in view of increasing their output? The sanitation company, will-it agree to guarantees them a certain monthly minimum income regardless of the market prices?

Source: Economic aspects of informal sector activities in solid waste management

Depending on the aimed at impacts, the capacities of the FS and IS, the available municipal budget etc. the most corresponding scenario can be chosen and the required strategy can be elaborated in detail.

6.2 Developing of informal sector organizations

In some countries of Latin America and Asia specific organization structures of the IS have already been developed. In Pune and Quezon f. ex. respectively 60% and 37% of the IS workers and waste pickers belong to an organization. In Brazil organization structures of the IS even exist at the national level. The "Latin-American Congress of Waste Pickers" which took place in 2003 and in 2005 in Brazil aimed at supporting interaction of waste pickers at the level of the continent.

6.2.1 The process of organizing

Mobilization and organization of IS workers, as waste pickers or owners of small junk shops, is often initiated from outside of the sector by NGOs, churches etc.; they provide initial assistance and support, and create trust and trustworthiness among waste pickers. Supported by and together with these organizations, the (newly) established IS associations act then as a social movement. They engage in protests, social marches and other activities which are associated with social activities. At the same time they are strategic actors by participating f. ex. in committees, working groups and forums together with the government and representatives of the private sector. In this way a process of social communication takes place and IS workers are mobilized and develop an identity of being "professionals of environment".

Box 16:

Development of the waste picker movement in Latin America (Case study)

Establishment of Brazilian organisations of waste pickers partly goes back to socio-pedagogical activities which were carried out by organisations of the Catholic Church. In Belo Horizonte the process of organization of waste pickers started in 1988 with support of the "Street Pastoral Team", a group of the Catholic Church that works with street dwellers. These activities finally led to the creation of the waste pickers association ASMARE in 1990. At that time the waste pickers mainly asked for the right to work in the city, to collect recyclables and to have a proper place for sorting their material.

Further development of the organization of waste pickers and their integration in the formal SWM-system is closely related to the election of the Workers Party at the level of different municipalities. Decentralization conferred more autonomy and financial resources to municipalities for addressing their issues and local governments could pursue their own social agendas. This led to official introduction of source segregation programs. During the next years many other waste picker organizations have been created with support of the municipality of Porto Alegre (1990). The City Government of Belo Horizonte started partnerships with waste picker organizations as ASMARE (1993). These developments did not only support growing of waste pickers organizations, they contributed also to local and national visibility of these organizations.

In 1998 the National Forum "Waste & Citizenship" was launched under the leadership of UNICEF; it helped to give more visibility to the social and environmental importance of the activities of waste pickers. Furthermore, existing cooperatives and associations were made more visible and they prompted other groups of waste pickers to get organized. Various actors as ASMARE, social agents from NGOs etc. increasingly made efforts for creating a national movement of waste pickers. In 1998 the "Federation of Recyclers' Association" was created in the state of Rio Grande de Sul. The "Movimento Nacional de Catadores de Recicláveis" (MNCR) was established at the occasion of the "1st National Congress of Brazilian Waste Pickers" which was held in Brasília in June 2001 with support of organisations as Pastoral de Rua, the National Waste & Citizenship Forum, UNICEF, the municipal administration of Belo Horizonte and others. In 2003 and 2005 the 1st and 2nd Latin - American Congresses of waste pickers took place in Brazil with the aim to initiate interaction between waste pickers of the whole continent.

Source: Integration of the Informal Sector in Solid Waste Management in Brazil, p.16

Organizations of the IS take different forms as self-help groups, CBOs (community based organizations), saving associations, marketing co-operatives, "labour unions" etc.; they can be further developed and community platforms, alliances and networks at the local, regional and even national level are finally established. The related rules, regulations and denominations partly differ between individual countries. Associations are often non-profit oriented organizations which are allowed to cover their costs, but which do not aim at making profits.

6.2.2 Activities and functions of IS organizations

Forming an (self-help) organization and being its member have a large number of advantages for IS actors, as waste pickers and small dealers. Formalisation of the IS does not mean formalisation of the individual (self-employed) IS worker or micro-enterprise itself. Formalisation rather takes place indirectly, through membership of (self-employed) IS workers or micro-enterprises in formalized and registered organizations.



Photo 7: Training of informal women waste pickers in Egypt

Membership in such an organization allows overcoming limitations and restrictions of the individual person (low level of schooling, missing experience in collaborating and negotiating with public authorities etc.) and IS organizations provide their members access to services as health insurance and micro-credit. These organizations are also important instruments for exchange of experiences, coordination and increased "visibility" of the sector. They sensitize and inform municipalities and the general public about the importance and contribution of the IS to the cleanliness of the city and conservation of environment.

Box 17:

Important functions of IS organizations

- Mobilization and organization of waste pickers and small junk dealers
- Support for creating an identity of their members (“professionals of environment”)
- Support to their members in establishing network relations and exchange of experiences
- Provision of services to their members as access to micro-credit, health-insurance, training, opportunities for exchanging of experiences
- Sensitization and information of public authorities (“the invisible sector becomes visible”)
- Lobbying and representation of interests of their members
- Official partners of municipalities for provision of services and collaboration (integration of IS)

Registered organizations are essential regarding the integration of the IS in the (formal) SWM-system. These organizations are the actors who directly deal with municipalities. They generally do not conclude contracts and covenants with individual IS workers, but only with their organizations.

Contracting of organisations allows to organise waste collection in a very flexible way and to take into consideration the priorities of the individual waste picker. Not an individual person, but a group of waste pickers is charged with collection. The group members organize the collection activities among themselves corresponding to their (financial) needs and availability. If one of the members cannot work on a specific day, he/ she will be replaced by another member of the group. Organizing finally allows to increase negotiation power and social status of IS actors, to improve their working conditions and market access, and to increase the income of IS workers. But not all the IS organizations aim at improving income generating opportunities and living conditions of their members. Sometimes they may also be used by their leaders for controlling access to waste eventually even in collaboration with public authorities.

Box 18:

Control of access of waste pickers to waste in Mexico City (Case study)

The 800 waste pickers of Tultitlan, in Greater Mexico city, belong to 4 different groups. Every group is guided by a "leader"; officially these groups are cooperatives. In reality, however, the leader alone takes decisions and he controls the waste pickers of his group. Political parties cooperate with the leaders. New waste pickers get official licenses from the municipality only when the leader of the group agrees. In recompense for that cooperation the group of the leader will support during the next elections the political party which is in power at the level of the municipality.

Source: Der informelle Sektor in der Abfallwirtschaft der Entwicklungsländer, p. 14

Membership in or establishment of IS organizations is often more difficult for women compared to men; women have insufficient access to information regarding the appropriate legal form of organization, limited management know-how and their families do not support their participation. Establishment of a cooperative eventually requires (waste picker) women to overcome fears and they may have to push through its registration because of missing consideration and even opposition of the municipality and society in general.

6.2.3 Support of municipalities in organizing the informal sector

Further development of individual groups and small IS organizations, and their growth into a regional and national movement require additional political conditions. Promotion of the integration of the IS in the formal SWM-system is generally not considered by the national government. The prevailing political framework conditions, however, have to provide municipalities with enough decision power (decentralisation) and financial means for deciding on their own SWM-programs. Development and implementation of programs which aim at integrating the IS in formal SWM-system require furthermore the corresponding political will (at the level of the municipalities) to make use of the existing opportunities for promoting the IS. The organizations of the sector are often weak and need further support for developing their institutional capacities and becoming efficient partners of municipalities.

6.3 Strengthening relations between municipalities and the informal sector

Municipalities (and the government) support the integration of the IS in two, often combined ways. They can be facilitators of the process by supporting the formation of IS associations, cooperatives etc., establishing a dialog with IS actors, facilitating them access to recyclables and information for entering new niches for activities etc.

But municipalities can also directly participate in the implementation of the integration process, by providing infrastructure for sorting, balling etc., carrying out of information campaigns for households and the general public, elaborating the legal framework for establishing partnerships with IS organizations, providing access to capacity building courses etc. These support activities do not have to be implemented directly by the municipality; they can be provided by appropriate local service providers of the private sector and civil society in coordination with and subsidised by the municipality. Corresponding examples are presented more in detail in the following chapter.

For providing the IS access to waste and recyclables the municipality can either collaborate with individuals (individual waste pickers, IS micro-enterprises involved in recycling activities etc.) or with IS organizations as associations, cooperatives etc. The municipalities can also choose between different legal forms for establishing formal partnerships with the IS. They can be based either on the accreditation of individual IS actors, contracts (with an IS organization), or covenants with an IS organization.

The scrap buyers of the Mactan Economic Zones I and II (see box) collaborate with Philippine Economic Zone Authority in view of collecting industrial waste. Their activities are based on the accreditation of individual scrap collectors; access to accreditation requires different types of permits, as an environment permit etc., which have to be presented by the scrap buyers when entering the industrial area.

Box 19:

IS involvement in industrial waste collection (Case Study)

The Philippine Economic Zone Authority (PEZA) has selected the Mactan Economic Zones I and II (MEZ I and II) as pilot sites for implementation of eco-industrial practices; accreditation allows actors of the so-called formalized-informal sector to engage in business either as scrap buyers or garbage collectors within MEZ I and II. Scrap collectors and buyers are generally alphabetized and have some level of schooling. They have to have different permits, as the environment permit, for engaging in business in MEZ I and II. Scrap collectors and buyers report that they often have considerable problems for getting these permits from public authorities. Partly they even have to pay informal intermediaries for getting these papers, so that finally not every scrap collector or buyer succeeds in getting the required permits.

There are altogether 162 locators (medium enterprises) in MEZ I and II which are involved in manufacturing. Corresponding to the guidelines of PEZA the locators as primary generators of waste are obliged to make use of the services of accredited scrap buyers and collectors for collection and transport of recyclable materials and residual waste. PEZA collects a solid waste management fee from the locators for collection and disposal of their residual waste. The scrap buyers pay the locators for the collected quantity of scraps.

There are about 61 locally-based and PEZA accredited scrap buyers which collect and buy the scrap which is generated in MEZ I and II. Locators contact accredited scrap buyers when there is scrap to be removed from their company. The locators bid out the monetary value of the available scrap in January and June of each year. The scrap buyers usually network with bigger junkshops or trading companies which lend them the necessary capital for buying the scraps.

PEZA launches an annual bidding for the transportation of the residual waste to the dumpsite. In MEZ I there is at present one temporary accredited collector of residual waste; in MEZ II the private company CBS (General Services and Transport Corporation) does the collection. In MEZ I a temporary storage facility has been built by PEZA which is used by accredited collectors for secondary sorting of recyclables (up to 89%) in residual waste. The collector of MEZ I has hired 15 dumpsite pickers for doing the sorting; they do not need to be accredited by PEZA, as they are directly employed by the collector. In MEZ II the collectors do the sorting directly at the garbage truck as no temporary storage does exist there. The recyclables are sold to junkshops; the residual waste is brought to the uncontrolled municipal dumpsite near-by.

Scrap buying and further sorting of residual wastes in the temporary storage facility and the garbage truck have reduced the waste which is disposed at the municipal dumpsite by around 20%. The decreased amounts of waste which reach the dumpsite have led to a decrease of income of the dumpsite waste pickers; they have filed a corresponding complaint with the City Government. The availability of scrap material has encouraged more persons to work as scrap buyers; this partly creates more competition.

Source: Involvement of the Informal Sector in Solid Waste Management in Mactan Economic Zones I and II, the Philippines

Individual accreditation as method for formalizing the relations with the IS requires that the IS actors have a certain level of negotiation skills and experiences. In the Philippines the level of education is relatively high; the concerned scrap buyers are generally alphabetized and have some experiences in dealing with public authorities.

In spite of that situation they report that not everybody succeeds to get the required permit; acquisition of the permit makes generally "informal" payments necessary. Accreditation of individual collectors may hence lead to the exclusion of IS actors who are less experienced in dealing with public authorities etc. When deciding on the application of a specific mechanism for formalizing collaboration with the IS, an in depth analysis of the local situation is required. Otherwise a large part of the local IS actors may be excluded from the collaboration.

The municipality of Diadema, Brazil, however, has concluded a contract with the waste picker organization OSCIP. It is treated in the same way as a private collector and is formally charged with (door-to door) collection of (recyclable) waste. The association is paid by the municipality for each ton of collected waste. The IS workers get in this way (easy) access to additional waste. They may do first sorting and recycling and sell the material then to small dealers and junk shops.

Box 20:

IS workers as contractors for waste collection, Diadema, Brazil (Case study)

The "Clean Life Program" which was launched in 2000 by the municipality of Diadema has been improved considerably in the meantime; today it aims at social inclusion, generation of income and environment conservation. The program aims at strengthening the economic recycling chain and at improving working and income conditions of IS workers with perspective of reducing waste management costs through partnership with waste pickers.

The city of Diadema is the second densest municipality of Brazil. There is no longer any place available for final disposal of construction and demolition waste; the municipality has to export its waste to neighboring towns; hence the cost of solid waste management corresponds to 6% of the city budget, compared to 3 - 5% as average ranges of Brazilian municipalities. Each ton of recyclables which is collected by the IS avoids costs for transportation and disposal in a private dump site in the City of Mau, as Diadema does not have a public dump area anymore. Hence the mayor's office decided in December 2005 to conclude a contract with the waste picker organization OSCIP (Organization of the Civil Society for the Public Interest) and to pay the pickers per collected ton the same amount which the municipality would have to pay to a private company for collection.

For supporting the introduction of the program and the establishment of a recycling centre the local waste pickers were registered by the municipality and training courses were organized for them. This allowed the waste pickers to get to know the program in detail and to be informed about the work to be performed at the recycling center; they were also informed about getting higher incomes, though not immediately. The waste pickers supply door to door collection in homes, businesses, schools and public buildings and reach around 35 000 families. The 6 recycling centers of the city collect 70 tons of recyclable material every month. The maintenance costs for the recycling centers and the infrastructure bills are at present still paid by the municipality. For recording and monitoring the collected material the municipality works together with college degree interns who follow the arrival and weighting of the material. Income generated by collection and sale is shared among the involved waste pickers according to the number of working hours of each individual. The 67 members of OSCIP have now a monthly income of US\$ 250,- significantly more than the current minimum wage of US\$ 190,00.

Concluding a contract with an IS organization on the same basis as with a service provider of the formal private sector requires that the concerned IS organization has well developed and functioning internal organization mechanisms; this is not always the case.

Municipalities also introduce source segregation schemes for improving their SWM system; the IS workers get then access to cleaner waste which allows to get higher prices from the junkshops than for mixed waste. Introduction of source segregation, however, requires corresponding preparation measures which have to be organized by the municipalities (distribution of drop-off containers, sensitization of households etc.)

But the municipalities combine their role as facilitator of the integration process also with direct interventions at the level of the IS organizations, f. ex. when collaborating with IS organizations which are still not well established. Within the framework of a covenant the municipality may pay subsidies to the IS organization for financing the salaries of its administrative staff, for paying water and electricity bills etc. The municipality may provide capacity building measures and environmental education to the members of the association for enhancing their understanding of occupational health and safety problems which are related to the current recycling practices of the IS. Informal recyclers may get training on improved recycling practices and the establishment of organizations or associations. Municipalities also donate recyclables, which have been collected by its collection services to organization of the IS waste pickers.



Photo 8: Waste wholesaler in Costa Rica

The municipality of Belo Horizonte supports establishment and functioning of formal recycling centers for providing (additional) employment to waste pickers. The municipal collection services bring the collected waste directly to the centers. In this way the waste pickers get access to more waste for sorting, recycling and selling, and their incomes finally increase. The involved waste pickers benefit, furthermore, from improved working conditions at the recycling centers. The monthly income of a waste picker who is member of a cooperative which is supported by the municipality, increased from US\$ 287 before the establishment of the cooperative (1998/99) to

US\$ 468 (2000-2005) after its establishment. The waste which has been treated at these recycling centers contains, however, lesser quantities of recyclable material when reaching the dumpsite; this leads to decreased income of dump pickers.

Box 21:

Recycling centre of ASMARE, Belo Horizonte, Brazil (Case study)

Based on a covenant the municipality of Belo Horizonte supports the recycling centre of ASMARE, an organization of self-supporting businesses (waste pickers) in recycling (paper, cardboard, plastic, aluminum cans). The municipality finances through subsidies the required infrastructure for implementing the source segregation scheme (trucks and drivers for collection of material from containers, recycling containers, recycling centers for sorting of the material by waste pickers and environmental education and skill training).

ASMARE is responsible for managing the recycling centers, for sorting and commercialization of recyclables and for provision of data on production of recyclables to the municipality for monitoring. Revenues from commercialization are split among the associated waste pickers of ASMARE.

The trucks and drivers daily collect the waste and bring it to the recycling centers for further sorting. In some parts of the town the system includes door-to-door collection which covers 80 0000 persons and allows collecting of 200 tons/month. But in some quarters there is competition from autonomous, unorganized waste pickers who may „steal“ the recyclables. This has a negative impact on the overall cost of the formal recycling scheme and reduces the quantity of material which can be taken to the recycling centers.

Source: Integration of the Informal Sector in Solid Waste Management in Brazil, p. 27

6.4 Establishing network relations between the informal and the formal sector

Because of their informality enterprises of the IS are often hindered in accessing support services of the formal sector. The negative perception of the IS by the overall society still worsens that situation. But - for being able to make use of their potential and the opportunities which are offered in the market – an enterprise needs to be integrated in a network which gives access to support services and information. Institutions of the FS, however, which are potential providers of support services do generally not have any contact and information about the “invisible” IS, its enterprises and organizations.

Direct consultation of IS actors allows to identify the potential of IS micro-enterprises which are involved in collection and recycling, and to get information about their needs for support (capacity building, access to credit etc.). An appropriate instrument for establishing contacts between IS actors and formal service providers can be the organization of workshops with participation of representatives of (women) micro-enterprises, associations and cooperatives of the IS on the one hand,

and representatives of FS support organizations which work in fields as capacity building, advice or finance etc. on the other hand.



Photo 9: Collection of waste containers in India

Through the meeting which had been organized by the CYMA-program FS service providers have been informed about specific needs of IS women enterprises. Banks and advisory organizations of the FS got access to basic information about potential clients and have been sensitized for the demands of these enterprises. The meeting was an opportunity for FS service providers to propose and discuss with IS participants (enterprises, associations and cooperatives) the type of services which could be offered. Participation in that workshop finally contributed to destroy barriers which existed between these two groups and had hindered establishment of contacts. The meeting also created a feeling of identity among the IS participants and strengthened their mutual contacts, essential factors for increased and efficient networking.

Box 22:

CYMA: Intensification of networking among women groups and FS service providers

(Case study)

The Program Competitividad y Medio Ambiente (CYMA) aims to improve collection and recycling of waste by micro-enterprises and collection centers under special consideration of gender. For identifying potential working areas in relation with the "Plan de Residuos Sólidos de Costa Rica (PRESOL) and the elaboration of appropriate support measures the program initiated an investigation. It aimed at analyzing the situation of women groups which are involved in Costa Rica in collection and recycling of waste. CYMY also intended to identify institutions and existing mechanism for financing, capacity development and support of these women groups. In a first step interviews have been carried out with altogether 18 organizations as a bank, NGOs, cooperatives, SME, an international organization, public institution, recycling centers and a women network.

Based on the collected information a workshop has been organized with participation of altogether 80 persons. The workshop focused on topics as financing, capacity building, advice, institution building and relations with the local government and community. More than half of the participants (54%) were representatives of women associations which were involved in management of collection centers and recycling initiatives; 40% of the participants were institutions which supply support in the fields of capacity building, advice and financing. During the workshop the women presented their problems and needs in the different fields; they also identified possible benefits which can be realized by working in networks. The women groups and support institutions have analyzed together their respective experiences in capacity building, finance and advice and elaborated related recommendations.

The workshop has been an opportunity for the representatives of the service provider organizations to present their support measures in the field of financing, capacity building and advice to the women groups. On the other site the women groups have given these institutions access to basic information on the needs of the women; that exchange of information and the common discussions of potential service suppliers and clients led to the destruction of barriers; it has created dynamics and has sensitized the institutions for the needs and demand of the women enterprises.

Furthermore contacts have been established between the different women groups who work in collection and recycling of waste. Mapping of the zones where the women groups work has contributed to create among them the feeling that there is a "big group of groups" and that they are part of same community.

Source: Sector Informal y Gestión de Residuos Sólidos en Costa Rica: Aspectos de Género

Relations with service providers, however, are not sufficient for assuring growth and success of an (micro-) enterprise. Well functioning channels for assuring regular provision with inputs are essential, too. Success of IS recycling centers depends to a large extent on regular provision with waste.

The political will which is required for supporting the integration of the IS in the formal SWM system is also influenced by the (positive/ negative) attitude of the population, local opinion leaders and politicians. The image of IS organizations as perceived by the general public may hence be important. As the below presented case study shows, IS organizations cannot become visible through protest marches

and strikes, only. Organizing of social events may also allow getting sympathy and acceptance by the local population and politicians.



Photo 10: Compacted plastic waste for sale

The enterprise Wongpanit is a private FS wholesaler which forms the link between IS collectors and the formal recycling industry. Its activities and methods of organization have allowed establishing of strong linkages with the community of waste pickers. A franchise system for the waste pickers has been established and transparent business relations have been developed. Regular information meetings and environmental education for waste pickers are organized among others. Organization of events with participation of the local population (“waste banks”, support to religious communities etc.) and employment of disabled persons creates very favorable attitudes among local opinion leaders and politicians regarding the enterprise.

Box 23:

Efficient networking structures between a recycling centre and waste pickers (Case study)

Wongpanit Co., Ltd., one of the leading recycling factories of Thailand was established in 1974. Initially it worked in the rural areas of Phitsanulok; at that time the volume of collected waste per day was of only about 1000 kg. After buying of a small junk shop in 1977, several extensions followed; in 1989 Wongpanit Co. Ltd. opened Thailand's first recycling plant. Today it has 200 franchise branches in Thailand and Laos and it sells recyclables to processing industries in Thailand and abroad. Wongpanit buys glass, plastic, scrap metals, paper, cardboard paper, e-waste, coconut shells, textiles, shoes and organic waste. Currently it receives about 205 tons of waste per day from households, scavengers, collection crews, smaller junk shops, enterprises, schools, temples and franchising partners in the surrounding regions.

Wongpanit deals with material that can be sold to recycling manufacturing industries or can be further processed; plastic is, hence, separated per type and then compacted; paper is separated by type/color and compacted into big blocks; bottles in good condition are sold to breweries etc. Wongpanit employs currently around 220 people in its headquarters in Phitsanulok. Disabled persons are employed for simple tasks; after pre-sorting further separation is carried out by skilled workers who have been specifically trained to perform this job.

The company has several branches which are located at major street junctions in Phitsanulok; because of the resulting good visual presence the company is in the mind of all involved stakeholders. The daily prices for all the recyclable materials are written in front of the premises of company. Furthermore a leaflet is published which informs about recycling of waste and its economic value. The flyer is distributed at the main entrance of big department stores etc. Wongpanit is continuously expanding; currently there are 226 branches in Thailand and Laos. But they are not obliged to trade only with Wongpanit.

The number of its branches is increased by using its specific franchise system. (Potential) franchise partners have to participate in a five day training workshop which deals with all aspects of SWM and informs how to start a successful recycling business. Needy people get a start-up loan. In Phitsanulok there are monthly meetings with participation of Wongpanit and its franchises partners (exchange of ideas for improving processing and setup of processing sites, evolution of prices in the recycling market etc.). Wongpanit is also involved in different types of sensitization activities which deal with waste recycling as "waste-banks" etc. Students or community members bring their recyclables to the waste bank in exchange for cash at the current market price ; at the occasion of "Pha Pa Khaya" people gather and bring waste which is then bought by Wongpanit; the generated money is donated to monks.

Source: Sector Informal y Gestión de Residuos Sólidos en Costa Rica: Aspectos de Género

However, there may also be technical reasons for supporting the establishment of relations and cooperation between the FS and the IS. The existing capacities of the FS for recycling of e-waste do generally not correspond to the available quantities. Recycling activities by IS, however, lead to considerable hazards for environment and health of the involved workers. Related programs and projects hence aim at reorganizing of e-waste recycling (pilot cooperation model); they support and promote transfer of harmful processes to formal recyclers with up to date technology

(multiplier effects) and start up of pilot (market-based and profit-oriented) cooperation models between the formal sector and the informal sector.

Box 24:

Lessons learnt: Measures that support integration of the informal sector into SWM

1. At the macro level

- *Decentralization which allows municipalities to define their own agenda and plan their own budget and*
- *consideration of IS integration in national SWM-plans.*

2. At the level of municipalities

- *Political will to make use of the existing scope for collaborating with and integrating the IS;*
- *consideration of the specific situation and needs of IS (activities, roles, problems, potentials etc.) at the beginning of the planning process for improving the local SWM-system;*
- *provision of training and information for the members of IS organizations (institution building training, information measures about the activities of the municipalities, establishment of contacts with bancs, business advisory services, NGOs etc.);*
- *conclusion of formal partnership agreements regarding the division of tasks between the IS organization and the municipality, and their respective contributions; the agreements have to be based on appropriate methods, as contracts, covenants or accreditations;*
- *consideration of the specific need of the IS for "clean" waste by official introduction of segregated waste collection systems and*
- *provision of subsidies (infrastructure for source segregation, facilities for sorting, storage, recycling centers, access to skilled staff).*

3. At the level of the informal sector

- *Access to external support for establishment and development of formalized IS membership organizations (mobilizing and sensitizing of waste buyers and pickers, and eventually small IS dealers) and for sensitizing of political decision makers, the general public etc. (the IS in SWM becomes a "topic");*
- *access to information about development, trends and demand for recycled material in the national and international market;*
- *institutional structures and capacities which allow to*
 - *establish a dialog with municipalities (information about the situation in the sector);*
 - *enter an official partnership with public authorities (municipalities);*
 - *organize the members of the organization at the micro-level for the provision of services on behalf of the municipality,*
 - *to manage the organization efficiently and to market and monitor the recycled material etc. (access to and collaboration with skilled staff);*
- *strong networking relations with waste pickers for providing regular supply of waste for recycling centers and*
- *integration of the organization into the local social environment (recognition by political and other opinion leaders).*

7. CONCLUSIONS

7.1 Potential of improved SWM based on integration of the informal sector

Improving the SWM system by integrating the IS can allow to

- increase the coverage of collection services (number of households having access to collection services);
- give employment to and increase income of the poor urban population presently working in the IS related to SWM;
- improve working conditions and social status of this part of the population;
- increase resource protection through recycling activities which are based on labour intensive, environmentally friendly technologies;
- create additional employment through
 - increased recycling activities of small enterprises (as much as technically possible) and
 - use of recycled material as input by small enterprises, and
- to run the overall urban SWM system at lower costs through
 - use of relative labour intensive technologies in collection and recycling of waste;
 - additional income from sales of recycled material and
 - reduced need in additional landfills and authorized dump sites.

Different measures can be taken to support integration of the informal sector in formal solid waste management systems and to fully realise the above presented potential effects. Some of these measures as

- considering the IS in planning and policy formulation
- supporting the organization of IS workers
- strengthening relations between municipalities and the IS
- establishing network relations between the IS and the FS

have been presented above more in detail. In most of the towns, however, implementation of improved SWM systems which are based on the integration of the IS is still in its initial stages. The aspects described in the following chapters should be considered in efforts to facilitate informal sector integration in solid waste management strategies.

7.2 Sustainability of IS organisations and enterprises

Orienting provision of collection services or recycling activities of informal sector organizations and enterprises (cooperatives, recycling centres etc.) at criteria of economic efficiency should be a focus of the provided support measures. In many cases civil society organisations and municipalities contribute to the development of these organizations through subsidies of various forms (payment of salaries for staff, electricity bills etc.). Sustainable increase of income and improvement of labour conditions of IS workers require, however, that these IS enterprises orient their activities at criteria of economic efficiency. Provision of corresponding advice and support is hence of considerable importance within the framework of a support strategy.

Provision of collection services, recycling and production by using recycled material as inputs are the core activities of these IS enterprises and (membership) organizations. Often, however, they carry out additional activities as mobilizing their (potential) members and providing them with training. These activities cannot be included when considering economic efficiency of IS enterprises and cooperatives. Implementation of these activities will need external funding through subsidies etc. also in the long. But these measures are essential in view of (sustainable) functioning and strengthening of IS cooperatives.

7.3 Need for multi-stakeholder dialogue

Strategies and support measures for integrating the IS in the formal SWM-system should consider all the different types of informal actors. Improved sorting reduces the quantities of recyclable waste which reaches the dump site. Often only a small number of independently working dump pickers accepts to involve in organized recycling activities. Small and micro enterprises of the IS need access to advice and support for using recycled material as inputs (access to appropriate production technologies, support regarding development of products which correspond to local demand etc.). A part of IS actors, as well-off dealers and junk shop owners, however, may not need direct support because of their comfortable income situation.

Formulation and implementation of individual, isolated measures and activities is finally not sufficient. Integration of the IS in SWM has to be based on a strategy which covers the whole waste flow chain from its beginning, the generators of waste, up to dump pickers and small and micro enterprises which use recycled material as inputs. Development and implementation of such a strategy require a multi-stakeholder dialogue which includes all the different types of actors and stakeholders involved in SWM, as the municipality, formal (business) service providers, NGOs

which support IS enterprises and IS membership organisations, and representatives of IS enterprises and organisations including dump pickers and well-off IS dealers.

A N N E X

A1: Glossary

Composting

Composting is a natural process; it converts biodegradable waste as food residues, grass etc. with help of bacteria into compost, a product which is used as soil conditioner for improving quality of soil. In a large number of societies composting is a traditional method for recycling organic waste.

Dalit(s)

Dalits do not belong to any of the Indian castes (out-casts, untouchables). They are socially very much stigmatized; cast Hindus do not marry them and eat with them. Out-casts, as Dalits, are generally only involved in "dirty" activities of the lowest social status as handling of waste, dead animals (working with leather). Officially, however, the cast system is no more in existence since a large number of years.

Disposal

All actions which concern placing of waste and residues in their final location and place. In many countries disposal means open dumping of waste which leads to pollution of water, land and air (see *dump side*).

Dump picker

Someone who sorts discarded items and material on dump sides to collect goods or materials that can be reused or be sold for earning money.

Dump side, (un-)authorized

A piece of land where waste is deposited; no care is taken at an unauthorized dump side for preventing pollution of air, water and the soil. There is generally no or only very poor planning and operational control; the deposited waste is often (continuously) burned. An authorized dump side is operated in such a way that minimal pollution of water or air results from disposal of waste (see also *landfill, sanitary*)

E-waste

Any broken or unwanted electrical and electronic appliance, as IT equipment, telecom equipment, household appliances, lighting equipment, electric and

	electronic tools and toys, leisure and sport equipment, medical devices and monitoring and control instruments.
Generator (of solid waste)	Individual persons, households, enterprises and institutions as schools and offices who discard items (see <i>solid waste</i>).
Informal sector	The informal sector consists of (self-) employed persons, workers and (micro-)enterprises with up to 10 workers; they are involved in production activities and provision of services which are their main source of income. Enterprises of the informal sector are generally not registered; hence, they neither pay taxes, nor do they follow laws and regulations related to employment, environment protection etc.
Itinerant waste buyer	An itinerant waste buyer moves from street to street and collects recyclables from households, institutions or businesses. He/she gets the items partly as an donation, may pay a small amount of money or exchange these items against households goods. Itinerant waste buyers are often specialized in a small number of specific items, as paper, glass, or metal, which he/she then to a dealer.
Junk dealer	Junk dealers buy and sell recyclables. There are junk dealers of different operating size; small and medium sized junk dealers generally belong to the IS. Large junk shops as scraps yards, depots of paper, are usually registered enterprises and are often specialized in some products. They only buy from other (smaller) junk shops and are involved in substantial processing and trading; large junk shops generally sell to large scale processing enterprises and are also involved in exporting.
Landfill , (sanitary)	A sanitary landfill is a dump site which has been prepared in such a way so that disposal of waste causes minimum pollution of air and water. When the operations will be ceased at the landfill, the situation at the dump site should be similar or better as on the surrounding areas. Often, however, sanitary landfills are not correctly operated and they are finally similar to open (unauthorized) dumps.
Micro-enterprise	Enterprise of (self-)employed persons and of generally up

to 10 workers (see *informal sector*)

Recycling

Recycling allows reintroducing of a product or good which has already be discarded into the economic circuit; recycling covers several stages as picking, transporting, selling, sorting, cleaning, processing and perhaps use as input for manufacturing. Recycling may lead to reuse of the material for the same purpose as the initial one (reuse of glass bottles) or for a different purpose (production of compost etc.).

Sanitary land filling

Controlled dumping of waste which does not lead to pollution of water, soil and air (see *landfill, sanitary*)

Solid waste

Solid waste is any item that is discarded by its owner; it can be distinguished between organic solid waste as leftovers from food, and un-organic solid waste as glass and tires. Gases and liquids in containers are also considered as solid waste. Individual persons, households and enterprises who discard items are generators of solid waste (see *solid waste*).

Solid waste management

Solid waste management includes all measures and activities, as storage, collection, transport, pro-cessing, recycling and disposal, which are required for minimizing inconvenience, nuisance, pollution and environmental hazards which are related with solid waste.

Street picker

Someone who sorts discarded items and material in the streets (street dumps, containers in the streets) to collect goods or materials that can be reused or be sold for earning money.

Transfer station picker

Waste picker who works at transfer stations (see *street picker*)

Truck picker

A waste picker who work at trucks of the municipality or private enterprise which is officially charged with collection of waste (see *street picker*).

Urban agriculture

Growing of plants and rising of animals within (intra-urban) and around (peri-urban) of cities and towns; often spaces in backyards, along rail way and undergrounds are used; the produced quantities of food products

(grains, vegetables, poultry etc.) and non-food-products (ornament plants, medicinal herbs etc.) can provide an important part of the local supply.

Waste flow chain

Flow chart which presents the different actors of a SWM-system, from the generators of waste (households, industries etc.) up to the end-users of recycled waste (exporters, manufacturing enterprises etc.) passing by recyclers and traders. The presentation of the waste flow chain can also inform about the type of linkages which exist between the different actors (formal contracts, informal relationships), support organizations which provide support services to the individual SWM actors (meso-level) and public authorities as the Ministry for Agriculture etc. (macro-level) responsible for the framework conditions of SWM.

Waste picker

Someone who sorts discarded items and material for collecting goods or materials that can be reused or be sold for earning money; waste pickers work in the streets, on trucks which are used by official collection crews and on transfer stations and dump sides.

WEEE

Waste of electrical and electronic equipment (see *e-waste*)

A2: References

BIRD, E-Waste Assessment in India – A Quantitative Understanding of Generation, Disposal and Recycling of Electronic Waste in India, GTZ, 2007

Chichi, A., Bakkali, M., Schrage, Clemens, Etude Socio-Economique des Chiffonniers de la Décharge Publique de Tanger, GTZ, Association des Enseignants des Sciences de la Vie et de la Terre, Tanger 2003

CID Consulting, The Informal Sector in Waste Recycling in Egypt, GTZ 2008

CID, EQI, EcoConServ, Enabling the Informal Sector in Solid Waste Management, Consolidated Summary Report, GTZ, 2005

Cisse, O., The Segmentation and Growth Factors of the Informal Solid Waste Recovery Activities in Dakar (Senegal), in: Waste – The Social Context, May 11 to 14, 2005, Alberta Canada

Coad, Adrian, Gonzenbach Barbara, Solid Waste Management and the Millenium Development Goals, CWG, 2007

Coad, Adrian, The Economics of Informal Sector Recycling, GTZ

Dias, Sonia M., Gama Alves, Fábio G., Integration of the Informal Sector in Solid Waste Management in Brazil, GTZ, Federal Ministry for Economic Cooperation and Development, 2008

Dirr, Martin, und Földi, Katharina, Livelihoods in the Informal Economy. The Informal Solid Waste Management Sector in Low-Income Settlements in Nairobi, Zusammenfassung der Diplomarbeit, Trier 2007

Dirr, Martin, und Földi, Katharina, Livelihoods in the Informal Economy. The Informal Solid Waste Management Sector in Low-Income Settlements in Nairobi; shortened version of the thesis, University of Trier, Department of Geography and Geosciences – Applied Geography/ Spatial Development, Trier 2007

Dos Santos, Anna Lúcia F., La Intégración del Sector Informal en la Gestión de los Residuos Sólidos Municipales – El Caso de la Región de los Lagos – Chile, ERM, GTZ, 2002

Dos Santos, Anna Lúcia F., Propuesta para una Estrategia de Inclusión del Sector Informal en la Gestión de Residuos Sólidos – Chile, GTZ 2008

Economic Aspects of Informal Sector Activities in Solid Waste Management

GTZ, Federal Ministry for Economic Cooperation and Development, Informal Sector in Solid Waste Management – Linkages with the Millennium Development Goals

GTZ, Indo-European e-Waste Initiative, Case Study

GTZ, Whither e-Waste in India?

Kolb, Martina, Involvement of the Informal Sector in Solid Waste Management in Phitsanulok, GTZ, 2007

Kolb, Martina, Cardenas, Lizette C., Involvement of the Informal Sector in Solid Waste Management in Mactan Economic Zones I and II, the Philippines, GTZ, Federal Ministry for Economic Cooperation and Development, 2007

Kolb, Martina, Ugalde Xinia L., Sector Informal y Gestión de Residuos Sólidos en Costa Rica: Aspectos de Género, GTZ, San José, Costa Rica 2008

Schroer, Maike, Die Privatisierung der Abfallwirtschaft in Kairo: Auswirkungen auf die Lebenssicherung der Müllsammler, Magisterarbeit, Rheinische Friedrich-Wilhelms-Universität, Philosophische Fakultät, Bonn

Schwabe, Annette, Der informelle Sektor in der Abfallwirtschaft der Entwicklungsländer, GTZ 2006

Streubing, Bernhard, E-Waste Generation in Chile, Situation Analysis and an Estimation of Actual and Future Computer Waste Quantities Using Material Flow Analysis, Swiss Federal Institute of Technology Lausanne, 2007

Waste matters SNTD Womens' University Group Recycling Livelihoods – Integrating the Informal Sector in Waste Management in India, Chintan Environment Research and Action, 2008

World Development Report 2002: Building Institutions for Markets, World Bank, New York 2002

Worlds Urbanization Prospects: The 2001 Revision, United Nations, New York 2002