



MAIN REPORT

VALUE CHAIN ANALYSIS OF SOLID WASTE MANAGEMENT FOR YOUTH ENGAGEMENT IN SERVICE DELIVERY (YES) PROGRAM IN ACCRA



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IN ACCRA**

Acronyms and Abbreviations

BOF	Biodegradable Organic Fraction
CBO	Community Based Organization
GAMA	Greater Accra Metropolitan Area
GOG	Government of Ghana
GPRS	Ghana Poverty Reduction Strategy
HIPC	Highly Indebted Poor Country
MEST	Ministry of Environment, Science and Technology
MINT	Material in Transition
MOU	Memorandum of Understanding
NYEP	National Youth Employment Programme
SWM	Solid Waste Management
VCA	Value Chain Analysis
WEEE	Waste Electrical and Electronic Equipment
YES	Youth Engagement in Service Delivery
TOR	Terms of Reference

Executive Summary

The Youth Engagement in Service Delivery (YES) program is designed to support the creation of employment opportunities targeting the youth, especially in low income indigenous communities. The program therefore aims at enabling the youth through gainful employment in services that also improves the delivery of solid waste management (SWM) services in these areas.

The objective of this Value Chain Analysis (VCA) is to investigate job markets for youth engagement in management of solid waste streams. Additionally, the analysis led to the design of interventions for skills development that will enable the youth be competitive for job placement in selected segments of the waste management industry. The target communities for CHF interventions include Avenor, Agbogbloshie, Sabon Zongo, Ayidiki, Nima, James Town and Ussher Town, all in Accra.

The study involved selecting and analyzing SWM sub-sectors (functions) and carrying out further **value-chain analysis** of the components of solid waste (biodegradable organic fractions, metals, plastics, waste-electrical and electronic equipment, WEEE, etc.) to identify job opportunities within the processes for handling the various components from source to final treatment and/or disposal.

CHF provided sample Industry Selection Tools which were adapted for selecting and prioritizing four (4) solid waste component-value-chains. The selection tools were used to assess various scenarios i.e. Neutral, Poverty, Growth and Competitiveness and Sponsor (Gates). This was followed by field interviews with various actors to learn and gather information about the respective structures and dynamics within each prioritized component value-chain (*compostables, thin-film plastics, e-waste and metal*).

The table below shows the ranked value chains of the different components of the solid waste stream.

Table ES1: Ranked Components' Value-Chains

Scenarios	Solid waste management sub-sector value chains									
	<i>Organics</i>		<i>Plastics & Rubber</i>			<i>Metal</i>		<i>WEEE</i>		
	<i>Compostables</i>	<i>Thermal Feedstock</i>	<i>Thin-film plastics</i>	<i>High density plastics</i>	<i>Pneumatics tyres</i>	<i>Ferrous scrap</i>	<i>Non-ferrous scrap</i>	<i>Used batteries</i>	<i>E-waste</i>	<i>Bulky waste</i>
<i>Neutral</i>	37	26	38	29	11	30	25	21	34	19
<i>Poverty</i>	55	38	59	45	15	43	36	28	32	28
<i>Growth</i>	61	40	55	41	15	55	47	31	55	31
<i>Sponsor</i>	67	49	75	57	21	49	39	33	59	33

The constraints and opportunities within these value chains were also identified. Market based solutions were subsequently developed, prioritized and tested with various solution providers to assess the success or risk factors that could be encountered when implementing the proposed interventions (solutions). A logframe for the proposed program of interventions was developed taking into account the deduced assumptions and risks (opportunities and constraints).

The *thin-film plastics* value chain was identified as the one having the largest potential for value addition if recycling is implemented. This option can offer sustainable means of employment for the youth in the selected communities. This is due to the fact that there is a large market demand for thin-film-plastic waste as well as abundant input supply (i.e. thin-film plastics currently litter all urban areas with adverse effects on aesthetic amenity of many communities). The ferrous scrap, e-waste and compostables value chains were observed to have comparatively limited potential as means of offering sustainable employment.

In order to provide a wide range of potential interventions to meet the different aspirations and choices of the youth encountered in these communities a number of activities to facilitate and provide avenues for engagement have been recommended for each value-chain examined.

The recommended interventions designed to meet the objectives of the YES Program include:

- Carrying out a youth-inclusive market analysis of the solid waste management sector and facilitate participatory program design and process

- Building the capacity of value chain actors and public and private sector providers to improve the performance, service coverage, and service delivery of the SWM sector through a youth-focused lens
- Building the capacity of local providers to offer or link youth to services supporting their role within the SWM sector

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1 Introduction

The number of unemployed youth in Ghana in general and the Greater Accra Metropolitan Area (GAMA) in particular is increasing and getting to alarming levels¹. The rate of urbanization is increasing, fuelled mainly by migration from rural areas and adjoining small towns.

On the one hand, the few employment opportunities that are available are either beyond the reach of the youth because of their limited education or do not meet their aspirations. On the other hand, the current situation of environmental sanitation services in almost all small towns, large towns and cities, particularly many settlements within the Greater Accra Metropolitan Area (GAMA) is very deplorable. The aesthetic amenity of many communities is poor as litter, choked gutters and drains, and filthy mounds of refuse are present all the time owing to poor services.

The two scenarios described above pose a challenge to service providers, development practitioners and all stakeholders to contribute to finding sustainable solutions to overcoming both challenges while accruing dual benefits of enabling the youth and improving amenities of the communities they live in.

CHF-Ghana's YES program is designed to contribute to these efforts. CHF's YES Program is also very responsive to Government of Ghana's (GoG's) policies and strategies.

The Environmental Sanitation Policy (Revised, 2009) promotes reduction, re-use, recycling and recovery (4Rs) of all types of waste streams as a way of reducing the volume and cost of waste delivered to final disposal sites. The National Environmental Sanitation Strategy and Action Plan (NESSAP) has taken this further by emphasizing that all wastes be regarded as material-in-transition ("MINT") whereby "waste" is not discarded but kept in transition and value added on/extracted at every stage along the SWM functions or processes. This concept is akin to current thinking of handling wastes from "cradle-to-cradle" or aiming for "zero waste".

The value addition becomes more apparent when a detailed VCA is carried out to reveal the potential pathways for gainful employment – and this is the main thrust of this assignment focusing on improving the management of municipal solid waste streams.

¹ According to the Ghana Demographic and Health Survey, 2008 the proportion of urban to rural is increasing. It is currently around 50:50 (up from 40:60 in 2000). The Ghanaian population is also young with 68.7% of women and 60.7% of men are between the ages of 15 – 34 years.

1.1 Background

SWM and Youth Employment (NYEP)

The Government of Ghana in 2006 introduced the National Youth Employment Programme (NYEP) with the support of funds generated from the HIPC Initiative to create employment for the youth. This program included the engagement of sanitation gangs in all 170 Metropolitan, Municipal and District Assemblies (MMDAs) country-wide to work with a private waste management and sanitation service company (Zoomlion) which has nation-wide operations capacity. This scheme gave employment opportunities to the youth especially young women. In the process, the hitherto poor environmental sanitation services in some selected areas - such as communal collection from neighborhoods, markets and lorry terminals, sweeping of main thoroughfares - saw some improvement, although more work remains to be done.

YES Program

The Youth Engagement in Service Delivery (YES) program is designed to support the creation of employment opportunities for the youth, especially in low income indigenous communities. The program is designed to build the capacity of local youth development organisations and empower youth in urban and peri-urban settings.

The current assignment which is contributing to the YES Program has three (3) main aims:

1. Conducting a youth-inclusive market analysis of the solid waste management sector and facilitating a participatory program design process;
2. building the capacity of the value chain actors and service providers (both public and private) to improve the performance, and service delivery of the SWM sector through a youth focused lens; and
3. building the capacity of local providers to offer or link youth to services supporting their role(s) within the SWM sector.

The YES Program seeks to address youth unemployment through enabling the youth with opportunities by focusing their skill training and search for employment towards the demands of the job market while at the same time responding to their (youth's) real interests. The Program also seeks to address gender imbalance in the selection of youth for skills training and job placement.

The YES Programme is currently collaborating with CHF, an international NGO to assist in identifying viable opportunities for employment in the waste management sector for the youth of some low income indigenous communities within the Accra Metropolitan Assembly (AMA). The targeted communities are Avenor Sabon Zongo, Ayidiki, Nima, Agboghloshie, James Town and Ussher Town.

To achieve this, a Value Chain Analysis (VCA) of the Solid Waste Management sector has been carried out to identify job opportunities for the youth and in the process contribute to improving services in these communities. The VCA of solid waste streams is expected to indicate the potential employment opportunities while dealing with major environmental effects of poor waste management practices.

1.2 Objectives of the Assignment

Objectives

The **overall purpose** of this assignment is *to select components of the solid waste stream and analyze value chains within Accra's solid waste management (SWM) sector and in the process identify opportunities for employing young people especially residents of the targeted communities*. The assignment also involves investigating delivery of SWM services and then proposing a list of options that provide opportunities for youth employment.

The **specific objectives** are:

- To identify clearly value chains in the solid waste sector that have opportunities (potential) for youth employment; and
- To facilitate the selection of value chains for assessment and subsequent design of program(s).

1.3 Scope of Work

The assignment is to provide technical assistance to CHF-Ghana/YES team to carry out a value chain analysis (VCA) of the solid waste sector employing CHF-endorsed value chain

framework² to collect and analyze information, and design of program approaches. The consultant worked with the CHF-Ghana/YES team to carry out the following activities:

- Conducting research on the value chain of the solid waste sector;
- Identifying clear value chains that have opportunity for youth employment;
- Facilitating the selection by the CHF team of a value chain(s) for assessment and program design;
- Debriefing CHF at the end of the assignment to present the key points and recommendations; and
- Producing final written report, including work plan and suggestions for monitoring and evaluation of the designed VC program.

The detailed Scope of Work is presented in as Appendix 1.

1.4 Methodology

The methodology followed in delivering the assignment is as follows:

- Desk study of existing data and service profile of solid waste management (SWM) system, socio-economic information, etc;
- Definition of the youth cohort for the targeted communities;
- Preparation of adapted versions of CHF-International Industry Selection Tool;
As required by the ToRs the CHF-International Industry Selection Tool was used as a starting template. The Tool was reviewed and adapted to reflect availability of information, local conditions and circumstances. The *Definitions and Evaluation Metrics* of the selection tool were amended accordingly.
The Neutral, Poverty, Growth and Competitiveness and Sponsor (in this case, Gates Foundation) scenarios were also amended.
- Use of the adapted Selection Tool to rank and select **four (4)** solid waste sub-sectors for further analysis. The *organic, plastics and rubber, metal* and *Waste Electronic, Electrical equipment* (WEEE) sub-sectors were selected.

² This framework generally follows the value chain guidelines articulated on www.microlinks.org. CHF provided specific templates and guidelines for the use of the consultant during the assignment.

- Detailed analysis of the selected sub-sectors to identify and prioritize value chains for further analysis. The value chains identified are *compostables* from organics, *thin film* from plastics, *ferrous metal* from metals and *e-waste* from WEEE.
- Identification of value chain participants, preparation of initial value chain maps and amending questionnaires for interviewing the identified key participants.
- Carrying out field interviews of major value chain participants.
- Analysis, discussion and collation of responses of value chain participants.
- Identification of important Opportunities/Constraints of the value chains.
- Proposal of potential solutions and interventions for the opportunities/constraints identified.
- Testing of potential solutions and interventions through Key Person Interviews (KPIs), Focus Group Discussions (FGDs) with key solution providers and other supporting actors.
- Finalising the Value Chain Maps and supporting the CHF-Ghana/YES team in identification and design of projects with a focus on creating jobs for the youth cohort in the targeted communities.

1.5 Definition of Youth Cohort

As part of the Value Chain Analysis of Solid Waste Management (SWM) services in Accra social issues relating to gender and the youth need to be critically considered. A pressing social problem of Ghana today is the acute shortage of sustainable employment opportunities for the youth. The immediate challenge to human resources development as stated in the Growth and Poverty Reduction Strategy (GPRS II) is the formulation of appropriate strategies to manage the population to ensure that the population growth rate is maintained at a level that will support economic growth and social development.³ The latest Ghana Living Standards Survey (2005/06) indicates that about 23 percent of the urban population and 51.6 percent of the rural population live below the poverty line. The most vulnerable groups are women, children and disabled youth.

The insecurity and vulnerability in the informal sector is also directly linked to the youth and women who are predominant in the sector. Women for instance have a greater responsibility in the management of household and domestic waste as well as some level of involvement in

³ GPRS II, Pages 27-28

solid waste management generally. Vulnerable groups are particularly affected by improper waste management often leading to deplorable living conditions that especially affect poor households of low income communities.

Youth: In Ghana the categorization of the youth varies from 15-25 to the 17-35 years age bracket. Unemployment in Ghana has been identified to be generally highest among the youth aged between 20 and 25 years. The GLSS 3 estimated that in 1992, 17.1 percent of youth aged 15-24 in the labour force were unemployed as against 4.3 percent for 25-44 and 2.7 percent for 45-59 years age groups, respectively. The GLSS 4 puts the unemployment rate for the youth aged 15-24 years at 15.9 compared to 7.4 percent for 25-44 and 4.7 percent for 45-64 year age groups, respectively.

Gender differences can also be seen in the incidence of youth unemployment in the country. The GSS (2005) estimated unemployment at 10.4 percent for males aged between 20 and 24 years and 10.9 percent for females in the same age group. The Ghana Demographic and Health Survey (GDHS, 2008) gives 25.9 percent and 24.4 percent respectively, for the same category (see Tables 1.1 and 1.2).

The National Youth Employment Programme (NYEP) ongoing at the national level aims at training and/or retraining some of the unemployed youth to enhance their chances of gaining employment or becoming self-employed.

The issue of child labour may also be considered in the VCA. The term “child labour” does not encompass all economic activities of children under the age of 18. It refers to only those types of work that are in some ways – mentally, physically, socially and/or morally – detrimental to children and interfere with their education. A more formal definition encompasses employment or work of children that does not conform to the standards enshrined in the ILO Child Labour Conventions No. 138 (C138) on the minimum age for employment and No. 182 (C182) on the worst forms of child labour (WFCL).

1.5.1 Youth Cohorts for Target Communities

For this assignment, the youth cohort determined for each of the target communities is presented in Table 1.3. As a general rule, C138 stipulates that the minimum age for admission to employment should not be less than the age of completion of compulsory schooling or 15 years, whichever is higher. Some flexibility however is built in to allow for a lower threshold depending on the level of development of the economy and the nature of the work involved. It can fall to 12 years for “light work” in a developing country.

Table 1.1: Employment Status of Females (Source: Ghana Demographic Health Survey, 2008)

Table 3.5.1 Employment status: Women					
Percent distribution of woman age 15-49 by employment status, according to background characteristics, Ghana 2008					
Background characteristic	Employed in the 12 months preceding the survey		not employed in the 12 months preceding the survey	Total	Number of women
	Currently employed ¹	Not Currently employed			
Age					
15-19	32.7	3.1	64.2	100.0	1,025
20-24	70.0	4.1	25.9	100.0	878
25-29	85.1	4.4	10.5	100.0	832
30-34	90.3	2.0	7.6	100.0	644
35-39	94.1	2.0	3.9	100.0	638
40-44	93.0	1.9	5.1	100.0	470
45-49	92.8	1.9	5.2	100.0	429
Marital status					
Never married	45.7	3.9	50.5	100.0	1,593
Married or living together	88.5	2.8	8.8	100.0	2,876
Divorced/separated/widowed	90.4	1.3	8.4	100.0	446
Number of living children					
0	47.8	3.9	48.3	100.0	1,691
1-2	84.5	3.3	12.3	100.0	1,447
3-4	92.3	1.9	5.8	100.0	1,050
5+	92.8	1.9	5.3	100.0	729
Residence					
Urban	70.5	3.3	26.1	100.0	2,383
Rural	78.8	2.7	18.6	100.0	2,533
Region					
Western	76.7	1.7	21.6	100.0	447
Central	76.6	1.5	21.9	100.0	424
Greater Accra	66.9	3.9	29.1	100.0	853
Volta	89.7	5.4	14.9	100.0	431
Eastern	75.7	2.1	22.2	100.0	483
Ashanti	75.0	2.7	22.3	100.0	1,011
Brong Ahafo	76.4	1.3	22.3	100.0	425
Northern	78.1	4.7	17.2	100.0	467
Upper East	78.3	4.0	17.7	100.0	253
Upper West	67.5	1.2	31.1	100.0	122
Education					
No education	88.0	2.6	9.3	100.0	1042
Primary	79.2	2.2	18.7	100.0	988
Middle/JSS	70.8	2.6	26.6	100.0	2039
Secondary +	62.7	5.4	31.9	100.0	844
Wealth quintile					
Lowest	82.4	2.4	15.2	100.0	783
Second	77.5	2.9	19.6	100.0	900
Middle	75.9	4.3	19.9	100.0	979
Fourth	74.0	1.7	24.3	100.0	1,119
Highest	64.2	3.6	29.2	100.0	1,135
Total	74.8	3.0	22.2	100.0	4,916
Note: total includes women with information missing on education who are not shown separately.					
¹ Currently employed is defined as having done work in the past seven days. Includes persons who did not work in the past seven days but who are regularly employed and were absent from work for leave, illness, vacation, or any other such reason					

Table 1.2: Employment Status for Males (Ghana Demographic Health Survey, 2008)

Table 3.5.1 Employment status: Men					
Percent distribution of woman age 15-49 by employment status, according to background characteristics, Ghana					
Background characteristic	Employed in the 12 months preceding the survey		not employed in the 12 months preceding the survey	Total	Number of men
	Currently employed ¹	Not Currently employed			
Age					
15-19	37.3	2.5	6.1	100.0	911
20-24	70.7	4.8	24.4	100.0	704
25-29	91.1	3.2	5.7	100.0	624
30-34	96.1	1.9	2.0	100.0	533
35-39	96.7	2.1	1.3	100.0	528
40-44	97.7	1.1	1.2	100.0	394
45-49	96.5	2.4	1.1	100.0	364
Marital status					
Never married	57.3	3.9	38.8	100.0	1,936
Married or living together	97.5	1.5	1.0	100.0	1,950
Divorced/separated/widowed	89.7	4.0	6.2	100.0	172
Number of living children					
0	60.1	3.8	36.1	100.0	2,086
1-2	95.3	2.4	2.4	100.0	893
3-4	97.5	1.5	1.0	100.0	655
5+	99.6	0.4	0.1	100.0	424
Residence					
Urban	74.2	3.7	22.1	100.0	1,866
Rural	81.2	1.9	16.9	100.0	2,191
Region					
Western	76.9	0.7	22.4	100.0	4.3
Central	74.2	4.0	21.8	100.0	326
Greater Accra	75.4	4.2	20.4	100.0	649
Volta	83.0	1.9	15.1	100.0	373
Eastern	73.6	1.7	24.7	100.0	411
Ashanti	77.4	3.8	18.8	100.0	785
Brong Ahafo	80.7	1.9	17.4	100.0	347
Northern	83.2	1.6	15.2	100.0	435
Upper East	80.5	3.9	15.6	100.0	219
Upper West	78.2	2.1	19.7	100.0	108
Education					
No education	96.3	1.2	2.4	100.0	540
Primary	76.5	1.5	21.9	100.0	619
Middle/JSS	76.1	2.3	21.6	100.0	1721
Secondary +	73.1	4.7	22.2	100.0	1167
Wealth quintile					
Lowest	87.0	1.3	11.6	100.0	708
Second	78.7	1.1	20.2	100.0	738
Middle	74.3	3.4	22.3	100.0	699
Fourth	75.5	2.9	21.5	100.0	974
Highest	76.0	4.4	19.6	100.0	939
Total 15-49	78.0	2.7	19.3	100.0	4,058
50-59	93.1	2.3	4.6	100.0	510
Total 15-59	79.7	2.7	17.6	100.0	4,568
Note: total includes men with information missing on education who are not shown separately.					
¹ Currently employed is defined as having done work in the past seven days. Includes persons who did not work in the past seven days but who are regularly employed and were absent from work for leave, illness, vacation, or any other such reason					

Table 1.3: Youth Cohorts Determined for Target Communities

Name of Community	Sub Metro Area	Youth Cohort	
		Male	Female
Avenor	Okaikoi South	15 - 25 years	15 - 25 years
Sabon Zongo	Ablekuma Central	15 - 25 years	15 - 25 years
Ayidiki	Ayawaso Central	15 - 25 years	15 - 25 years
Nima	Ayawaso East	15 - 25 years	15 - 25 years
Agbogbloshie	Ashiedu-Keteke	15 - 25 years	15 - 25 years
James Town	Ashiedu-Keteke	15 - 25 years	15 - 25 years
Ussher Town	Ashiedu-Keteke	15 - 25 years	15 - 25 years

Children under the age of 15 years also play a major role in the value chain, as they pick items such as thin-film plastics, crown corks and other items which are not manually intensive for sale. These items are usually picked during occasions like funerals, parties, et cetera. Some even go a step further to dump sites in search of such items.



Children reposing after picking items at a refuse disposal site



Plate 1.2: Crown corks of bottled beverages usually picked by children

2 Solid Waste Management Services in Accra

2.1 Solid Waste Generation

The Greater Accra Metropolitan Area (GAMA) consists of the Accra and Tema Metropolitan Assembly areas, the Ashiaman, Adentan, Ledzokuku-Krowor, and Ga-South Municipal Assembly areas as well as the Ga-West and Ga-East District Assembly areas.

The categorization of the waste generation sources is based on the economic status and population density⁴ of the suburbs under consideration. These are:

- High income low density waste zones (HILPDWZ)
- Middle income middle density waste zones (MIMPDWZ)
- Low income high density waste zones (LIHPDWZ)

The categorization is premised on the assumption that there is a significant positive correlation between per capita waste generation and income levels of residents. The proportion of the GAMA population in each of these income-population density zones is estimated to be 3.9% in HILPDWZ, 50.4% in MIMPDWZ and 45.7% in LIHPDWZ.

The component materials in the GAMA waste stream for each of these zones include:

- Organics - food waste, garden waste i.e. leaves and sticks and wood.
- Paper and Cardboard - newsprint, white office paper, mill scrap, corrugated cupboard and paperboard.
- Plastics and Rubber – polythene packaging, PET bottles, UPVC/PVC materials and LDPE/HDPE materials.
- Metals – ferrous scrap such as household appliances, cans and i.e. iron/steel products and non-ferrous scrap including aluminum, copper, lead, tin and precious metals.
- Glass - clear glass, green glass, brown glass and other colored glass.
- Textiles – jute sacks, clothing, upholstery, embroidery and carpets.
- Inerts and residues - ash from cooking etc, soil and stones
- Miscellaneous - waste electrical and electronic equipment (WEEE), waste oils, batteries, composite packaging.

Table 2.1 presents the waste characterization of the waste stream for the housing segments in the GAMA. There is a greater content of organics in the waste stream compared to packaging waste i.e. paper, metal, plastics and glass for all income groups.

⁴ Adapted from Fobil N.J. et al (2005)

Table 2.1 Waste characterization for the GAMA waste stream

Component	Areas		
	High Income	Middle Income	Low Income
Organics			
percentage by weight (%)	72	61	49
generation rate (kg/person-d)	0.323	0.233	0.087
energy content (MJ/kg)	16.54	17.02	14.4
carbon content (%)	45	46	40
Paper and Cardboard			
percentage by weight (%)	10	7	8
generation rate (kg/person-d)	0.043	0.027	0.014
energy content (MJ/kg)	17.50	16.28	16.73
carbon content (%)	40	40	40
Plastics and Rubber			
percentage by weight (%)	6	9	9
generation rate (kg/person-d)	0.027	0.035	0.016
energy content (MJ/kg)	-	-	-
carbon content (%)	-	-	-
Metals			
percentage by weight (%)	2	4	4
generation rate (kg/person-d)	0.011	0.014	0.007
energy content (MJ/kg)	-	-	-
carbon content (%)	-	-	-
Glass			
percentage by weight (%)	1	2	2
generation rate (kg/person-d)	0.005	0.007	0.004
energy content (MJ/kg)	-	-	-
carbon content (%)	-	-	-
Textiles			
percentage by weight (%)	2	3	8
generation rate (kg/person-d)	0.008	0.011	0.015
energy content (MJ/kg)	16.82	17.30	19.23
carbon content (%)	46	48	56

Component	Areas		
	High Income	Middle Income	Low Income
Textiles			
percentage by weight (%)	2	3	8
generation rate (kg/person-d)	0.008	0.011	0.015
energy content (MJ/kg)	16.82	17.30	19.23
carbon content (%)	46	48	56
Inerts and Residues			
percentage by weight (%)	5	12	17
generation rate (kg/person-d)	0.024	0.045	0.030
energy content (MJ/kg)	-	-	-
carbon content (%)	-	-	-
Miscellaneous			
percentage by weight (%)	2	2	3
generation rate (kg/person-d)	0.011	0.008	0.005
energy content (MJ/kg)	-	-	-
carbon content (%)	-	-	-

Figure 2.1 shows the average waste composition for the GAMA waste stream. The average moisture content and bulk density are 50% and 474 kg/m³ respectively. Figure 2.2 shows the variation of waste composition in GAMA over a 20 year period i.e. 1989⁵ – 2009. Over the period, there has been a reduction in the proportion of organics and a corresponding increase in that of plastic waste in the GAMA area. This is the general trend for the whole country.

⁵ Adapted from Boadi K.O. and Kuitunen (2004)

Figure 2.1 Average material composition for GAMA waste stream

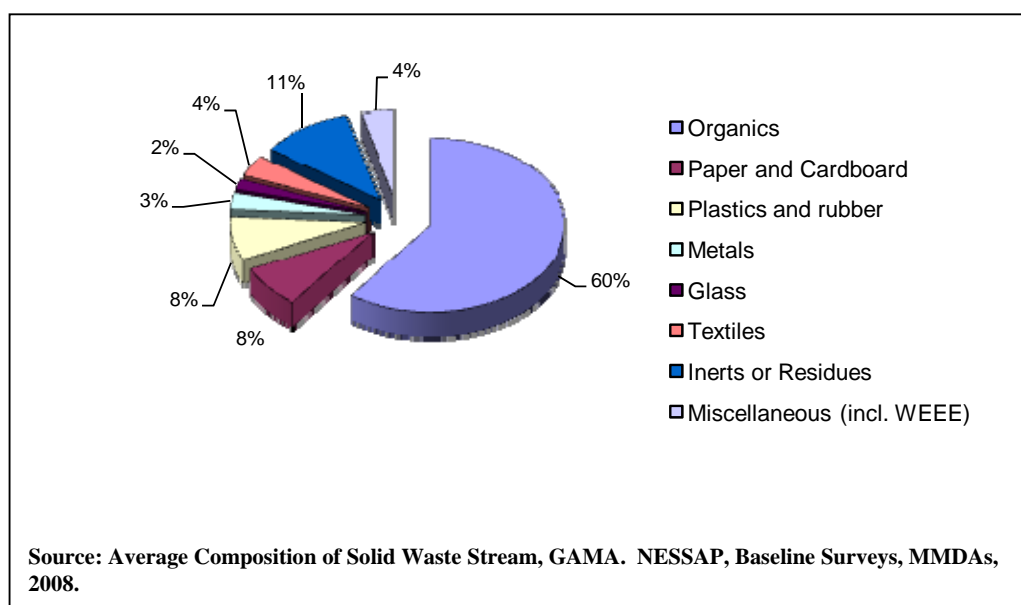
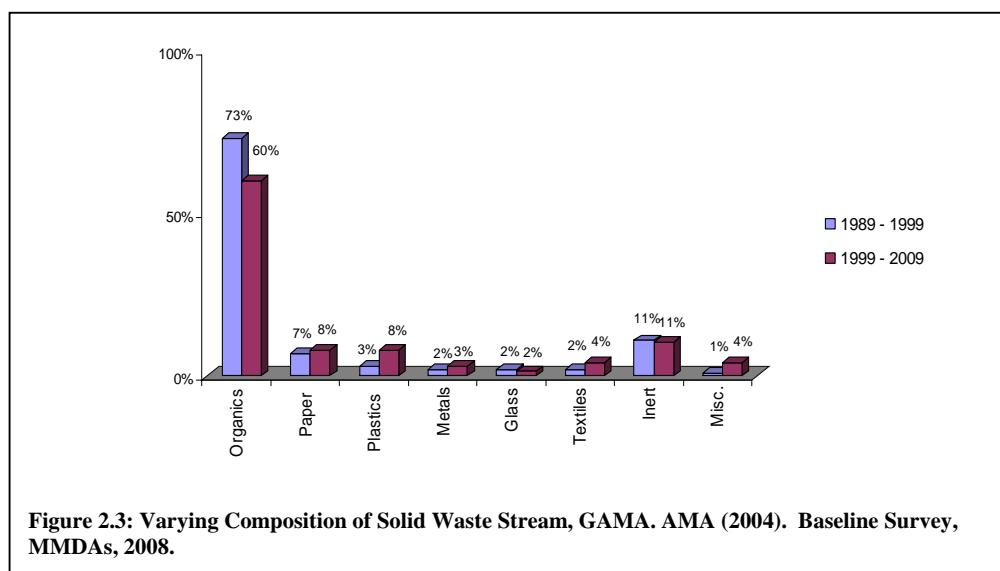


Figure 2.2 Variation of waste composition in GAMA from 1989 – 2009



The seven CHF partner communities are located in five (5) Sub-Metropolitan Districts within the administrative boundaries of the Accra Metropolitan Area (AMA). Table 2.2 presents the list of communities and the respective administrative areas within the Accra Metropolis.

Table 2.2 Location of CHF partner communities

Name of Community	Sub Metro Area
Avenor	Okaikoi South
Sabon Zongo	Ablekuma Central
Ayidiki	Ayawaso Central
Nima	Ayawaso East
Agbogbloshie	Ashiedu-Keteke
James Town	Ashiedu-Keteke
Ussher Town	Ashiedu-Keteke

The categorization of the waste generation sources from the above Sub-metros is based on the guidelines⁶ for the preparation of District Environmental Sanitation Strategy and Action Plan (DESSAP) issued by the Ministry of Local Government and Rural Development (MLGRD). These are:

- Domestic
- Commercial
- Institutional

The composition of the waste stream is similar to those indicated for GAMA in Figure 2.1 i.e. a high proportion of organics compared to packaging waste. Tables 2.3 – 2.7 present the percentage waste composition on a volume basis for the listed CHF partner communities.

Segregation of domestic waste at source is not officially mandated and so it is practiced only on voluntary basis by few households and in some few cases motivated by the potential cash returns that can be earned. Segregation of metals and WEEE is carried out by the youth and it is expected to grow in the near future. The national Environmental Sanitation Policy (Revised, 2009) encourages the segregation of waste at source as a means of creating opportunities for further processing and handling to enhance alternative uses of discarded materials and also to reduce the volume and cost of residue delivered at final disposal sites.

⁶ Handbook on Preparation of District Environmental Sanitation Strategy and Action Plans (2007)

Table 2.3 Waste Composition for Avenor

Waste Source	Composition (% by volume)							
	Organic	Paper	Plastics	Glass	Metal	Textiles	Wood	Misc
Domestic								
Households-Rural	-	-	-	-	-	-	-	-
Households-Low Income	50	10	30					10
Households-Middle Income	50	10	20					20
Households-High Income	40	20	20					20
New Development (Fringe) Areas	-	-	-					-
Communal Containers	50	10	20					20
Commercial								
Shops (Trading places)	10	50	10		10		10	10
Hotels	-	-	-					
Restaurants/Chop bars	80	10	10	-	-	-	-	-
Markets	90		10	-	-	-	-	-
Slaughter Houses/Abattoirs	80	10	10	-	-	-	-	-
Lorry Stations	90		10	-	-	-	-	-
Other	40	10	50	-	-	-	-	-
Institutional								
Schools	-	50	50					
Police/Army/Prison Barracks	70	5	10					15
Prison Complex	-	-	-					-
Offices	5	60	10	5				20
Other	80	-	10					10

Source: MMDAs DESSAP Survey, 2008

Table 2.4 Waste Composition for Sabon Zongo

Waste Source	Composition (% by volume)							
	Organic	Paper	Plastics	Glass	Metal	Textiles	Wood	Misc
Domestic								
Households-Rural	-	-	-	-	-	-	-	-
Households-Low Income	46	15.5	18.6	3.5	6.5	3.2	4.6	
Households-Middle Income	41.1	23	11.6	4.6	6.6	4.6	4.8	
Households-High Income	40	31.2	21.5	2.7	1.5	1.2	0.75	
New Development (Fringe) Areas	-	-	-					-
Communal Containers	-	-	-	-	-	-	-	-
Commercial								
Shops (Trading places)	15	37.2	35.5	7	6.3	6.8	5.6	
Hotels	34.6	24.4	29.2	9.2	1.5	1.53	2.3	
Restaurants/Chop bars	64.7	12.2	15	5.2	5	1.33	3.7	-
Markets	63.3	13.3	19	3.5	1	1	1	-
Slaughter Houses/Abattoirs	65	10	15	2	2	2	4	-
Lorry Stations	35	11.5	34.5	3	6	3.5	7	-
Other				-	-	-	-	-
Institutional								
Schools	27.3	20.3	45.2	1.5	1.5	1	7	
Police/Army/Prison Barracks	56.6	12.3	12.3	4.6	4.5	5	6.5	
Prison Complex	-	-	-					-
Offices								
Other		-						

Source: MMDAs DESSAP Survey, 2008

Table 2.5 Waste Composition for Ayidiki

Waste Source	Composition (% by volume)							
	Organic	Paper	Plastics	Glass	Metal	Textiles	Wood	Misc
Domestic								
Households-Rural								
Households-Low Income	24	20	30	4	2	10	10	
Households-Middle Income	31	18	26	8	3	8	6	
Households-High Income								
New Development (Fringe) Areas								
Communal Containers								
Commercial								
Shops (Trading places)								
Hotels	20	10	40					30
Restaurants/Chop bars	40	10	40					10
Markets								
Slaughter Houses/Abattoirs								
Lorry Stations								
Other								
Institutional								
Schools	10	60	20	2	2	2		4
Police/Army/Prison Barracks								
Prison Complex								
Offices	10	60	20	2	2	2		4
Other								

Source: MMDAs DESSAP Survey, 2008

Table 2.6 Waste Composition for Nima

Waste Source	Composition (% by volume)							
	Organic	Paper	Plastics	Glass	Metal	Textiles	Wood	Misc
Domestic								
Households-Rural	60		30					10
Households-Low Income	45	25	20	5				5
Households-Middle Income								
Households-High Income								
New Development (Fringe) Areas								
Communal Containers								
Commercial								
Shops (Trading places)	20	55	20					5
Hotels	15	30	50					5
Restaurants/Chop bars	45	15	30	5				5
Markets	35	30	20				5	10
Slaughter Houses/Abattoirs								
Lorry Stations	40	15	30	5				10
Other	30	15	40	5				10
Institutional								
Schools	5	50	30	5				10
Police/Army/Prison Barracks	30	20	30	10			5	5
Prison Complex								
Offices	15	60	20					5
Other (Wood Complex)	30		20				45	5

Source: MMDAs DESSAP Survey, 2008

Table 2.7 Waste Composition for Agboghloshie, James Town and Ushher Town

Waste Source	Composition (% by volume)							
	Organic	Paper	Plastics	Glass	Metal	Textiles	Wood	Misc
Domestic								
Households-Rural								
Households-Low Income	60	12	15	3	1	0.2	0.6	0.2
Households-Middle Income	65	6	3.5	3	2.5	1.7	17.1	1.2
Households-High Income	75	5	10	4	2	2	1	1
New Development (Fringe) Areas	-	-	-	-	-	-	-	-
Communal Containers	65	6	3.5	3	2.5	1.7	17.1	1.2
Commercial								
Shops (Trading places)	65	6	10	3	4	4	4	4
Hotels	70	8	12	4.2	1.8	2	2	-
Restaurants/Chop bars	80	12	6	1.2	0.6	0.1	0.1	-
Markets	60	6	13	3.5	2.5	12.5	1.5	1
Slaughter Houses/Abattoirs	90	2	2	0.8	1.2	1	4	-
Lorry Stations	41	5	55	0.1	0.1	0.2	0.2	0.2
Other								
Institutional								
Schools	32	52	12	0.2	0.2	1.4	2	0.2
Police/Army/Prison Barracks	66	10	18	2	2	1	0.8	0.2
Prison Complex	-	-	-	-	-	-	-	-
Offices	54	32	10	1	-	1.2	0.8	
Other								

Source: MMDAs DESSAP Survey, 2008

2.2 Solid Waste Collection, Transport and Disposal

Based on a city-wide bulk generation rate of 0.8 kg per person per day and a gross population of 4 million, the currently estimated municipal solid waste output for Accra could be in the region of 3,000⁷ tons per day.

The Waste Management Department (AMA-WMD) estimates a daily generation of 2000 tonnes of which the city and its private operators haul about 80%⁸ to three (3) privately operated disposal sites. While many residents are skeptical of this claim owing to the filthy nature of many communities resulting from uncollected refuse, the city authority insists that it is the back-log of the uncollected 20% over the period that creates the poor and unaesthetic conditions.

Table 2.8 presents estimated generation and collection ratios for Ghana's five largest cities while Table 2.9 is a snap shot of the national and regional averages of household solid waste

⁷ In the absence of a more systematic measurement from refuse sources (especially large generation centres like markets and lorry stations) the above figures can be used for planning purposes. The population figure includes an estimated 1.7 million transient persons per day (e.g. hawkers, traders, commuters and those who visit to transact business with Ministries, Departments and Agencies).

⁸ Personal Communication, Anderson Blay, Head of AMA-WMD. NESSAP Workshop, Cocunut Grove Regency. April 2010.

collection recorded from the 2000 Housing and Population Census report. Table 2.10 gives the national and regional averages of household solid waste collection collated from baseline data collected by the various Metropolitan, Municipal and District Assemblies (MMDAs) in 2008.

From the baseline environmental sanitation data gathered in 2008 by MMDAs close to 76% of households still rely on improper waste collection and disposal methods. Figure 2.3 shows the different collection and disposal methods.

Table 2.8: Municipal Solid Waste Data for 5 Largest Cities, 2004 – 2010

Characteristics	Accra	Kumasi	Sekondi-Takoradi	Tamale	Tema*	All cities
2004						
Population, thousand *	1,904	1,343	348	228	437	4,260
MSW generated, kg/capita/day	0.79	0.82	0.68	0.66	0.59	0.76
MSW generated, tons/day	1,500	1,100	236	150	260	3,246
MSW collected, tons/day	950	850	170	85	155	2,210
Percent collected	63%	77%	72%	57%	60%	68%
Collection cost, US\$/ton	10.0	8.0	7.0	6.0	8.0	7.8
Disposal cost, US\$/ton	2.0	1.0	-	-	-	1.5
Total cost, US\$/ton	12.0	9.0	7.0	6.0	8.0	8.4
2010						
Population, thousand *	2,340	1,651	404	272	537	5,204
MSW generated, kg/capita/day	0.80	0.80	0.70	0.70	0.70	0.75
MSW generated, tons/day	1,872	1,321	283	190	376	4,042
MSW collected, tons/day	1,498	1,123	226	124	263	3,233
Percent collected	75%	85%	80%	65%	70%	80%
Collection cost, US\$/ton	10.0	8.0	7.0	6.0	8.0	7.8
Disposal cost, US\$/ton	3.0	2.0	2.0	2.0	1.5	2.1
Total cost, US\$/ton	13.0	10.0	9.0	8.0	9.5	10

Source: Project Appraisal Document– World Bank Urban Environmental Sanitation Project (Phase 2), Nov. 2004.

Table 2.9: Coverage of Refuse Collection and Disposal (National and Regional Averages)

	Household Solid Waste Disposal by Method (%)					
	Collected	Burned	Public dump	Dumped elsewhere	Buried	Other
National	4.8	7.9	57.6	25.0	3.9	0.9
WESTERN	2.2	4.6	59.6	28.6	34.6	4.0
CENTRAL	0.8	6.4	69.3	19.9	2.6	0.9
GT. ACCRA	19.5	12.2	51.4	11.5	4.6	0.7
VOLTA	2.4	12.9	46.5	31.6	5.8	0.8
EASTERN	2.2	10.1	56.5	25.2	5.2	0.9
ASHANTI	1.3	3.3	78.9	13.4	2.6	0.4
BRONG AHAFO	0.9	3.4	70.3	22.6	2.4	0.4
NORTHERN	2.1	9.4	30.4	55.3	2.5	0.3
UPPER EAST	3.3	16.4	13.2	55.2	5.7	6.2
UPPER WEST	2.3	4.6	21.1	65.6	6.0	0.3

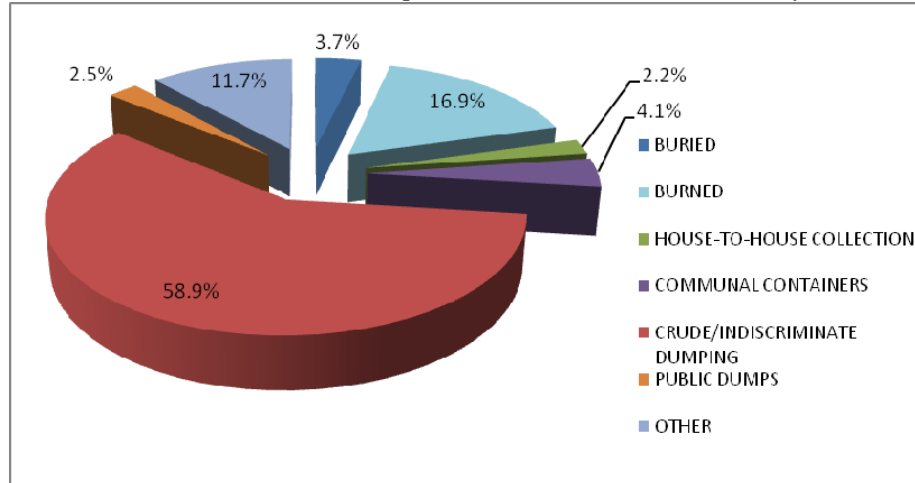
Source: Facts Sheet No. IV, National Population Council, 2006.

Table 2.10: Coverage of Refuse Collection and Disposal (National and Regional Averages)

Communal Solid Waste Disposal by Method (%)							
	Buried	Burned	House-to-House Collection	Communal Container	Crude/Indiscriminate Dumping	Public Dumps	Other
NATIONAL	3.7	16.9	2.2	4.1	58.9	2.5	11.7
ASHANTI	8.2	13.3	5.3	12.6	51.6	9	0
BRONG AHAFO	3.2	15.3	0	1.7	76.2	2.3	1.3
CENTRAL	0.5	4.2	0	2.9	86.3	5.5	0.6
EASTERN	0.4	16.5	0	12.5	66.4	4.2	0
GT. ACCRA	1.5	20	23	16.4	38.5	0	0.6
NORTHERN	2.8	18.8	0	0.5	69.2	0	8.7
UPPER EAST	0	24.8	0	0	36.2	0	39
UPPER WEST	19.3	31.3	0	1.5	35.8	0	12.1
VOLTA	0.4	6.1	0	1.2	77.1	6.7	8.5
WESTERN	1.2	1.8	4.6	12.2	79.6	0.4	0.2

Source: DESSAP Field Survey, EHSD/MLGRD, 2008/ NESSAP MLGRD, 2010.

Figure 2.3: Estimation Solid Waste Collection and Disposal Methods, MMDAs DESSAP Surveys, 2008



Source: NESSAP, MLGRD 2010

The littering of refuse within the built environment and its poor management at final disposal sites remain an intractable challenge faced by all MMDAs in Ghana.

Crude, open dumping is the commonest practice in almost all communities. In the few cases where controlled-dumping is practiced, environmental impacts whether immediate or long-term are not routinely monitored and thus ignored. Implementing improved site management procedures is often only in reaction to public outcry and threat of closure of operations by nearby communities.

Kumasi and Tamale are the only cities with engineered landfills. Accra's refuse is disposed off in abandoned quarries in adjoining districts of Ga West, Ga East, Adenta and Ga South (Weija)⁹, while city authorities continue to grapple with resistance from nearby communities over a planned disposal site at Kwabenya in Ga East District, which has not progressed beyond initial site preparatory works that cost almost \$2 million.

The current disposal charge of twelve Ghana Cedis (GH 12.00) per tonne of refuse placed is an indication of the tremendous potential for cost savings that can accrue to the Metropolitan, Municipal and District Assemblies (MMDAs) if alternative means of processing and handling the components of the solid waste streams are identified, especially options for value-addition.

⁹ The whole of the AMA, Ga-East, Ga-West, Ga-South, Adentan and Ledzokuku-Krowor depend on 3 - 4 controlled disposal sites operated by private operators. The GH 12 per tonne disposal fees charged are for Improved Mechanised Dumping operations and with no weighing bridges installed at these sites the city authorities are at the mercy of the private operators (both haulers and managers of the sites)

To address this challenge the Medium Term Development Policy Framework (2010 – 2013) of the Government of Ghana has recommended the provision of improved disposal for wastes as a key strategy for improving services.

2.2 Summary of Governance and Resource Allocations

2.2.1. Investments of Municipal Assemblies

Investments by Metropolitan, Municipal and District Assemblies (MMDAs) are mainly capital expenditures for the acquisition of goods and comprise:-

- i. Markets
- ii. Lorry Parks
- iii. Public Toilets
- iv. Public Basic School Buildings
- v. Sanitary Sites (Transfer Depots) within communities
- vi. Final Landfill Disposal sites
- vii. Infrastructure , Equipment and tools for Waste Management
- viii. Office Buildings, Vehicles and Equipment for the administration of the Assembly

2.2.2 Resource Allocation

The MMDAs generate revenues by levying rates, fees and fines on residents and businesses and rents from markets and other public buildings.

In addition to the Internally Generated Funds (IGFs), all 170 local authorities (governments) share an annual allocation from Central Government through the District Assembly Common Fund (DACF) which amounts to 7.5% of national revenues set aside for the purpose.

Municipalities also receive donor support either directly or through Government of Ghana/ Donor loans and grants by way of projects which in most cases is used for procuring the investments listed above. The salaries and wages of government employees are also covered by the Consolidated Fund.

Table 2.11 summarizes the resources and the expenditure allocations for selected assemblies within the Greater Accra Metropolitan Area (GAMA) for the year 2007. Table 2.9 shows the minimum solid waste service delivery costs of waste management services in the GAMA area.

Table 2.11: Income and Expenditure Accounts of selected MMDAs in GAMA

	AMA	TMA	GA EAST	GA WEST	TOTAL
	GH¢	GH¢	GH¢	GH¢	GH¢
Resources					
Internally Generated Funds	7,434,862	3,733,037	727,896	659,167	12,554,962
District Assembly Common Fund & Grants	12,959,379	3,276,843	1,540,694	1,733,390	19,501,306
Total Resources	20,394,241	7,009,880	2,268,590	2,392,557	32,056,268
Expenditure					
Recurrent Expenditure	8,715,163	4,100,225	863,942	752,689	14,432,019
Capital Expenditure	10,384,201	2,830,951	1,793,880	1,347,438	16,356,470
Total Expenditure	19,099,364	6,931,177	2,630,822	2,100,127	30,761,490
Excess /(Deficit)	1,294,877	78,703	(362,232)	292,430	1,294,778

2.2.3 Profiles and Responsibilities of the Municipal Assemblies

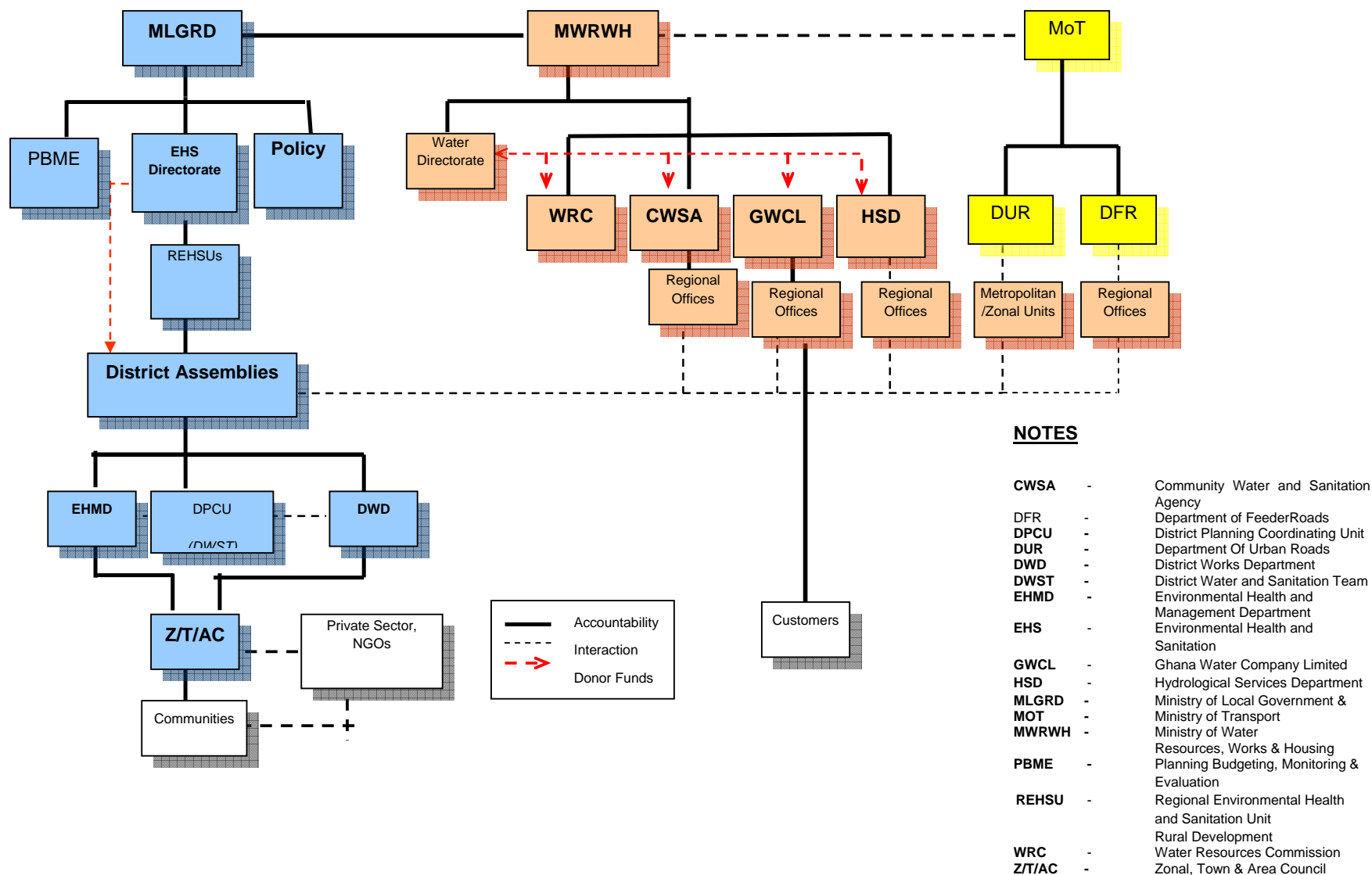
The responsibilities, rights and obligations of the Assemblies are stipulated in the Local Government Act, 1993 (Act 462). The Establishment Instruments of the various MMDAs define the specific services under their responsibility including ownership and management of wastes. The responsibilities across the decentralized departments of the MMDAs are diagrammatically represented as in Figure 2.4 below.

Table 2.12: Service delivery costs in the GAMA area

Service Type	Service Fee
<i>i. Commercial and Owned Containers</i>	
Category A-10,000 ltrs	Gh¢ 255/p/m/container
Category B-7,000 ltrs	Gh¢ 100/p/m/container
Category C-3,200 ltrs	Gh¢82/p/m/container
Category D-1,100 ltrs	Gh¢30/p/m/container
Category E 320 ltrs	Gh¢15/p/m/container
Category F 120 ltrs	Gh¢12/p/m/container
<i>Households</i>	
Category A-1 st Class Res	Gh¢12.00/p/m/house
Category B-2 nd Class Category C-3 rd Class	Gh¢10.00/p/m/house
Category D-Other Areas	Gh¢ 8.00/p/m/house
	Gh¢ 4.00/p/m/container
<i>Dumping Fees-Landfill</i>	
Category A-Comp. Truck	Gh¢ 10.00/trip
Category B – Trucks	Gh¢ 8.00/trip

Source AMA (2009) Annual Fee Fixing Resolution

Figure 2.4: Organizational collaboration between agencies for delivering aspects of environmental sanitation services



3 Value Chain Analysis of potential sub-sectors

This chapter describes the procedure followed in identifying the sub-sectors (components) of the solid waste stream and then conducting value chain analyses.

3.1 Adapted CHF Industry Selection Tools

In compliance with the requirements of the scope of works (Appendix 1), the CHF Industry Selection Tools were adapted for sub-sector analysis. The adapted tools include:

- **SWM Subsector Ranking** – carried out using available statistics
- **Evaluation Metrics** - initial list of 22 metrics, refined and consolidated to 10 with definitions and terminologies
- **Validated Scenarios** - Neutral, Poverty, Growth & Competitiveness, Sponsor(Gates)
- **Reviewed Questionnaires** - end-market users, intermediaries (converters/bulk buyers, agents/dealers), value pickers
- **Reviewed Opportunity/Constraints Matrix** - inputs/supply (domestic/freshly imported) market-access, technology and product development, regulatory/policy, physical infrastructure
- **Reviewed Intervention Prioritization Matrix** - High, Medium, Low
- **Reviewed Intervention Success/Risk Matrix** - Probability, Consequence, High, Medium, Low

3.2 Selection and Prioritization for Value Chain Analysis

The adapted Tools were applied in ranking and selecting the solid waste sub-sectors by applying four scenarios i.e. Neutral, Poverty, Growth and Competitiveness and Sponsor respectively.

The selection was done in two stages:

- i. Selection of four sub-sectors from among nine (9) waste stream components
- ii. Prioritization of four sub-sectors for value chain analysis

3.2.1 Selection of four sub-sectors for analysis

Nine (9) components (fractions) of the solid waste stream were analyzed by applying the adapted selection tools to select the four highest ranking sub-sectors for further prioritization. Each sub-sector was analyzed applying the four different scenarios mentioned earlier. The summary of the results of the ranking of sub-sectors under the various scenarios is presented in Table 3.1.

Table 3.1 Summary scores for SWM sub-sectors (component)

Scenarios	Solid waste management sub-sector								
	<i>Organic</i>	<i>Paper & Cardboard</i>	<i>Plastics & Rubber</i>	<i>Metals</i>	<i>Glass</i>	<i>Textiles</i>	<i>Wood</i>	<i>WEEE</i>	<i>Inerts</i>
<i>Neutral</i>	13	21	38	36	21	12	15	36	16
<i>Poverty</i>	56	34	59	55	35	22	28	54	28
<i>Growth</i>	58	32	55	62	34	19	21	59	24
<i>Sponsor</i>	59	37	72	60	38	24	31	60	32

The detailed results including graphical representation of the outcomes for all the scenarios are presented in Appendix 2. The selected sub-sectors are:

- Organic
- Plastics and Rubber
- Metals
- Waste electronic and electrical equipment (WEEE)

The adapted CHF Industry Selection Tools applied in ranking and selecting the four (4) sub-sectors are shown in Appendix 2.

3.2.2 Prioritization of sub-sectors for Value Chain Analysis

The four selected sub-sectors were further disaggregated into specific components, (Table 3.2), which were then analyzed, prioritized and subsequently subjected to value chain analysis. The sub-sectors and their components for which VCA was carried are presented in Table 3.2.

Table 3.2: Sub-sectors and components selected for further analysis and prioritization

Sub-sector	Component value chains analyzed for prioritization
Organics	Compostables, Thermal feedstock
Plastics and Rubber	Thin-film plastics, High-density rubber, Pneumatic tyres
Metals	Ferrous scrap, Non-ferrous scrap
WEEE	Used batteries, E-waste, Bulky waste

The CHF Industry/Value Chain Selection Tool was used to analyze the value chains selected for the four sub-sectors under the various scenarios mentioned above. The summary of the results is shown in Table 3.3. The detailed results are presented in Appendix 2. The value chains that were finally prioritized based on the results are shown in Table 3.4.

Table 3.3 Summary scores for value chains

Scenarios	Solid waste management sub-sector value chains									
	<i>Organics</i>		<i>Plastics & Rubber</i>			<i>Metal</i>		<i>WEEE</i>		
	<i>Compostables</i>	<i>Thermal Feedstock</i>	<i>Thin-film plastics</i>	<i>High density plastics</i>	<i>Pneumatics tyres</i>	<i>Ferrous scrap</i>	<i>Non-ferrous scrap</i>	<i>Used batteries</i>	<i>E-waste</i>	<i>Bulky waste</i>
<i>Neutral</i>	37	26	38	29	11	30	25	21	34	19
<i>Poverty</i>	55	38	59	45	15	43	36	28	32	28
<i>Growth</i>	61	40	55	41	15	55	47	31	55	31
<i>Sponsor</i>	67	49	75	57	21	49	39	33	59	33

Table 3.4 Prioritized value chains for sub-sectors

Sub-sector	Prioritized for value chains
Organics	Compostables,
Plastics and Rubber	Thin-film plastics,
Metals	Ferrous scrap,
WEEE	E-waste, Bulky waste

3.3 Value Chain Structures and dynamics

This section presents a narrative description of the relation between the various tiers of value chain participants (or actors) and how the legal and policy environments affect their roles. The derived value chain maps from these inter-relationships are also presented.

3.3.1 Thin film plastics waste value chain

Value chain participant profiles and relationships

The value chain actors or participants who were identified in the field surveys include the following:

- **Value pickers** – these include street sweepers/sanitary labourers employed by the



Plate 3.1: Different plastic types collected by value picker for sale to intermediaries

metropolitan authorities for litter control activities in streets and public spaces as well as private individuals who engage in this activity to supplement their income. The value pickers are typically those in the industry who do not have the financial resources to either buy and transport large volumes or convert available recyclables.

- **Intermediaries** – this refers to the individuals or micro-enterprises who buy thin film plastic wastes from the value pickers at various locations within the city. These intermediaries subsequently sell the materials to the plastic packaging manufacturing

firms. The intermediaries can be categorized into two groups i.e. the bulk buyers and the converters. The bulk buyers who constitute the majority sell the recyclables to end-market-users after minimal processing usually manual sorting and washing to reduce dirty appearance. Laborers are normally engaged to perform these tasks. The converters rely on machines for manufacturing plastic pellets or granules which earn a higher market price than ordinary recyclables. These plastic converters have to bear the additional costs of electricity, water for processing and the cost of machinery. In spite of these added costs, many of the converters consider the business as very lucrative. Converters purchase up to 6-7 tonnes of recyclables a day from Value-Pickers. On the average an intermediate converter with a monthly processing capacity of about 16.5 tonnes makes a turnover of GH¢ 20,000 (US\$14,285)¹⁰ whereas a bulk buyer/supplier makes a revenue of GH¢ 6,600 ((US\$4,714). The value picker(s) in this supply chain on average make a turnover of GH¢ 3,300 (US\$2,357).



Plate 3.2: Various stages in the thin- film processing into pellets. Stage 1: Melted plastics, Stage 2- grinding of melted thin-film plastics into pellets.

- **End market users** - this refers to the plastic manufacturing companies who buy un-processed or semi-processed thin-film plastic wastes or secondary raw materials (i.e. plastic pellets) from intermediaries. On the average the end-market price that local packaging manufacturing companies pay for thin film plastic recyclables is about 35p per kilo. The price may be reduced if the recyclables contain a lot of foreign material (contaminants) such as liquids, silt, stones etc. The extent of contamination may lead to rejection in some instances.

¹⁰ US\$ = 1.4 GH¢; April/May 2010.

The value chain map for thin-film plastics is presented in Figure 3.1.

Thin-film plastic wastes typically include empty water and ice-cream sachets, black polythene carrier bags, factory floor spoils of sachet water manufacturers and thin-film wrappers used by food vendors and shops. The bulk of these high value recyclables are used in the production of pellets which are the main raw materials used mostly by local plastic-packaging manufacturing firms. The pellets made from plastic wastes are categorized as secondary raw materials and is about 40% cheaper than virgin raw material.



Plate3.3: Washed water sachets (thin film plastics).



Plate3.4: Pellets processed from thin film plastics.

The locally produced pellets are also mixed with imported pellets in proportions depending on the quality of the local pellets.

Some of the thin film recyclables i.e. empty water and ice-cream sachets are also used as raw material in the fashion accessories industry to produce hand bags, traveling bags, rain coats, jackets etc. These companies pay a rate of about GH¢ 5 for 500 pieces of ice cream sachets (250 ml) and 30p per kilo for empty water sachets (500 ml). This end use activity is currently however very limited due to the lack of patronage of their products on the local market. As such, the quantity of recyclables purchased by these firms is very small compared to that of the packaging manufacturing companies.



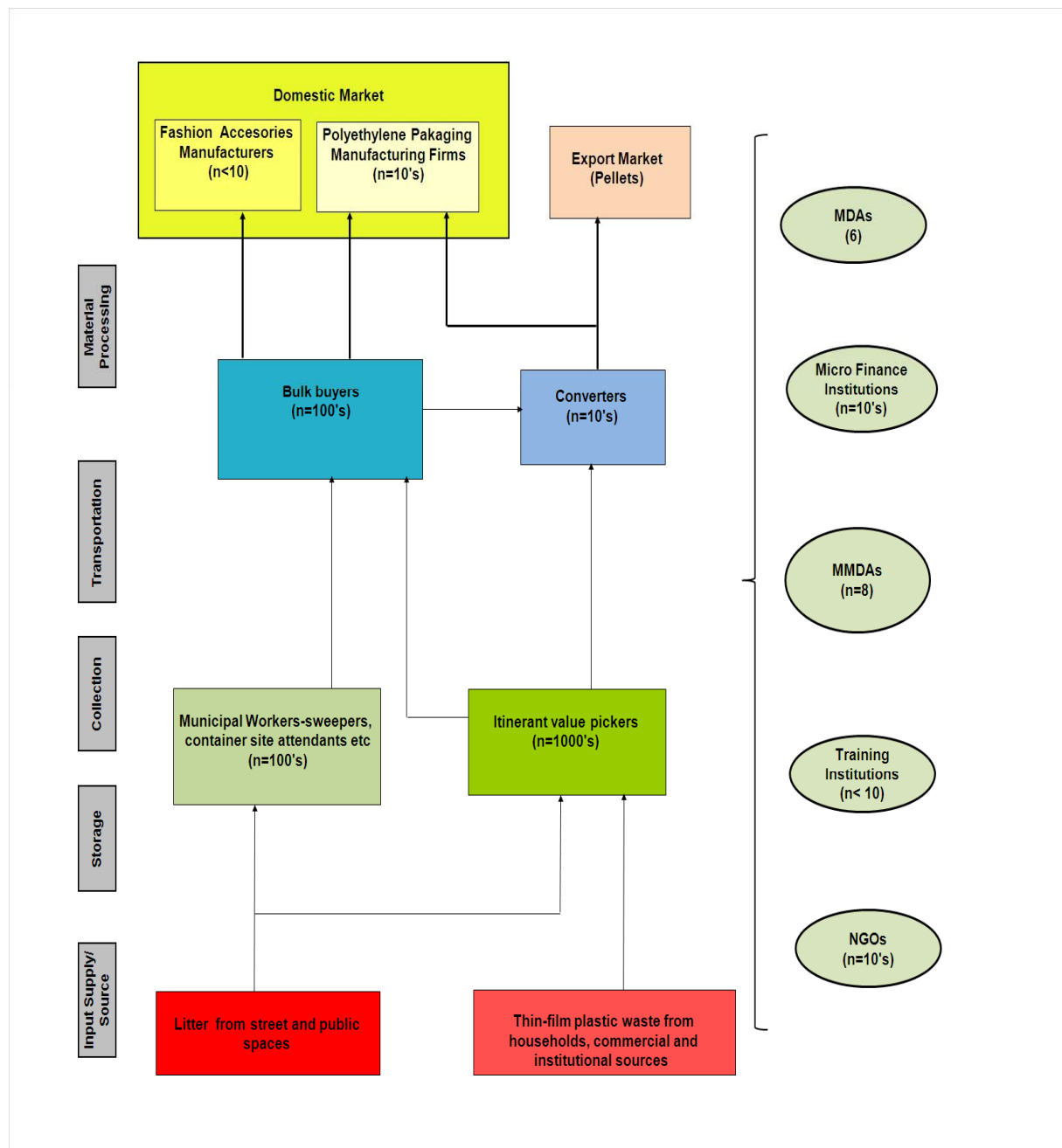
Plate 3.5: Carrier bags made with recycled thin-film plastics



Plate 3.6 Jacket and hat made with recycled thin-film plastic

The thin-film plastics wastes industry is largely controlled by the end-market users who determine the market prices they are willing to pay for materials that meet their specifications. The intermediaries and value-pickers have to comply with the dictates of the market. End-market prices do not necessarily increase during periods of shortage of the feed-material since the end-users are able to afford purchasing virgin raw materials to make up for the shortfall.

Figure 3.1 Value chain map for thin film plastics waste



Business Enabling Environment

The thin-film plastic recycling industry can be considered as a very informal activity at the level of the value pickers and some of the intermediaries. The converters and plastic packaging material manufacturers belong to either the small, medium or large scale industry category in the country. They do not receive any special subsidies or access to soft

loans/credit for using secondary raw materials and thus conserving the nation's natural resources.

Many of the companies like Blowplast Ltd have made several representations to both the local and central government agencies and other relevant departments like the EPA to recognize their contribution to environmental sanitation. Nonetheless, they still do not consider this lack of sensitivity as being major obstacle in meeting their financial turnovers or production targets.

Supporting Markets

The main supporting markets of the thin-film plastic industry are the manufacturers of plastic packaging materials and the producers of sachet-water who generate a lot of the source materials from their original production. In essence a large percentage of their output gets into the recycling process. Sellers of thin film-polythene bags also play a major role in the distribution of these bags which are currently the main packaging materials used in everyday activities i.e. wrapping food etc.

Inter firm Linkages

The plastic product manufacturers have close linkage with the plastic pellet manufacturers due to the supply chain existing between them. Likewise, the intermediaries who purchase the waste materials from the value-pickers have strong supply chain linkage with the plastic pellets manufacturers since they supply them with their input materials. The number of value pickers is quite large and scattered therefore the intermediaries are unable to serve of all them as desired.

3.3.2 Ferrous Metal Scrap Value Chain

Value chain participant profiles and relationships

The value chain actors or participants who were identified in the field surveys include the following:

- **Value pickers** - this refers to the predominantly male youth who roam the streets of the major urban areas in search of scrap. The value pickers comb the entire city boundaries for the scrap metal. They initially scout for the materials before mobilizing the required financial and logistical resources to move the materials from the point of purchase to the locations like the Agbogloboshie market temporary collection point. These pickers are predominantly male and include boys as young as 12 years.

- **Intermediaries (scrap agents and dealers)** - this refers to the individuals or micro-enterprises which buy scrap from the value pickers at various locations within the city. These intermediaries subsequently sell the materials to the steel mills or the waste exporters.
- **End market users** - this refers to the steel mills (5 local mills) and scrap exporters who buy scrap from the intermediaries. The scrap metal industry is largely influenced and controlled by prevailing world market price. The end market users rely on a number of intermediate scrap dealers for the regular supply of materials. A major manufacturing firm like Tema Steel Company transacts business with about 50 scrap dealers.



Plate 3.7: Storage of Scrap - Tema Steel Company



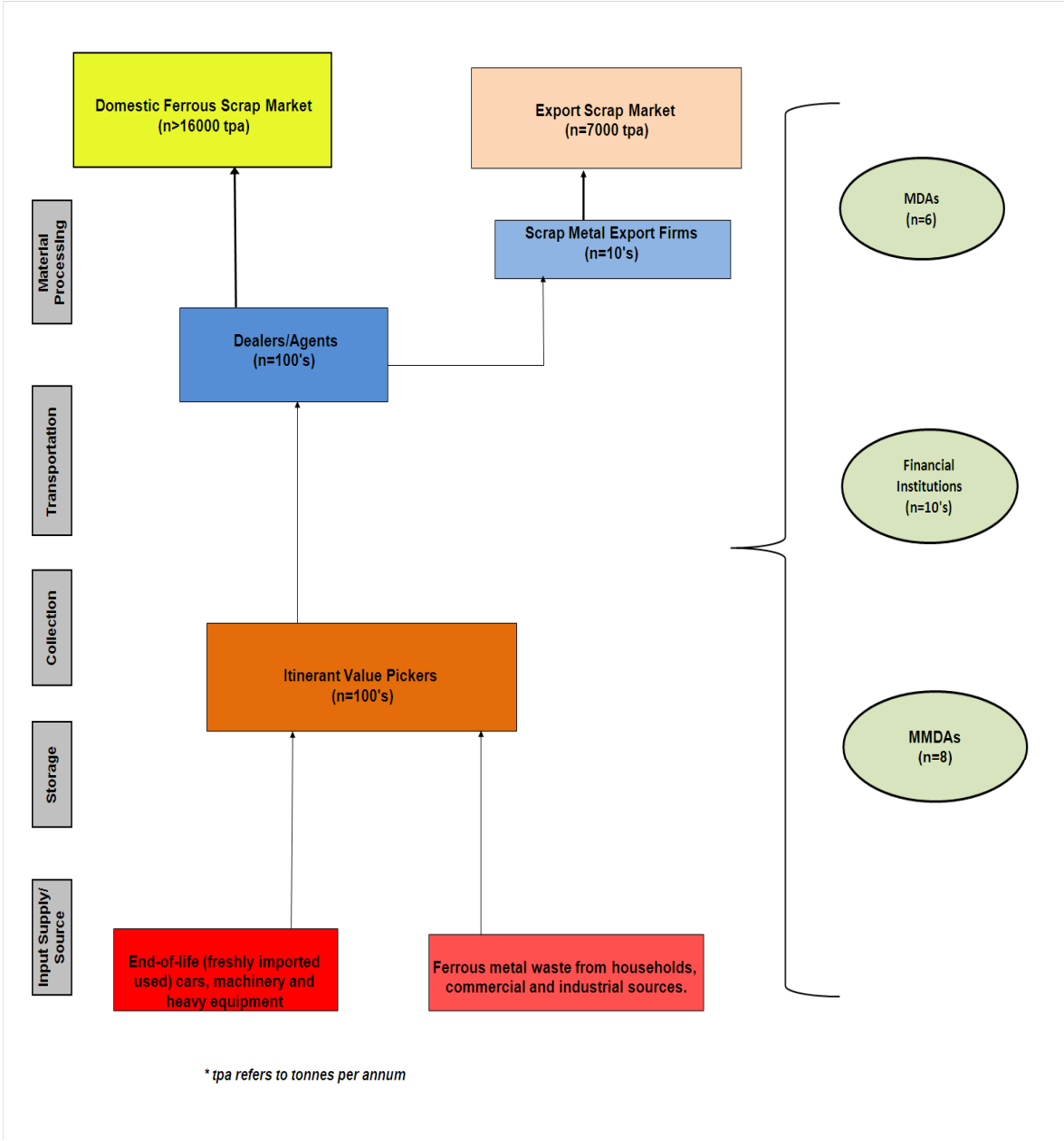
Plate 3.8: Truck load of scrap metal ready for weighing at SGS, Tema, before export

The value chain map for ferrous metal scrap is presented in Figure 3.2.

Ferrous metal scrap is recycled by the steel mills into iron rods and other steel material like nails for the building/construction industry. The preference for scrap metal as secondary raw material is high because there are limited quantities of virgin raw material i.e. iron ore in the country. The average price for scrap material offered by the local end-market users is between GH¢ 280 – GH¢350 per tonne depending on the condition/type of the scrap metal. Highly oxidized metals i.e. those which are old and rusty attract a lower price. Ferrous scrap is also exported from Ghana by a number of firms. This has led to the unavailability of high grade scrap for the local industries.

The major steel mills in the Tema Industrial Area purchase and process a total of about 800 tonnes of residual (low grade scrap metal) a day. This corresponds to a projected annual scrap purchase of GH¢ 36 million¹¹ (US\$25.7m).

Figure 3.2 Ferrous Metal Scrap Value Chain Map



The exporters buy the high grade ferrous scrap from scrap metal agents at about GH¢400 per tonne. The value of ferrous scrap export is estimated at GH¢ 4.5 million (US\$ 3.2m) per annum.

¹¹ This is based on an average price of GH¢300 per tonne and 210 days of production per annum.

Business Enabling Environment

The export of ferrous scrap metal has created a shortage of high grade secondary raw materials for their production lines of local steel mills (local end market users). Local manufacturing firms have to contend with high cost of electricity and residual fuel-oil for heating furnaces. The very high interest rates (above 25%¹²) quoted by local banks mean that a number of the local steel mills have to look to European and Asian financial markets for credit at lower lending rates of between 6-9%.

Supporting markets

The huge import of second-hand engine-blocks, car parts such as doors, bonnets and frames as well as near-end-of-life used electrical and electronic equipment (white waste¹³) from Europe, Asia and America constitute an important source of supply of scrap metals. Many mechanical engineering workshops which repair motor vehicles and other heavy equipment generate huge amounts of ferrous metal scraps which go to feed the scrap market. Scraps from the building industry also support the industry.

Inter firm Linkages

The end-user steel manufacturers have a supply chain linkage with the scrap dealers/agents. Their linkage is purely on the basis of supply and demand. Likewise, the scrap dealers /agents also have a supply chain linkage with the value-pickers which is managed on a supply and demand basis.

3.3.3 E-waste value chain

Value chain participant profiles and relationships

The value chain actors identified from field surveys include:

- **Value pickers** - these are mostly male (teenagers and men) aged between 15 to 30 years. The value pickers constitute the first line of transaction on the Value Chain Map. Usually using push-trucks, they visit all premises, refuse dumps and every vacant lot used for discarding, storing or repairing of WEEE to collect abandoned ICT equipment or in some instances to purchase the equipment from offices, homes, and shops etc.

¹² The inter-bank interest rate pegged by the Bank of Ghana for the period March – May 2010 is around 22%.

¹³ White waste refers to refrigerators and other kitchen appliances such as stoves etc.

- **Intermediaries** - this refers to the resident buyers at Agbogloboshie who purchase non-ferrous metals and circuit boards and electronic parts from the value pickers. They typically do their business in medium-sized metal containers (or wooden shacks) for storage of materials purchased materials. The basic tool of the trade is a weighing scale.
- **End-market buyers** - these are the agents of the manufacturing firms who use non-ferrous metals and circuit boards. The trade in recovered e-waste components is to a large extent shrouded in secrecy. Verification of information about the flow of recovered materials from intermediaries to the end market buyers or users was not possible due to the un-cooperative posture of the intermediaries possibly due to recent exposure of the potential pollution hazards of open-burning to recover metals. The intermediaries claim that computer firms based in neighboring Nigeria purchase the circuit boards for re-use in newly-assembled computers. The non-ferrous metals are sold to cable manufacturing companies. A lot of plastic (rubber) from cable insulation (sheathing) is also generated which is used by local plastic-recycling outlets.

The e-waste value chain map is presented in Figure 3.3. It is estimated that the dealers in non-ferrous materials recovered from e-waste make a profit margin of about 50%. The estimated annual revenue from export of recovered copper is GH¢ 13.5million (US\$9.64 m).

The main sources of e-waste are mainly near-end-of-life computer equipment and accessories from Europe and also to a lesser extent domestic ICT equipment suppliers, repairers, retailers and distributors. Un-serviceable computers are dismantled into the component parts such as metallic frames, power supply cables, circuit boards, cathode ray tubes and plastics by the use of simple hand tools. The high value components are the circuit boards and copper which is recovered from the wires and cables. The recovery of the wires is through open burning.

The circuit boards are used in assembly of new/refurbished computers. The copper wires are mostly sold to the local cable manufacturing companies. Some precious metals extracted from the components are exported to foreign markets. On the average the end-market price for recovered copper is about GH¢3.00 per pound (0.45 kg). After the initial recovery of component materials especially through burning and then washing there is no further processing as the materials move up the value chain to the end market.

Business Enabling Environment

The e-waste recycling industry at Agbogbloshie is a very informal activity at all the levels. The itinerant and small-scale collectors find the location ideal as it serves as a one-stop centre for dealing in the various components and transacting business among the various actors. There are currently no enforcement of regulations on open burning and pollution and so the open burning of cables has gone on without complaints by fellow inhabitants or attracted sanctions from EPA or environmental health inspectors of the city authority. It is believed that the business location within the slum enclave of Sodom and Gomorrah provides an “out-of-sight” cover for operations and thus avoided by enforcement agents.



Plate 3.9: Smoke produced as a result of burning (processing) e-waste (e.g. Electric cables) at Sodom and Gomorrah



Plate 3.10: Residuals from burning of e-waste (including plastic outer case of monitors and televisions, etc)

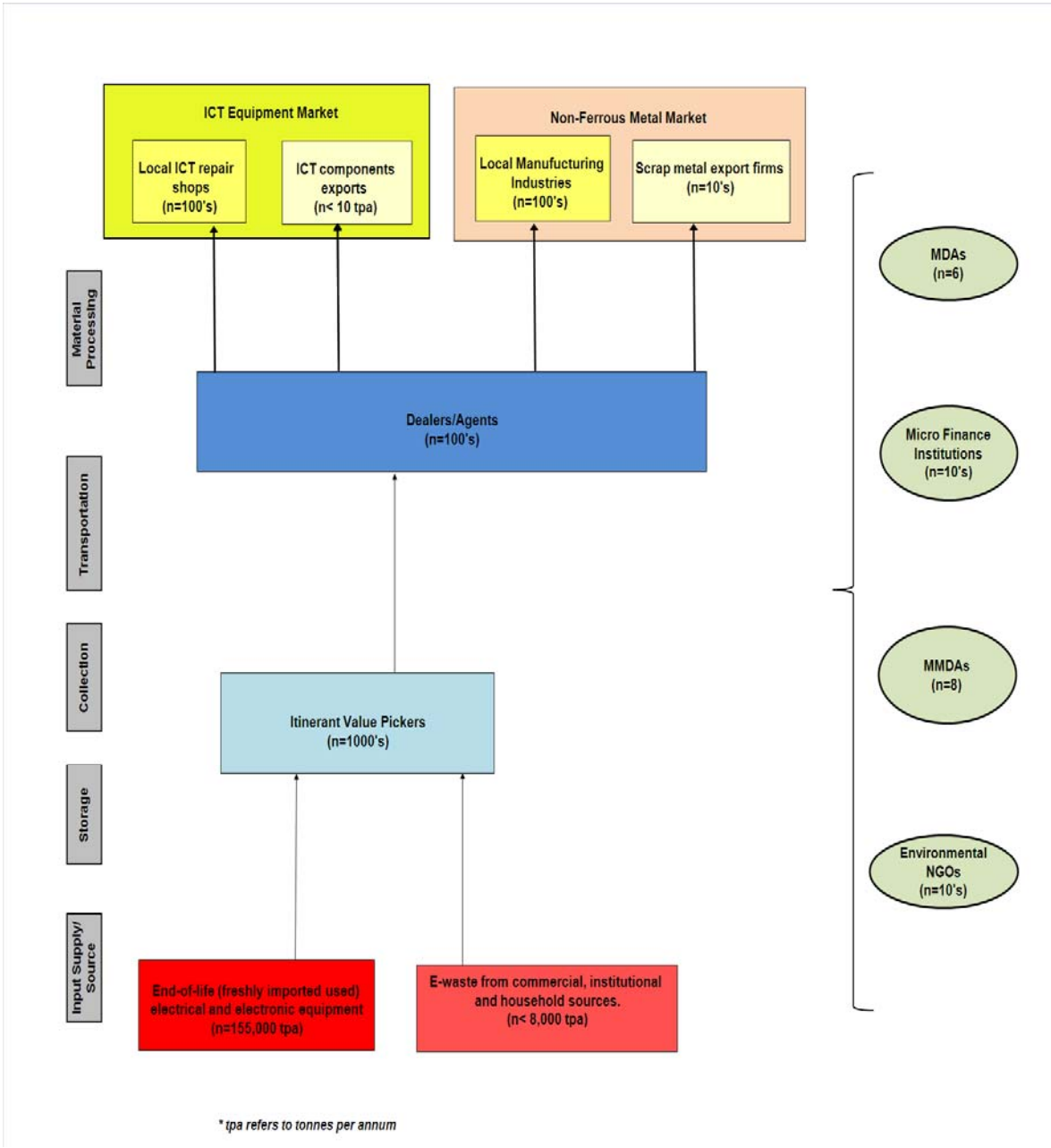
Supporting Markets

The continuous importation of near end-of-life electronic and electrical equipment from Europe ensures that there is a constant supply of WEEE into the local market. The banning of the importation of used items from abroad is not foreseen in the nearest future as it is difficult to interfere with buyers' (purchasers') right and choice of functioning equipment unless, perhaps, banned in the country of origin. Additionally, the demand from the local/international ferrous and non-ferrous scrap industry means there is ready market for metals recovered from WEEE.

Inter-firm Linkages

The linkage between the value-pickers and the intermediaries is vertical and informal. The end market users communicate their demands to the intermediaries who in turn purchase from the value-pickers. The value pickers also respond to the demands of the intermediaries by picking items that the intermediaries require. There are no direct contacts between the value pickers and end-market users. It is the demand of the intermediaries (based on requests from end-market users) which determine the volume of business of the value pickers.

Figure 3.3 E-waste value chain map



3.3.4 Compostables value chain

Value chain participant profiles and relationships

The closure of the only municipal compost plant that has operated in the city of Accra (and indeed the whole of Ghana) located at Teshie has significantly affected the production and use of composts. The plant owned and operated by the Accra Metropolitan Assembly (AMA) was built in 1976 with a processing capacity of 200 tonnes a day.



Plate3.11: Superstructure of the defunct Teshie Compost Plant showing the refuse conveyor belt.

The current producers of small-scale on-farm composts use a large portion of it on their own farms leaving a small amount of it for other users.

Co-composting with animal manure or human excreta was also practiced at the plant. Most of the MSW from the eastern suburbs of Accra was transported by waste haulage companies to the Teshie Compost plant as an alternative to the land disposal sites which were located in the western outskirts. Historical records indicate that the end market users who patronized the compost from the facility over

the years included:

- Real estate developers – compost used as soil conditioner in landscaping
- Vegetable farmers – compost used for nursing vegetables
- Waste Management Department (disposal operations) – compost used as cover/capping material to reduce malodors.

In the year 2002, the price of finished compost from the facility, then operating at about 20% capacity, was GH¢ 2 per tonne (US\$1.43).

At the time of this Value-Chain analysis the Teshie Plant had been de-commissioned and so the actors and relationships described below are based on interviews with the previous Plant Manager and expert knowledge of similar operations.

The Value Chain Participants identified in the chain are:

- **Value-pickers** – these are the large number of youth who will operate within communities to pick solid waste from generators and separate them to isolate the organic materials for onward delivery to composts plants either directly or to transfer stations (mainly communal container depots at sanitary sites) established within the communities.



Plate3.12: A typical composition of solid waste at Agbogbloshie market showing a high percentage of organic materials.

- **Compost plant operators** - these are the youth who will be responsible for operating the plants and processing composts for sale. Sales are expected to be made directly to end-users and distributors as the case may be.

- **Waste haulage services providers** – these haul waste from residential or

commercial sources to the composting facility. This is effectively carried out in low-income communities by pre-collection services using small-scale operators with tricycles and/or push-trucks.

- **Distributors** - these are entrepreneurs who will stock composts and sell in smaller quantities to household gardeners, estate developers and landscaping contractors etc.

The compostables value chain map is presented in Figure 3.4.

Business Enabling Environment

There are currently no environmental regulations which will hinder the production of composts within the GAMA area. The presence of huge dumps of uncollected waste within communities provides an avenue for encouraging compost production. All the MMDAs within GAMA and Environmental Protection Agency are willing to support the establishment of compost plants due to the projected positive impact on the environment and a potential for reducing the costs of managing solid waste, particularly as the organic vegetable putrescibles (biodegradable organic fraction, BoF) constitute the largest portion of the municipal solid waste stream.

The introduction of source-separation services and controlled sorting at communal transfer depots will enhance the supply of source inputs to compost plants.

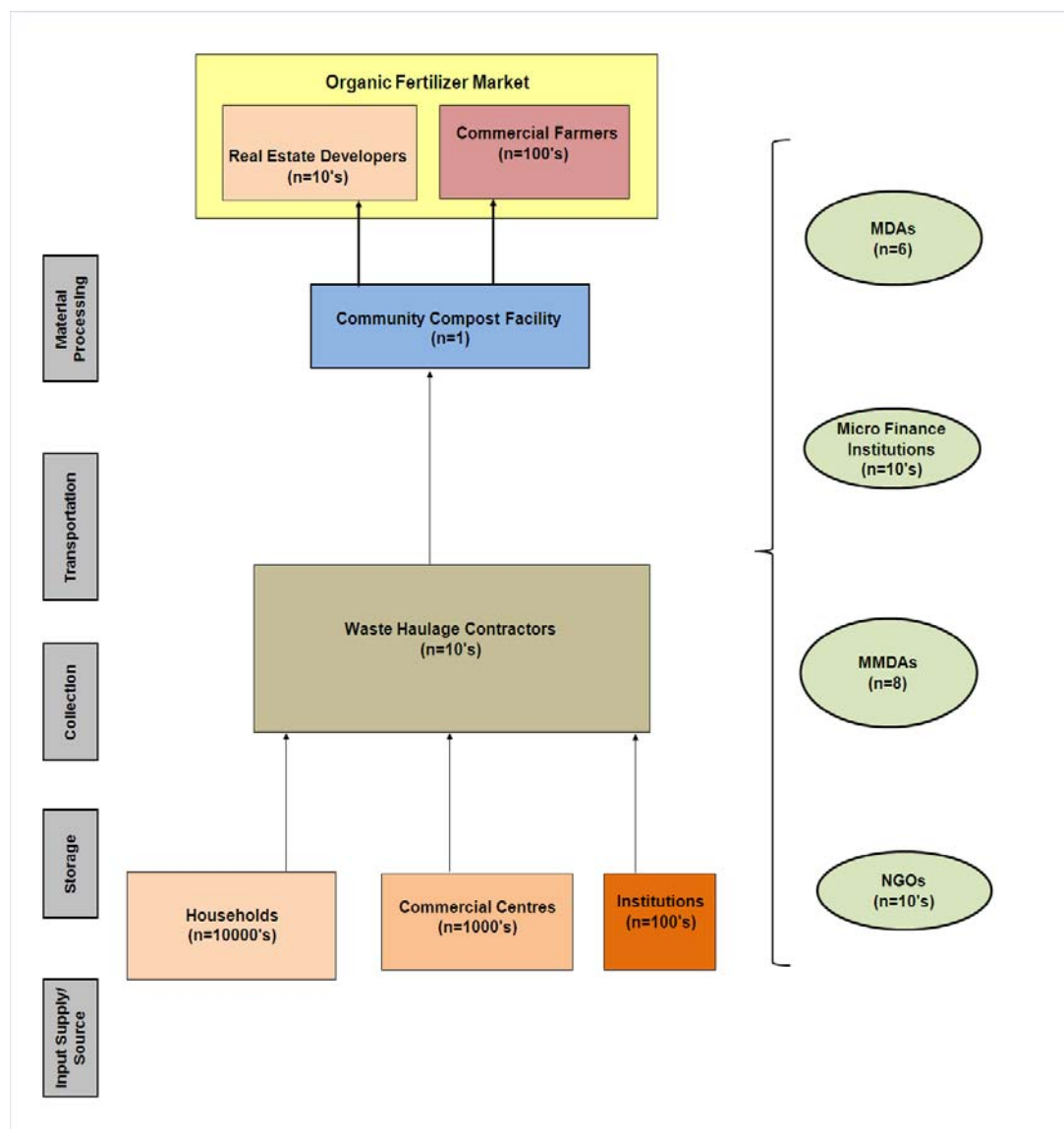
Supporting Markets

The large food markets which traditionally sell un-processed foodstuffs to households, restaurants and hotels and other commercial eating joints are the main sources of supply of the compostables. As indicated from the composition of household refuse the BoF is high and is an important source.

Inter firm Linkages

The compost facility operators will depend on private waste hauling companies to ensure constant supply of compostables. They will link with distributors of agricultural inputs and supplies.

Figure 3.4 Compostables value chain map



3.4 Value Chain Findings

3.4.1 Opportunities, Constraint matrices for value chains

The key factors that affect industry competitiveness for each of the value-chains are presented in the completed opportunities and constraints matrices for the individual value chains in Tables 3.5 to 3.8. The tools used for the interviews and other relevant information are presented in Appendix 3.

Table 3.5 Opportunities Constraints Matrix for thin film plastics

CATEGORY/ FUNCTION	CONSTRAINTS/ OPPORTUNITIES	SOLUTIONS	INTERVENTION	SOLUTIONS PROVIDERS
SOURCE/INPUT/SUPPLY	<p>(O) There is a large quantity of thin-film plastic waste littering communities especially urban areas, which can be recycled</p> <p>(C) There is insufficient quantity of secondary raw material (pellets) for the plastic packaging manufacturing industries.</p>	<p>Increase/introduce special collection of thin-film plastics littering the urban areas.</p> <p>Reduce the amount of plastics that are thrown away indiscriminately.</p>	<p>Organise public awareness for the public on the economic benefits of collecting plastic waste.</p> <p>Encourage end-market users and Intermediate Converters to offer higher prices for collecting thin-film plastic waste.</p> <p>Develop “buy-back “ or refund programmes that put value on plastic waste and educate people on where to send their plastic wastes for refund</p>	<p>Plastic manufacturing firms</p> <p>Material Converters, GOG, MMDAs, MDAs (EPA), NGOs ,CBOs</p>
MARKET ACCESS	<p>(C) Competition from better quality imported finished plastic products.</p> <p>(O) Low grade secondary recyclables have other beneficial uses such as production of plastic products like dolls, plastic footballs, etc.</p>	<p>Improve quality of secondary raw materials to lower processing/production costs to make them more competitive.</p>	<p>Public awareness on source separation of plastic recyclables</p> <p>Training of intermediaries and value pickers on simple processing techniques e.g. Manual sorting, washing, etc.</p> <p>Improve technology for the production of better quality secondary raw materials (pellets)</p>	<p>EPA/MMDAs; Plastic manufacturing companies</p> <p>Material converters</p> <p>Training Institutions, CBOs, Private Operators</p> <p>Technology Transfer/Training Institutions</p>
FINANCE	<p>(C) High interest rates and loan collateral requirements by local banks and financial institutions makes access to credit difficult</p> <p>(O) Potential for Government investment in</p>	<p>Explore alternative funding sources.</p>	<p>Facilitate access to non-commercial funding such as Global Environment Facility (GEF), and GoG sourced-funds to Micro-Finance Institutions;</p>	<p>Environmental NGOs, Donors, AGI, Banks</p>

	initiatives such as composting and “buy-back”			
ORGANISATION AND MANAGEMENT	(C) Poor organisation and irregular modes of operations affects flow of recyclables along and across the value chain.	Improve business, marketing, and management skills of the various stakeholders. Strengthen horizontal & vertical linkages in the value chain	Training and technical assistance to intermediaries in business management practices. Facilitate and establish direct linkages between the chain actors.	Manufacturing Companies, NGOs, Microfinance institutions
REGULATORY/ POLICY	(c) There are no policies that promote the use of secondary raw materials in the plastic packaging manufacturing industry (O) Environmental Sanitation Policy promotes 4Rs (reduction, re-use, recycling and recovery)	There should be some recycling friendly policies to support the industry.	Advocacy by civil society organizations Facilitate the financing of strategic interventions in National Environmental Sanitation Strategy and Action Plan (NESSAP)	Environmental NGOs; DPs, MoFEP/MLGRD
TECHNOLOGY AND PRODUCT DEV'T	High level of contaminants which increases production costs.	Value pickers and Intermediaries should use better processing techniques.	Improving sorting and segregation methods during collection, storage and transport of plastic waste.	Value Pickers, Intermediaries
	High cost of electricity and water.	More options should be explored on other cost effective technologies eg. Gas.	Manufacturers and Intermediate converters should recycle process water	Manufacturing companies
PHYSICAL INFRASTRUCTURE	Inadequate storage facilities for value pickers and intermediaries due to the large quantities of thin-film plastics collected.	Provision of adequate storage facilities	Establishment of buy-back centres at vantage locations in the urban areas	GOG, MMDAs, Entrepreneurs, Environmental NGOs

Table 3.6 Opportunities Constraints Matrix for ferrous metal scrap

CATEGORY/ FUNCTION	CONSTRAINTS/ OPPORTUNITIES	SOLUTIONS	INTERVENTION	SOLUTIONS PROVIDERS
SOURCE/INPUT/SUPPLY	<p>(C) Export of high-grade scrap metals create shortages, leaving only low-grade (residuals).</p> <p>(C)Have no access to high grade scrap metal from mining industry which the traditional leaders have the right of first refusal.</p>	<p>Reduction in Export of high-grade ferrous scrap.</p> <p>Explore access options to mining industries' scrap</p>	<p>Local steel mills should be encouraged to pay competitive prices comparable to that of the world market.</p> <p>Facilitate negotiations between traditional leaders and local end-market users to have access to the high grade scrap.</p>	<p>Steel Mills</p> <p>Steel mills, Chamber of mines, Traditional Leaders.</p>
MARKET ACCESS	(O)There is no competition from foreign imports due to the growing demand for building construction materials such as iron rods, nails, etc.			
FINANCE	(C)High interest rates and loan collateral requirements by local banks and financial institutions makes access to credit difficult	Explore alternative funding sources	Facilitate access to low-interest/ non-commercial funding sources	Commercial banks, AGI
ORGANISATION AND MANAGEMENT	(O)There is a scrap metal dealers and agent association that seeks the interest and welfare of its members.	Strengthen vertical and horizontal linkages	Provide training in HSE.	NGOs, CBOs, Training Centres, Micro-credit Institutions
REGULATORY/ POLICY	(C)There are no policy framework/guidelines regulating the ferrous scrap recycling industry.	Development of guidelines to regulate the activities of dealers, agents and value pickers.	Advocacy by civil society and trade associations	NGOs, Scrap Metal Dealers Association, EPA, MMDAs
TECHNOLOGY AND PRODUCT DEV'T	High cost of electricity and Residual-Fuel Oil (RFO) for reheating/firing of furnace when rolling/billeting.	More options should be explored on other cost effective technologies	Installation of energy-efficient plant and machinery for example gas furnaces.	Manufacturing Companies, Ghana Energy Commission Research Institutions.

Table 3.7 Opportunities Constraints Matrix for e-waste

CATEGORY/FUNCTION	CONSTRAINTS/ OPPORTUNITIES	SOLUTIONS	INTERVENTION	SOLUTIONS PROVIDERS
SOURCE/INPUT/ SUPPLY	(O)There is a large quantity of E-waste due to increased imports particularly used and end-of-life items and use of information communication and technology (ICT) device.	Facilitate the collection, repair and disposal of e-waste components	Support collection of e-waste.	MMDAs, EPA, NGOs Training institutions
MARKET ACCESS	(O) There is high domestic demand for the repair and refurbishment of ICT devices.	Promote recovery of ICT components and parts.	Provide skills training to youth i.e. repair/refurbishment of imported ICT equipment	MMDAs, MDAs, NGOs, Training Institutions entrepreneurs
FINANCE	(C)High interest rates and loan collateral requirements by local banks and financial institutions makes access to credit difficult.	Explore alternative funding sources	Facilitate access to micro finance Institutions.	MFIs, GoG, NGOs
ORGANISATION AND MANAGEMENT	(O)Most of the value chain actors are also engaged in the ferrous metal scrap business.	Strengthen vertical and horizontal linkages	Training in HSE.	Training Centres, NGOs
REGULATORY/POLICY	(C)There are no guidelines regulating the activities of the dealers, agents and pickers.	Development of guidelines to check the environmental and health impact of activities, e.g. open burning of cables at Agbogbloshie.	Advocacy by civil society and trade associations	NGOs, Scrap Metal Dealers Association, EPA, MMDAs
TECHNOLOGY AND PRODUCT DEV'T	(c)Very crude material recovery methods for copper resulting in environmental and health risks in the Agbogbloshie settlement.	Provision of better healthy and safe environment working.	Provision of Personal Protection Equipments (e.g. nose masks	NGOs, EPA, MMDAs

Table 3.8 Opportunities Constraints Matrix for Compostables

CATEGORY/ FUNCTION	CONSTRAINTS/ OPPORTUNITIES	SOLUTIONS	INTERVENTION	SOLUTIONS PROVIDERS
SOURCE/INPUT/SUPPLY	(O) Large volume of compostable in the waste stream.	Facilitate the processing of compostable waste	Create awareness of the economic and environmental benefits of composting Facilitate the establishment of compost plant	GOG, MDAs, MMDAs, NGOs, CBOs, Entrepreneurs MoFEP
	(c)Lack of separation at source will increase production costs.	Encourage source separation of compostables at generation points	More storage containers should be provided. Create awareness of source separation	MMDAs, NGOs, CBOs, Waste Haulage Contractors
MARKET ACCESS	(c)Low sales of compost due to low appreciation of compost (C)High cost of compost as compared to manure.	Increase knowledge on the benefits of use of compost especially for export products (e.g. organically-grown fruits and vegetables)	Introduce city wide beautification and greening programmes and policies. Extensively market compost. Improve retail and distribution networks	MMDAs, NGOs, CBOs, End market users
FINANCE	(C)High interest rate and stringent loan collateral requirement by local banks and other financial institutions make access to credit difficult	Explore other funding and collateral options	Facilitate youth's access to youth-friendly financial services Mobilizing youth into groups to enhance their credibility for financing Obtain collaterals for financial institutions to enhance onward lending to youth	NGOs, MFIs
ORGANISATION AND MANAGEMENT	(O)Well-established waste collection and transport systems in the urban areas.	Collaboration with existing actors	Increasing interaction with the actors Establish contracts for delivery of waste.	MMDAs, NGOs, Waste Contractors

CATEGORY/ FUNCTION	CONSTRAINTS/ OPPORTUNITIES	SOLUTIONS	INTERVENTION	SOLUTIONS PROVIDERS
REGULATORY/ POLICY	(C) Absence of regulations and guidelines for construction and operation of compost facilities	Development of requisite regulatory framework.	Advocacy for the development of regulations and guidelines by relevant agencies.	GOG, MDAs, MMDAs, NGOs, CBOs,
TECHNOLOGY AND PRODUCT DEV'T	(O) Availability of low cost and labour-intensive composting technology	Establishing compost plants based on appropriate technology	Mobilize and train youth in the appropriate technology	Training Institutions, NGOs, CBOs,
PHYSICAL INFRASTRUCTURE	(O) Unavailability of compost facilities at both the municipal or community level.	Establishment of compost facilities at both the municipal and community level.	Establishment of pilot community compost facilities.	CBOs, NGOs, community GOG, MDAs, MMDAs, NGOs, CBOs, Entrepreneurs

3.4.2 Profitability analysis for value chains

Thin film plastic waste value

Value picking is to a large extent an informal activity organized on an individual basis. This makes it very difficult to quantify the actual labour costs incurred in picking thin film plastics. Nonetheless, a comparison can be made to the minimum daily wage.

Table 3.9 Profitability analysis for a thin film plastic value chain actor

Description	Cost per Kilo	Operations for a month
Selling price	GH¢ 1.20	GH¢ 20,000
Profit margin – 20% of selling price	GH¢ 0.24	GH¢ 4,000
Cost of production	GH¢ 0.96	GH¢ 16,000
Cost of thin film plastic waste purchased	GH¢ 0.40	GH¢ 6,667
Cost of production inputs	GH¢ 0.56	GH¢ 9,333
Returns for intermediary		
Gross Margin	GH¢ 0.20	GH¢ 3,333
Net Margin-50%	GH¢ 0.10	GH¢ 1,667
Returns for value picker(s)		
Gross Margin	GH¢ 0.20	GH¢ 3,333
Net Margin-50%	GH¢ 0.10	GH¢ 1,667
Estimated earning for a single value picker (40 kg/day)	GH¢ 4.00	GH¢ 108

Value pickers earn about GH¢ 0.20 per kilo which means a value-picker must collect in excess of 14 kilos to be able to earn a daily income which is higher than the minimum daily wage of GH¢ 2.70. It was not possible to determine the average weight/volume of thin film plastic waste a value picker collects on a daily basis.

Intermediaries who purchase the recyclables from the value pickers earn between GH¢ 0.35 - GH¢ 0.45 per kilo, depending on the level of contamination of the recyclables, when they sell to converters or end market users. It was not possible to determine the proportion of expenditure spent on bulk transportation or storage of recyclables. Converters earn GH¢ 1.20 per kilo for pellets manufactured. Table 3.9 showed the summary of the profitability analysis.

Ferrous metal scrap value chain

Table 3.10 Profitability analysis for ferrous scrap value chain actors

Value chain actors	Purchasing Price	Selling Price	Profit Margin
Value pickers	GH¢ 100/tonne	GH¢ 200/tonne	GH¢ 100/tonne
Scrap Agents /Dealers (Low grade/ Residual Scrap)	GH¢ 200/ tonne	GH¢ 300 / tonne	GH¢ 100/tonne
Scrap Agents /Dealers (High grade Scrap)	GH¢ 200/tonne	GH¢ 400/tonne	GH¢ 200/tonne
Waste Exporters	GH¢ 400/tonne	GH¢ 600/tonne	GH¢ 200/tonne

Value pickers earn about GH¢ 200 per tonne of ferrous scrap when they sell to intermediaries i.e. scrap agents and dealers. A ferrous metal value picker must therefore collect in excess of 14 kilos of scrap a day in order to earn the minimum daily wage of GH¢ 2.70. The intermediaries sell the high grade scrap to the waste exporting firms at a rate of GH¢400 per tonne whereas the low grade residual scrap is sold to the local steel mills at a rate of GH¢ 280 per tonne. It was not possible to determine the expenditure these intermediaries incur in the bulk transportation of the recyclables. Generally, respondents i.e. scrap agents/dealers and

end-market buyers¹⁴ were not very forthcoming about the specific details on incomes and expenditures along the value chain. A profitability analysis is presented in Table 3.10.

E-waste value-chain

The profitability analysis for this value chain is shown in Table 3.11.

Table 3.11 Profitability analysis for e-waste value chain actors

Value chain actors	Purchasing Price	Selling Price	Profit Margin
Value pickers	GH¢ 4,400/tonne	GH¢ 6,600/tonne	GH¢ 2,200
Scrap Agents /Dealers	GH¢ 6,600/ tonne	GH¢ 9,000 / tonne	GH¢ 2400/tonne
End market buyers (Local and Export market)	-	-	-

Compostables value chain

The compost industry is currently non-existent in the GAMA area. However, the selling price of compost produced at a privately operated facility in Dobro, which is about a few kilometers from the GAMA area, is about GH¢ 30 per tonne. Generally, the operation costs for a typical small to medium scale compost facility is about 30% of the selling price.

¹⁴ There is a large presence of foreign agents (Chinese and Indian) who provide the outlets and capitalization for purchase of high-grade ferrous metals.

4. Assessment of Market-based Solutions

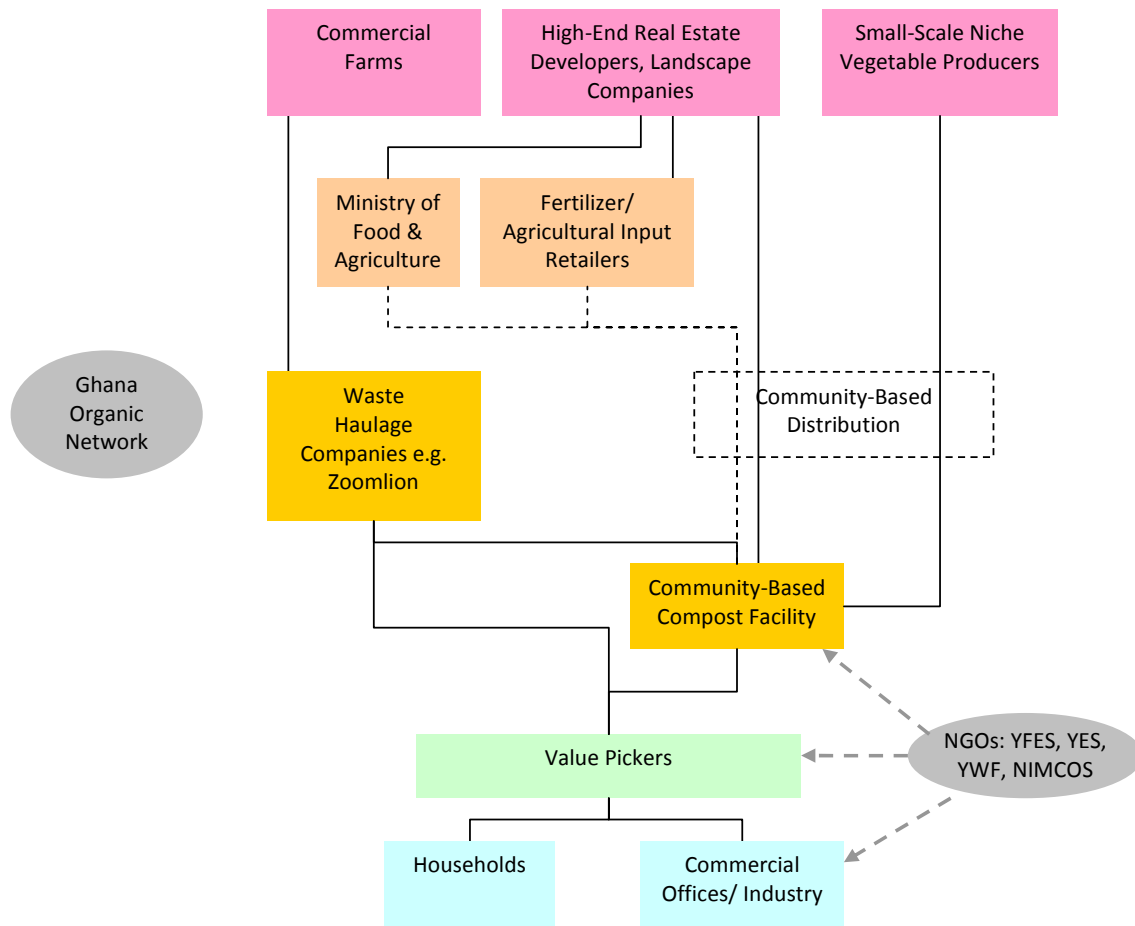
4.1 Opportunities identified within the value chains

Various opportunities for training and engaging the youth in the SWM have been identified and listed for each value chain based on the foregoing analyses. These opportunities can be further pursued to create the desired jobs for the youth. Table 4.1 presents some opportunities identified within the value chains. Based on these opportunities a list of direct and indirect activities for each of the value chains is summarized in Tables 4.2 to 4.5.

4.2 Proposed Interventions and Solutions

The proposed interventions and solutions as identified in the Opportunities/Solutions Matrix have been prioritized and the corresponding incentives analyzed for each value chain as shown in Tables 4.6 to 4.9. The dynamics and specific activities for the envisioned value chain development options for the respective sub-sectors as well as the various value chain vision maps have also been presented. Figures 4.1 to 4.6 illustrate the value chain vision maps.

Figure 4.1 Community-Based Niche Compost Value Chain Vision Map



Community-based niche compost value chain development

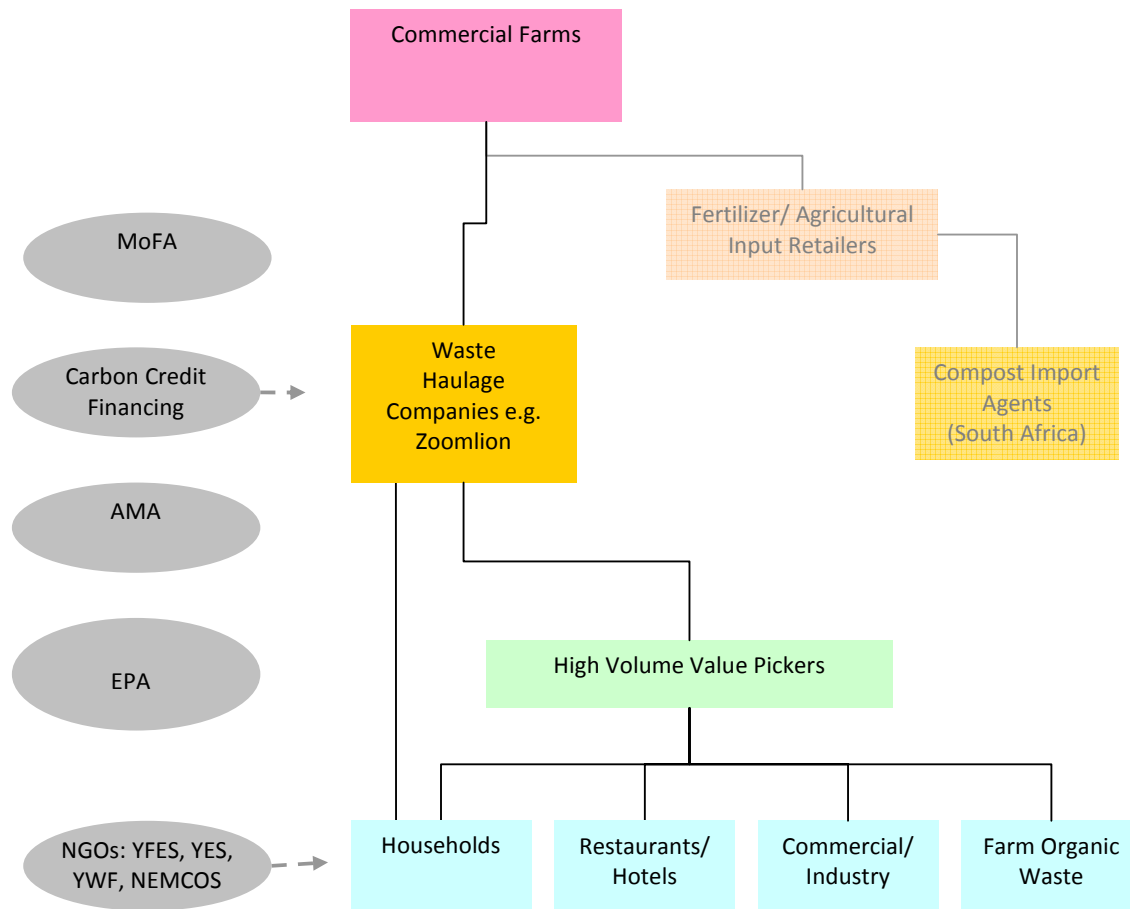
At the present time, input retailers are not particularly interested in selling compost and do not see a high demand among their markets. As such, further demonstration of the market potential for compost is needed. A community-based compost facility, four constructed in 4 zones of Accra, will demonstrate the operational workings of composting and the market potential for this product.

Activities to support the niche community-based compost value chain development include:

- Introducing additional containers to ensure source separation at household levels in 4 zones.
- Introducing additional containers to ensure source separation in commercial and industrial areas
- Conducting education campaign on source separation practices in 4 zones.

- Offering insurance on Value Picker tricycle leases to offset risk faced by Zoomlion micro-loans.
- Working with value pickers at household level to collect separated waste and to reinforce household education about source separation
- Encouraging value pickers to collect waste at commercial/ industrial sites (bulk inputs).
- Working with value pickers and waste haulage companies to set up price incentives for households/ offices to source separate (lower prices for separated waste).
- Introducing compost production at community-level – set up 4 compost plants.
- Boosting demand for compost among niche buyers with demonstration projects and other promotional efforts. (Conducting thorough market assessment to establish appropriate product specifications, customer segmentation, pricing, distribution networks, promotional strategies).
- Facilitating market linkages between community compost facility and identified niche buyers.
- Setting up a distribution channel for community-based compost to go to market.
- Working with agricultural input retailers to offer locally made organic compost in the long terming.
- Establishing a Ghana Organic Network to establish standards and marketing of locally-made, high quality, organic compost.

Figure 4.2 Commercial Compost Value Chain Vision Map



Commercial compost value chain development

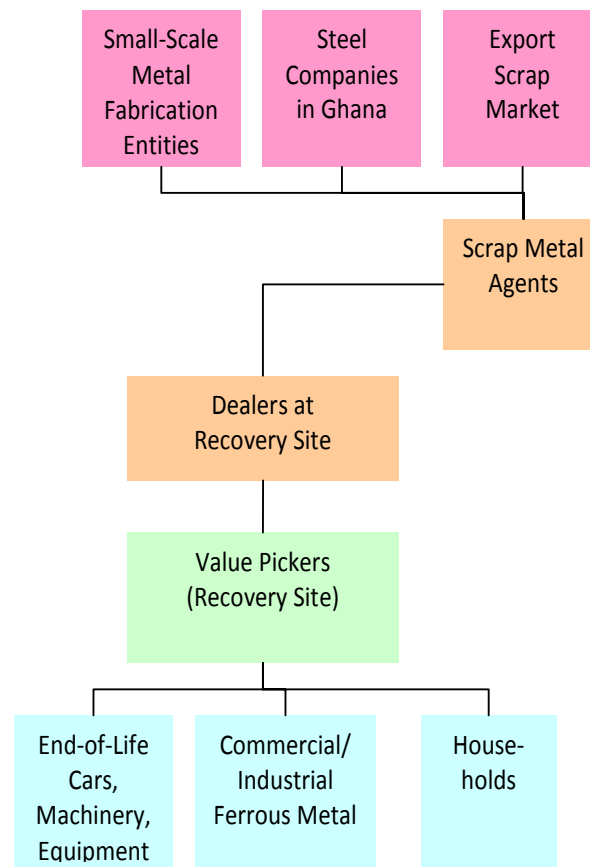
Ghana's major waste haulage company, Zoomlion, is now constructing a compost facility as part of a new landfill site, in order to sell compost to commercial farmers. To this end, commercial compost production may be a highly vertically integrated value chain in the short-term until additional competition comes online. Source separation will be a critical factor in the chain in order to improve the quality of the finished compost and to increase collection efficiencies.

Activities which will support the commercial value chain development include:

- Introducing containers to ensure source separation at household level in 4 zones.
- Introducing containers to ensure source separation at commercial and industrial areas
- Conducting education campaign on source separation practices in 4 zones.
- Supporting high volume value pickers to collect/ sort waste for waste haulage companies.

- Facilitating carbon credit financing for Zoomlion’s compost facility, and any other future facilities.
- Providing training in GIS, fleet management, and other operational efficiencies for waste haulage companies.
- Working with value pickers and waste haulage companies to set up price incentives for households/ offices to encourage source separation.

Figure 4.3 Ferrous Metal Value Chain Vision Map



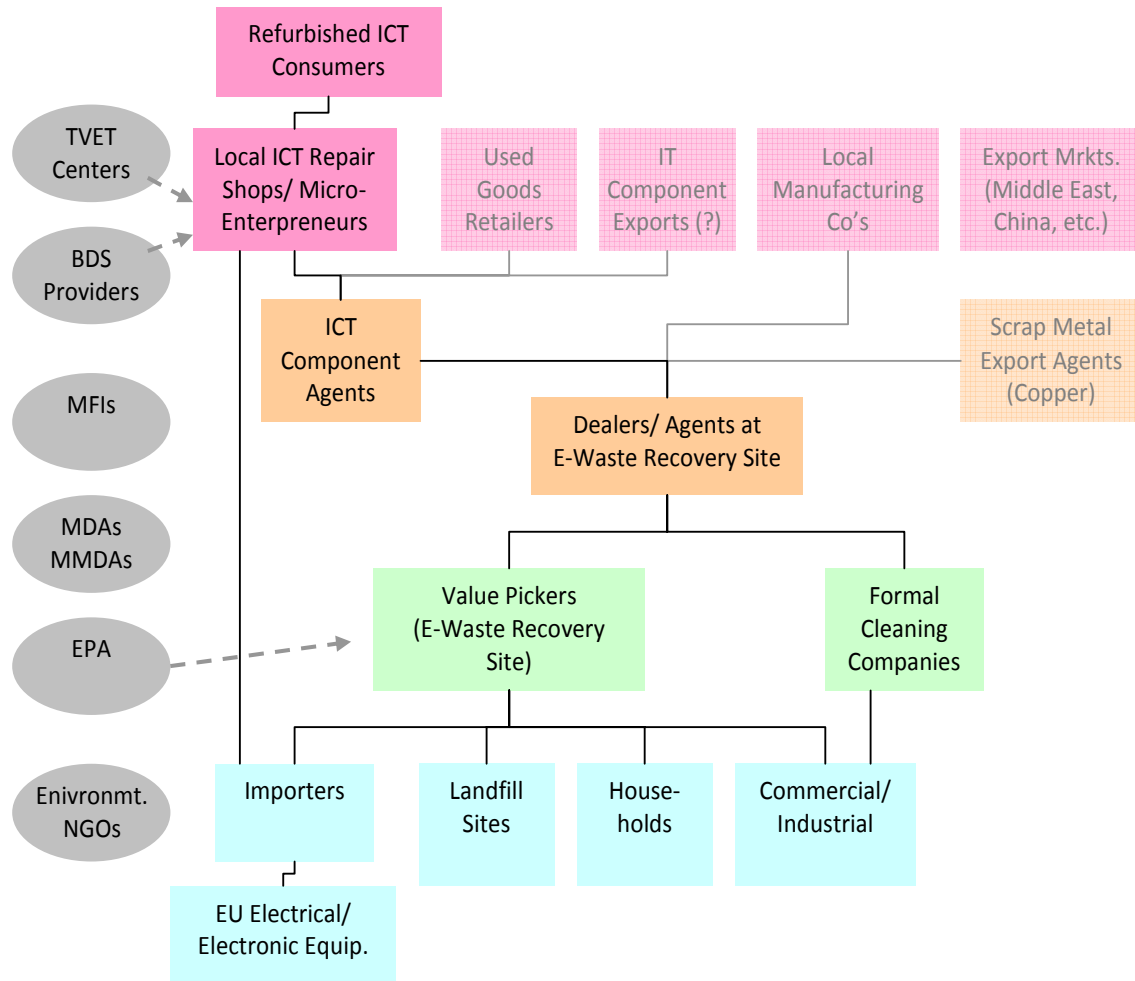
Ferrous metal value chain development

For this value chain it is envisioned that the roles played by various actors will be strengthened. Activities include:

- Formalization of value pickers at the scrap metal recovery site
- Health and safety training and safety equipment for value pickers

- Exploring financing options for value pickers and/or dealers/agents at scrap metal recovery site

Figure 4.4 Refurbished ICT (E-waste) Value Chain Vision Map

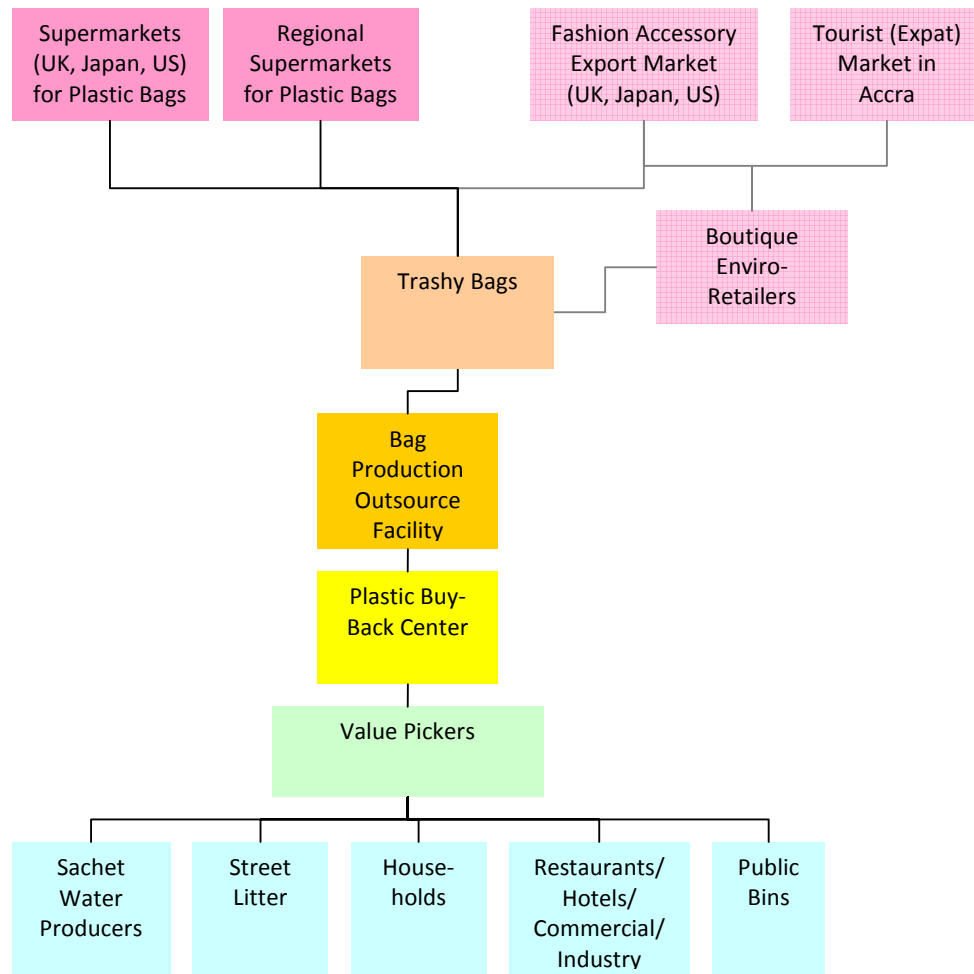


Refurbished ICT Equipment (E-waste) value chain development

The activities which are envisioned to support the refurbished ICT value chain development include:

- Formalization of value pickers at the e-waste recovery site
- Health and safety training and safety equipment for value pickers
- Exploring financing options for value pickers and/or dealers/agents at e-waste recovery site

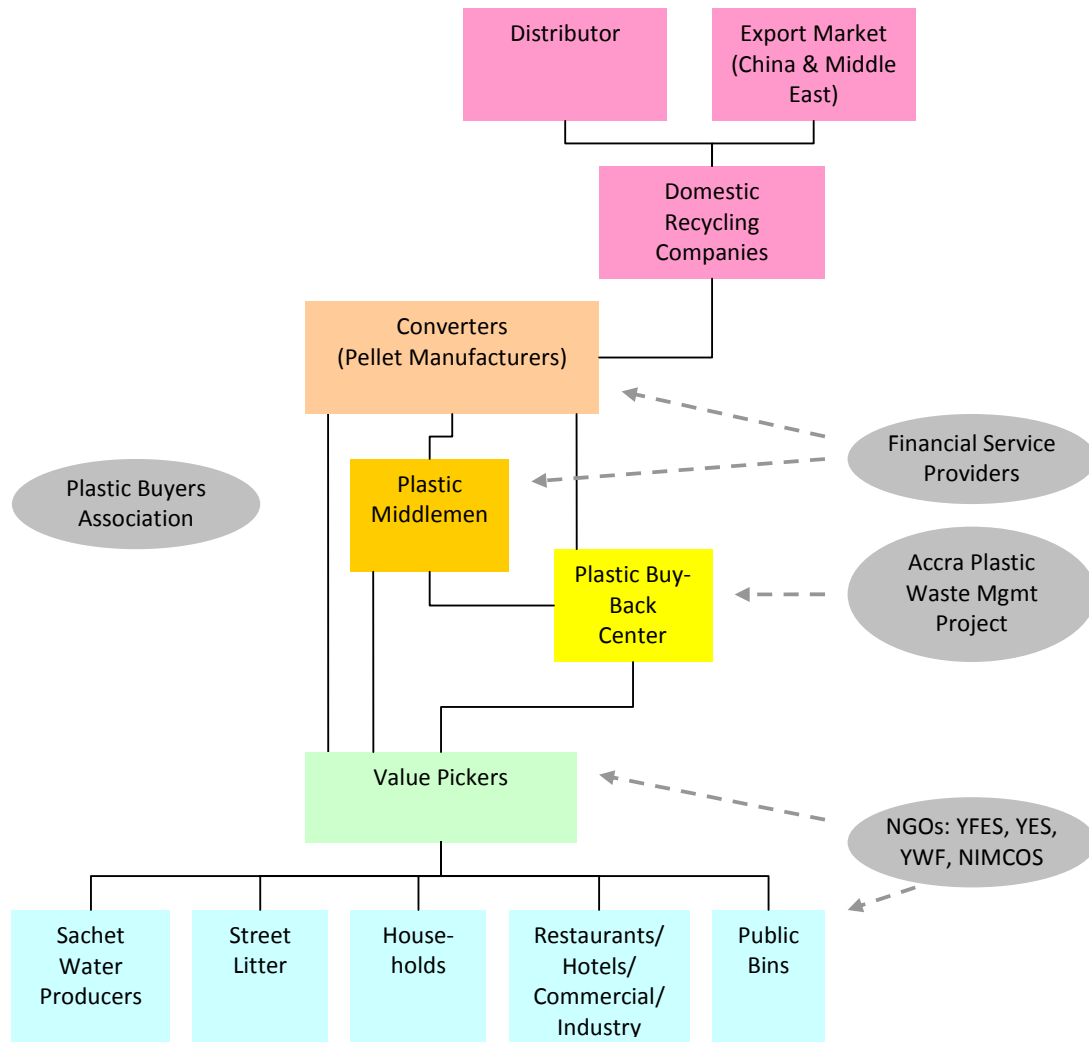
Figure 4.5 Recycled Plastic Shopping Bag Value Chain Vision Map



Recycled Plastic Shopping Bag Value Chain Development

The major producer, Trashy Bags, reports a demand for both fashion bags and also plastic reusable shopping bags. There is a need for an outsourcing center to produce plastic shopping bags.

Figure 4.6 Plastic Pellets Value Chain Vision Map



Plastic Pellets Value Chain Development

The Plastic Pellet value chain is largely driven by both the quantity and quality of inputs particularly at the source level. The specific activities which will support the plastic pellets value chain development include:

- Providing bins at household/ community level for source separation
- Establishing a central, reliable, community-based location for dumping, washing, sorting, and selling plastic waste.
- Facilitating market linkages between buy-back centers and converters in the long-term.

Table 4.1 Opportunities identified within the value chains

Sub-sector	Value Chain	Collection and Storage	Transport	Processing
Organic Waste	Composts	Fabrication of collection bins Labour input for waste separation Labour input for waste collection	1. Fabrication and motorising of transfer bins 2. Labour input for transfer of waste 3. Manufacture of carts, trucks, trailers for carting raw materials and finished products	1. Labour for preparation of composts 2. Labour for bagging the compost 3. Labour input for distributing and selling composts
Plastics	Thin Film	Labour input for collection and washing, cleaning and sorting of waste plastics Establishment of Buy back Centres Labour input in the operation of buy back centres	1. Transportation services for carting waste and semi and finished products to processing points 2. Labour input for loading and off loading bulk 3. Labour input for driving vehicles for bulk delivery and distribution of finished products	Fabrication of grinding machines Fabrication of Pelletting machines Labour input for operating grinding and pelleting machines Labour input for repairs and maintenance of grinding and pelleting machines Labour input for handling products at the factory floor Labour input for distributing finished plastic products selling of finished plastic products Establishment of plastic processing plants
Metals	Ferrous Scrap	Labour input for purchasing, picking and sorting scrap metals. Fabrication of hand tools for breaking bulk and compressing metals	Manufacture of carts, trucks , trailers for carting metals	Fabrication of household Kitchen appliances and other metal based appliances Fabrication of equipment Establishment of fabrication shops for manufacture of machine parts, hand tools etc
Waste Electronic, Electric Equipment	E-waste	Labour input for purchasing, picking and sorting scrap electronic waste Establishment of Buyback centres for handling e-waste	Manufacture of carts, trucks , trailers for carting e-waste	Repair, refurbishment of electrical and electronic equipment

Table 4.2 Direct and Indirect Activities in the Thin film Plastics Value Chain

Direct Activities	Indirect Activities
<ol style="list-style-type: none"> 1. Increase collection rate of thin-film plastics 2. Improve storage and transportation of thin film plastic waste (collectors and intermediaries) 3. Secondary separation and simple processing of thin film plastic to improve quality 4. Youth to operate “buy-back” centres 5. Youth to operate Pellets producing centres 6. Youth in thin film plastics as textiles industry 	<ol style="list-style-type: none"> 1. Awareness creation for the public on the economic benefits of collecting plastic waste 2. Public awareness on source separation of plastic recyclables 3. Develop “buy-back “ or refund programmes 4. Training of intermediaries and value pickers on simple processing techniques 5. Facilitate youth’s access to youth friendly financial services 6. Facilitate training and technical assistance to intermediaries in business management practices 7. Facilitate Networking and knowledge sharing among actors within the chain (collectors, middlemen and end users) 8. Facilitate the development of guidelines policies to support the recycling industry 9. Provision of adequate storage facilities 10. Establishment of buy-back centres at vantage locations in the urban area 11. Establish grinding machines at the buy-back 12. Facilitate Health Safety training 13. Provide personal protective equipment for thin film plastic recyclable collection

Table 4.3: Direct and Indirect Activities in the Ferrous Metals Value Chain

Direct Activities	Indirect Activities
<ol style="list-style-type: none"> 1. Improve collection methods of ferrous metal 2. Youth in metal product Fabrication (gas cookers etc) 	<ol style="list-style-type: none"> 1. Encouraged Local steel mills to pay competitive prices comparable to that of the world market. 2. Facilitate youth's access to youth friendly financial services 3. Facilitate Health Safety training 4. facilitate the development of guidelines to check the activities of dealers, agents and value pickers 5. Facilitate Networking and knowledge sharing among actors within the chain (collectors, middlemen and end users)

Table 4.4 Direct and Indirect Activities in the E- Waste Value Chain

Direct Activities	Indirect Activities
<ol style="list-style-type: none"> 1. Collection of e-waste 2. Repair of e-waste equipment 3. Disposal of e-waste components 4. Recovery of ICT components and parts. 	<ol style="list-style-type: none"> 1. Provide skills training to youth in repair and refurbishment 2. Facilitate Networking and knowledge sharing among actors within the chain (collectors, middlemen and end users) 3. Facilitate youth's access to youth friendly financial services. 4. Facilitate Health Safety training 5. provide personal protective equipment for E-waste recyclable recovery processes 6. Facilitate the Development of guidelines to check the environmental and health impact of E-waste recyclable recovery processes

Table 4.5 Direct and Indirect Activities in the Compostable Organic Value Chain

Direct Activities	Indirect Activities
<ol style="list-style-type: none"> 1. Improve timely collection and transportation of sorted waste (compostable) 2. Secondary sorting of compostable at the compost plant site 3. Youth operate compost plant 4. Youth Bagging of compost 	<ol style="list-style-type: none"> 1. Create awareness of the economic and environmental benefits of composting 2. Facilitate the establishment and operation of compost plant 3. Create awareness of source separation 4. Provide more storage containers for source separation 5. Facilitate the marketing of compost. 6. Facilitate youth's access to youth-friendly financial services 7. Obtain collaterals for financial institutions to enhance onward lending to youth 8. Facilitate Health Safety training 9. Provide personal protective equipment for Plant operation and sorting processes 10. Facilitate Networking and knowledge sharing among actors within the chain (collectors, operators, distributors and end users) 11. Establish contracts for delivery of waste to the compost plant. 12. Establishing compost plants based on appropriate technology 13. Facilitate the development of guidelines for timely approval and issuance of permits for composting 14. Mobilize and train youth in the appropriate composting technology

Table 4.6 Prioritization of Opportunities & analysis of incentives for thin-film plastics recycling

Sector Priority/ Opportunity	Improvement to Industry Performance	VC Actors Incentives and Resources	Challenges to achieving Opportunities	Intervention(s)	Solution Providers
Establishment of Buy-back centers	High (immediate): sustainable employment	High among value pickers, bulk buyers and converters since it provides adequate storage space and reduces transportation costs	Value pickers and intermediaries lack the requisite financial resources to set up.	Seek assistance from donors/entrepreneurs for seed capital. Facilitate access to credit from micro finance institutions	Donors, NGOs, Entrepreneurs MFIs
		High among MMDAs since there is a potential to reduce haulage costs	Acquisition of land is difficult. Permit approval and issuance process is very slow.	Facilitate linkages and joint ventures between land owners, MMDAs and potential investors.	GOG, MMDAs, Environmental NGOs, CBOs Entrepreneurs
Improve quality and quantity of processed recyclables and secondary raw materials (pellets) for plastics manufacturing industries.	High (immediate): higher profit margins for VC actors	High among value pickers and intermediaries who recognize the effect of contamination on sales.	Absence of community- based/youth groups who have requisite skills to engage in small-scale low- cost plastics processing.	Facilitate the development of technical and business skills training for community-based/ youth groups.	NGOs Training institutions
		High among local equipment manufacturers who are willing to provide technical skills training for youth as well as after- sales support services. High among training service providers.	Start-up costs for installation of plastic grinders is relatively high and beyond the means of youth in the low-income communities.	Facilitate access to credit from micro finance institutions	NGOs Equipment manufacturers Training institutions

Table 4.7 Prioritization of Opportunities & analysis of incentives for ferrous scrap

Sector Priority/ Opportunity	Improvement to Industry Performance	VC Actors Incentives and Resources	Challenges to achieving Opportunities	Intervention(s)	Solution Providers
Development of training programmes for youth in metal works fabrication of low-grade ferrous scrap.	Low	High among NGOs and training services providers. involved in community development and upgrading.	Youth may find it more lucrative in to engage in the recovery of ferrous scrap rather than acquire vocational skills.	Facilitate community mobilisation and identification of qualified youth for training programmes.	NGOs Training Institutions

Table 4.8 Prioritization of Opportunities & analysis of incentives for e-waste

Sector Priority/ Opportunity	Improvement to Industry Performance	VC Actors Incentives and Resources	Challenges to achieving Opportunities	Intervention(s)	Solution Providers
Development of training programmes for youth in ICT hardware repair and refurbishment (e-waste).	Low	High among training services providers users if quality and regular supplies can be guaranteed. High among NGOs involved in community development and upgrading training.	ICT technology is consistently being improved and as such some hardware components may not be re-usable in newer models. Youth may be find it more lucrative in to engage in the recovery of non-ferrous scrap (from e-waste) rather than acquire vocational skills.	Facilitate community mobilisation and identification of qualified youth for training programmes.	NGOs Training Institutions

Table 4.9 Prioritization of Opportunities & analysis of incentives for compostables

Sector Priority/ Opportunity	Improvement to Industry Performance	VC Actors Incentives and Resources	Challenges to achieving Opportunities	Intervention(s)	Solution Providers
Establishment of labour-intensive community compost facilities.	High (immediate): sustainable employment; reduction in SWM expenditures	High among end market users if quality and regular supplies can be guaranteed	Use of human waste (excreta) may limit patronage of finished compost by vegetable farmers.	Sensitisation of general public on the environmental and environmental benefits of composting.	Donors, NGOs, Entrepreneurs MFIs
		High among MMDAs as potential to reduce waste haulage costs exists	Acquisition of land is difficult.	Facilitate linkages and joint ventures between land owners, MMDAs and potential investors/operators.	MMDAs, Environmental NGOs, CBOs
		High among donors and NGOs) who have initiated the construction of pilot community compost facilities.	Permit approval and issuance process is very slow.	Facilitate timely issuance and approval of permits.	MDAs - (EPA, MEST, MLGRD) NGOs
		Low among youth in the target communities	Interests of the youth and their low perception of composts	Facilitate the sensitization of the youth about benefits of composts	NGOs , CBOs MMDAs, MLGRD

4.3 Success/Risk Assessment of Proposed Solutions

The CHF Intervention Success/Risk Matrix have been adapted, modified and applied in assessing the probability/consequence of each of the proposed interventions. These Success/Risk Matrices are presented in Tables 4.10, 4.11, 4.12 and 4.13.

Table 4.10 Interventions Success Risk Matrix for thin-film plastics

		CONSEQUENCE		
		LOW	MEDIUM	HIGH
PROBABILITY	HIGH			<ul style="list-style-type: none"> • Develop and create awareness on “buy-back “ or refund programmes for thin film plastics • Create awareness on, provide storage containers for source separation of thin film plastics • Training of intermediaries and value pickers on simple processing techniques e.g. Manual sorting, washing, etc. • Facilitate Health and Safety training and provision of personal protective equipment • Provide training and technical assistance to intermediaries in business management practices ` • Facilitate Networking and knowledge sharing among actors within the chain • Train youth in thin film plastic recycling into textile • Improve storage and transportation of thin film plastic pellet • Establish grinding machines at the buy-back centres • Training and technical assistance to intermediaries in business management practices. • Facilitate youth’s access to youth friendly financial service
	MEDIUM			<ul style="list-style-type: none"> • Facilitate the development of guidelines and policies to support the thin film plastic recycling industry
	LOW			

Table 4.11 Interventions Success Risk Matrix for Ferrous Scrap

		CONSEQUENCE		
		<i>LOW</i>	<i>MEDIUM</i>	<i>HIGH</i>
PROBABILITY	<i>HIGH</i>		<ul style="list-style-type: none"> Facilitate Health and Safety training Provision of personal protective equipment 	<ul style="list-style-type: none"> Facilitate youth's access to youth friendly financial services
	<i>MEDIUM</i>			<ul style="list-style-type: none"> Facilitate Networking and knowledge sharing among actors within the chain
	<i>LOW</i>			<ul style="list-style-type: none"> Facilitate training and technical assistance to intermediaries in business management practices Facilitate the development of guidelines to regulate the activities of dealers, agents and value pickers

Table 4.12 Interventions Success Risk Matrix for E-waste Recycling

		CONSEQUENCE		
		<i>LOW</i>	<i>MEDIUM</i>	<i>HIGH</i>
PROBABILITY	<i>HIGH</i>			<ul style="list-style-type: none"> • Provide skills training to youth in repair/refurbishment of imported ICT equipment • Support improved methods of recovery of e-waste recyclables • Facilitate youth's access to youth friendly financial services • Facilitate Health and Safety training and provision of personal protective equipment Provision of Personal Protection Equipments (e.g. nose masks)
	<i>MEDIUM</i>			<ul style="list-style-type: none"> • Facilitate Networking and knowledge sharing among actors within the chain
	<i>LOW</i>			

Table 4.13 Interventions Success Risk Matrix for Compostables

		CONSEQUENCE		
		<i>LOW</i>	<i>MEDIUM</i>	<i>HIGH</i>
PROBABILITY	<i>HIGH</i>			<ul style="list-style-type: none"> • Create awareness of the economic and environmental benefits of composting • Pilot and facilitate the establishment of compost plant • Create awareness on, provide storage containers and pilot source separation • Facilitate youth's access to youth-friendly financial services • Facilitate the development of guidelines on the issuance of permits for composting • Mobilize and train youth in the appropriate composting technology • Promote and extensively market compost through demonstration farms, enhance distribution network • Facilitate Networking and knowledge sharing among actors within the chain
	<i>MEDIUM</i>			<ul style="list-style-type: none"> • Establish contracts for delivery of compostable organics to the compost plant • Facilitate collaterals for micro-financial institutions to enhance onward lending to youth • Identify, select and support lead firms in private sector through technical assistant, credit facilitation and subsidized support) to go into composting
	<i>LOW</i>			

5. Project Implementation

5.1 Logframe for YES programme

A logframe has been prepared for the proposed interventions for the respective value chains. It indicates the activities planned for each specific objective of the YES programme. These are presented in Table 5.1.

Table 5.1: Log-frame for activities under the YES programme.

SMART OBJECTIVES	MAJOR ACTIVITIES
<p>Objective 1:</p> <p>Conduct youth-inclusive market analysis of the solid waste management sector and facilitate participatory program design and process</p>	<ol style="list-style-type: none"> 1. Conduct Value chain assessment of the solid waste sector 2. Conduct youth focus group discussions to identify their priorities 3. Conduct mapping of organizations and SWM related service providers 4. Identify the specific skills and resources needed to access the skills with youth and implementing partners, 5. Organize a program design workshop to set up a clear strategy based on the value chain assessment, with identified actors

Table 5.1 (cont'd) Logframe for activities under the YES programme.

SMART OBJECTIVES	MAJOR ACTIVITIES
<p>Objective 2:</p> <p>Build the capacity of value chain actors and public and private sector providers to improve the performance, service coverage, and service delivery of the SWM sector through a youth-focused lens</p>	<ol style="list-style-type: none"> 6. Conduct technical capacity assessment of value chain actors and public and private sector providers 7. Develop and implement a capacity building plan in SWM sector 8. Introduce GIS to monitor and manage waste collection 9. Create awareness of the economic and environmental benefits of composting and thin film plastic management 10. Facilitate collaterals for micro-financial institutions to enhance onward lending 11. Facilitate youth's access to youth-friendly financial services 12. Provide training and technical assistance to intermediaries in business management practices 13. Facilitate networking and knowledge sharing among actors within each chain 14. Facilitate Health and Safety training and provision of personal protective equipment 15. Create awareness on, provide storage containers and pilot source separation

Table 5.1 (cont'd): Logframe for activities under the YES programme.

SMART OBJECTIVES	MAJOR ACTIVITIES
<p>Objective 2:</p> <p>Build the capacity of value chain actors and public and private sector providers to improve the performance, service coverage, and service delivery of the SWM sector through a youth-focused lens</p>	<ol style="list-style-type: none"> 16. Identify, select and support lead firms in the private sector (through technical assistance, credit facilitation, and or subsidized support) to go into composting 17. Develop and implement a capacity building plan in SWM sector Pilot and facilitate establishment of compost plants(s) 18. Facilitate the development of guidelines for the issuance of permits for composting 19. Mobilize and train youth in appropriate technology 20. Facilitate collaterals for micro-financial institutions to enhance onward lending Promote and extensively market compost through demonstration farms, enhance distribution networks etc. 21. Establish contracts for delivery of waste to compost plants 22. Mobilize, train and equip youth for collection of thin plastic film 23. Develop and create awareness on buy-back or refund programmes for thin film plastics 24. Identify, select and support lead firms in the private sector (through technical assistance) to establish plastic grinding and pellets production centers 25. Offer training to youth in plastic recycling into fashion accessories 26. Training of intermediaries and value pickers in thin film on simple processing techniques 27. Provide skills training to youth in plastic recycling in repair/refurbishment of imported ICT equipment 28. Introduce improved methods of recovery of e-waste recyclables e.g. copper wires etc 29. Mobilize, train and support youth in collection of ferrous metal

Table 5.1 (cont'd) Logframe for activities under the YES programme.

SMART OBJECTIVES	MAJOR ACTIVITIES
<p>Objective 3:</p> <p>Build the capacity of local providers to offer or link youth to services supporting their role within the SWM sector</p>	<p>30. Identify, vet and select local provider/NGOs relevant to the VC for partnership</p> <p>31. Conduct organizational and technical capacity building assessment of partner organizations</p> <p>32. Conduct outreach to attract urban youth into the selected VCs.</p> <p>33. Develop strategy for collecting client intake information to assess income levels of target youth</p> <p>34. Implement capacity building plans through 'Experiential Learning' efforts to develop skills development programs and financial services for youth</p> <p>35. Develop and implement 'Integration by Doing' activities to encourage youth participation in solid waste-related community initiatives such as composting.</p> <p>36. Annual participatory assessment of program progress</p> <p>37. Conduct capacity building to civil society organizations for advocacy for policies that support and regulate the plastic, compost, e-waste and ferrous metals industries</p>

5.2 Baseline data

Baseline data that will be required prior to the commencement of the activities listed in the logframe are presented in Table 5.2:

Table 5.2 Baseline data for activities

A.	Data on Youth in the Community	Data Type
1.	Population of Youth resident in Community and age bracket <ul style="list-style-type: none"> - males - females - persons with disability - females - males 	Number and age bracket
2	Educational background of youth in the Community and age bracket <ul style="list-style-type: none"> - males - females -persons with disability - females - males 	Highest level of educational qualifications for each type of qualification, and their ages
3.	Professional, vocational and other skills of youth in the Community and age bracket <ul style="list-style-type: none"> - males - females 	Number of persons for each type of skill, vocation and their age.

	<p><i>-persons with disability</i></p> <p><i>- females</i></p> <p><i>- males</i></p>	
4.	<p>Current employment status and income levels of youth in the community and age bracket</p> <p><i>- males</i></p> <p><i>- females</i></p> <p><i>- persons with disability</i></p> <p><i>- females</i></p> <p><i>- males</i></p>	Number employed and their income levels

Table 5.2 (cont'd) Baseline data for activities

B.	Solid Waste Facilities within the Community	
1.	Number of disposal sites in the community	Number of communal sites in the community
2.	Number of solid waste containers in the community	Number of containers, type and volume
3.	Level of service at each disposal site and volume evacuated	Number of times containers are lifted and volume per lifting
4.	Average daily waste generation	Average kg. of waste generated by each resident in the community
5.	Composition of waste	Percentage of composition of waste generated by the community
6.	Current Weight of Waste Recycled	Weight of waste recycled
C.	Interest to join programme	
	youth in the community and age grouping -males -females -persons with disability -female	Number of youth who showed initial interest in the programme and their areas of interest

5.3 Performance Indicators

The performance indicators for the interventions are presented in Tables 5.3, 5.4, 5.5 and 5.6

Table 5.3 Indicators for thin film plastics value chain interventions

Description	Unit	Frequency
Youth trained in business management skills	No.	Quarterly
Youth trained in plastic processing technologies	No.	Quarterly
Youth trained in fashion accessories manufacture i.e. Trashy bags concept	No.	Quarterly
Youth employed at buy back centers	No.	Quarterly
Youth provided with Health and Safety training and personal protection equipment	No.	Quarterly
Youth/youth groups obtaining credit from micro finance institutions	No.	Quarterly
Funds disbursed to individuals/youth groups engaged in thin film plastics recycling	Amount in GH¢	Quarterly
Thin film plastic recyclables processed at buy back centre	Quantity in tonnes	Quarterly
Turnover at buy back centers	Amount in GH¢	Quarterly
Thin film plastics awareness programs	No.	Quarterly

Table 5.4 Indicators for ferrous scrap value chain interventions

Description	Unit	Frequency
Youth trained in business management skills	No.	Quarterly
Youth trained in metal works fabrication technologies	No.	Quarterly
Youth engaged in metal works fabrication	No.	Quarterly
Youth provided with Health and Safety training and personal protection equipment	No.	Quarterly
Youth/youth groups obtaining credit from micro finance institutions	No.	Quarterly
Funds disbursed to individuals/youth groups engaged in metal works fabrication	Amount in G¢	Quarterly

Table 5.5 Indicators for e-waste value chain interventions

Description	Unit	Frequency
Youth trained in business management skills	No.	Quarterly
Youth trained in ICT equipment refurbishment and repair	No.	Quarterly
Youth engaged in ICT equipment refurbishment and repair	No.	Quarterly
Youth provided with Health and Safety training and personal protection equipment	No.	Quarterly
Youth/youth groups obtaining credit from micro finance institutions	No.	Quarterly
Funds disbursed to individuals/youth groups engaged in ICT equipment refurbishment and repair	Amount in G¢	Quarterly

Table 5.6 Indicators for compostables value chain interventions

Description	Unit	Frequency
Youth trained in appropriate composting technologies	No.	Quarterly
Youth employed at community composting facilities	No.	Quarterly
Youth provided with Health and Safety training and personal protection equipment	No.	Quarterly
Youth/youth groups obtaining credit from micro finance institutions	No.	Quarterly
Funds disbursed to individuals/youth groups engaged in community based composting	Amount in G¢	Quarterly
Private sector firms supported to establish composting facilities	No.	Annual
Construction of pilot community composting facilities	No.	Annual
Households practicing source separation	No.	Annual
Compostables processed at community composting facilities	Quantity in tonnes	Quarterly
Turnover at community composting	Amount in G¢	Quarterly
Composting awareness programs	No.	Quarterly

6. Conclusions and Recommendations

6.1 Conclusions

The overall purpose of this assignment, which was to select and analyse value chains for solid waste management in Accra and identify employment opportunities for youth of the targeted communities, has been largely fulfilled. This has enabled CHF-Ghana to develop a log frame that presents planned activities over the duration of the YES programme.

The thin film plastics value chain was identified as having the largest potential for value addition through the processing of recyclables as well as offering a sustainable means of employment for the youth in the partner communities. This is due to the large market demand for recyclables as well as abundant supply of inputs in urban areas.

The ferrous scrap, e-waste and compostables value chains were observed to be much more restricted with respect to the potential for value addition as well as offering a means of sustainable employment for the youth. This is borne out of the capacity, choices and preferences of the youth for engaging in these sectors. Nonetheless, youth focused market based solutions were developed for each of these value chains.

The CHF Industry Selection Tool was used to perform a multi-criterion analysis of the solid waste sub-sectors and value chains objectively rather than on a biased or subjective basis. The Opportunities-Constraints matrices made it possible for the prioritization of opportunities/constraints so that solutions could be developed and tested taking into consideration the specific value chain actors who could influence or benefit directly from the remedial actions.

The major constraint faced during this assignment was the insufficiency of data either from primary or secondary sources. Most significant was the un-willingness of some of the value chain actors, especially those in the e-waste and ferrous scrap industry, to divulge information about end-market buyers or the enabling environment. This meant that beyond identifying the key and supporting actors in the value chains it was not easy quantifying the volumes of recyclables/revenues along those value chains.

The time frame for this exercise was also a limiting factor since it did not allow sufficient time to collect and analyze data from a larger sample size (i.e. pool of respondents or interviewees). This was very critical since the many informal actors engaged in the various unregulated activities have different modes of operation and so did not allow generic deductions and/or projections.

6.2 Recommendations

A number of recommendations have been made to ensure the sustainability of the various interventions/activities that are being proposed for implementation under the CHF-Ghana/YES program. These are:

- Carrying out a feasibility study to assess the profitability analysis of the key interventions that have been proposed for each of the value chains. Specifically, start-up and operating costs as well as revenue projections. This has become necessary due the inability to determine these parameters during this assignment because of the limited time frame.
- Establishing close collaboration with the local government authorities in the partner communities to ensure that activities that are planned are consistent with current service delivery arrangements to avoid a situation where similar activities are performed by different actors leading to potential sources of conflict in these communities.
- The Ministry of Local Government and Rural Development has developed a National Environmental Sanitation Strategy and Action Plan (NESSAP) to implement the measures and actions of government's environmental sanitation policy, particularly job creation aspects. Efforts should therefore be directed at identifying synergies with proposed CHF-Ghana's interventions and how these can trigger demand for undertaking interventions in all the assessed value-chains.

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