

## Final Report

# RETA 7450 PROJECT PREPARATION SUPPORT FOR LIVABLE CITIES

## Study area 2: Promoting recycling in municipal solid waste management through suitable business models:

### Improving the supply chain for recyclables



**Sustainable Consumption and Production Area  
Institute for Global Environmental Strategies**

**April 2014**

**April 2014**

### **International consultants**

Dr. Janya Sang-Arun, Institute for Global Environmental Strategies, Japan

Dr. Magnus Bengtsson, Institute for Global Environmental Strategies, Japan

### **National Consultants**

Mr. Piya Wanpen, Asian Coastal Resources Institute-Foundation (CORIN-Asia), Thailand

Prof. Jinhui Li, Tsinghua University, People's Republic of China (PRC)

Dr. Prasad Modak, Environmental Management Centre LLP, India

Dr. Lee Chong Theng, Soluwaste Management Consultants, Malaysia

### **Contributors**

Ms. Zhao Nana, Tsinghua University, PRC

Ms. Shreeya Batia, Environmental Management Centre LLP, India

Ms. Supaporn Buachum, Asian Coastal Resources Institute-Foundation, Thailand

Mr. Simon Gilby, Institute for Global Environmental Strategies, Japan

**Contact information:**

Dr. Janya Sang-Arun,  
Task manager  
Resource Circulation and Integrated Waste Management  
Sustainable Consumption and Production Area  
Institute for Global Environmental Strategies  
2108-11 Kamiyamaguchi, Hayama, Kanagawa, 240-0115 JAPAN  
Tel: [+81-46-826-9573](tel:+81-46-826-9573); Fax: [+81-46-855-3809](tel:+81-46-855-3809)  
E-mail: [sang-arun@iges.or.jp](mailto:sang-arun@iges.or.jp)  
URL: <http://www.iges.or.jp>

## Preface

Asia is a huge and very diverse region and this diversity is reflected also in the way recycling is carried out. The flows of recyclable materials are usually handled by complex networks of specialized actors, each performing their particular function needed for bringing the materials back to the economy as raw materials. In many cases recycling is driven by economic incentives, but it can also be motivated by environmental or social concerns. While most recycling activities are in line with national legislations and local regulations, there are also those that operate in a legal grey-zone and some that are unlawful or illegal. Technologies used range from very basic ones with almost no need for initial investments to advanced facilities with large capital needs. While recycling certainly plays an increasingly important role in society, it is also associated with many challenges including pollution and social issues. The value of recycling is often not acknowledged by society and those who work in the sector often suffer from social stigma. Overall, there is room for improvement of the sector, of its environmental performance as well as of the quality of the jobs it provides.

In this fascinating study, which was conducted over a period of 18 months, we have had the opportunity to look into these complex and highly diverse activities in four countries: PRC, India, Malaysia, and Thailand. This would not have been possible without a close collaboration with our national partners: Mr. Piya Wanpen at Asian Coastal Resources Institute Foundation (CORIN-Asia), Thailand, Professor Jinhui Li at Tsinghua University, PRC, Dr. Prasad Modak at Environmental Management Centre LLP (EMC), India, and Dr. Lee Chong Theng at Soluwaste Management Consultants (SMC), Malaysia.

The study has been possible thanks to financial support from the Asian Development Bank (ADB) under its Liveable Cities Programme. Throughout the study period it has also benefitted from an active interest and support from our contact person at the ADB, Mr. Vijay Joshi.

We wish to thank all those mentioned above for their valuable contribution to the study. Looking at the results we have mixed feelings: we are very pleased to see that the study has generated a number of policy-relevant and evidence-based conclusions, but we also feel that we have only been able to scratch the surface of this topic. Some answers have been provided, but many questions remain. In our future work we hope to be able to address some of those, in collaboration with our partners from this study and others.

Hayama, Japan, 25 February 2014

Janya Sang-Arun and Magnus Bengtsson  
Institute for Global Environmental Strategies (IGES)



## Executive Summary

### *Background and Objectives*

Due to a rapid increase in waste generation in Asia, recycling businesses are increasing their already significant contribution to sustainable solid waste management. At the same time, improper practices of recycling businesses can also generate serious health and environmental impacts. There is therefore a clear need to promote the scaling up of recycling businesses in an environmentally sound manner to achieve sustainable waste management in Asia.

This study aims to (i) investigate and extract the lessons learnt from Wongpanit, a large and successful waste trader in Thailand, and other models in selected countries: Thailand, PRC, India and Malaysia, (ii) identify driving factors of and barriers to recycling business development in the selected countries (focusing on the recyclable supply chain which includes collection, sorting, cleaning, baling, pre-processing of recyclable materials, and not on recycling technologies and material recovery as such), and (iii) develop recommendations for establishing and developing an environmentally and socially sound recycling sector that can be extended to encourage 3R implementation.

### *Wongpanit Business Model*

Among the many recycling business models, Wongpanit is recognized as particularly outstanding due to not only investing in trading recyclables for monetary benefits but also significantly contributing to social development and environmental conservation. Wongpanit introduces various initiatives to improve its business.

Keys to the success of Wongpanit include (i) cooperating with local governments in promoting recyclable waste separation at source for sale, (ii) increasing public interest through the slogan of ‘waste is gold’ and ‘waste separation for society and the environment’, (iii) providing capacity building services to various stakeholders: residents, communities, governments, investors, (iv) extension and scaling up the business through a franchise system that can distribute income for wider stakeholders under the concept of a ‘win-win business model’, (v) increasing value of recyclables through fine segregation of waste to meet recyclers’ requirement, (vi) public announcement of real-time recyclable prices: board, webpages, SMS, and (vii) purchasing all recyclables and identifying opportunities in new recyclable materials.

Lessons learnt from this model are useful and applicable in efforts to improve other recycling business models. Nevertheless, intervention from governments and NGOs are important to improve the condition of the recycling sector in the region. Multilateral development agencies such as the ADB could also play a role as catalysts for change. Suggestions of how lessons learnt from Wongpanit and intervention from governments, NGOs and ADB can support the improvement of recycling businesses in developing Asia are detailed in **Annex I to IV**.

### ***Recycling Business in the Selected Countries and Way Forward***

Recycling businesses in all studied countries are on the rise, with major driving forces coming from the economic value of recyclables, social movements regarding the environment and socio-economic development, and government policies. However, recycling business practices vary, depending on local conditions, market availability and governmental intervention in each country. There are both distinct differences and similarities. Therefore, the solution to overcome the challenges of the recycling business in one country may not be applicable for other countries.

In Thailand, recycling is mainly carried out by private sector with less governmental intervention. There were two recycling business models found during the study: (i) a conventional business model that consists of both multiple type waste buyers and single type waste buyers and (ii) the Wongpanit business model (a multiple type waste buyer) that tries to improve its business by collaborating with local governments to promote recyclable waste separation at source, providing training for the public, and developing a franchise system for new entrants. Key constraints of the recycling business in Thailand are a lack of tax incentives, lack of accessibility to financial sources, market vulnerability, lack of databases and, where these exist, a lack of ease of accessibility for recyclers to such data, weak interaction between business and local government, lack of regulations to promote recyclable waste separation at source, and labour shortages. The recycling sector in Thailand can be improved with national government intervention, for example, the creation of monetary incentives such as tax reduction, set up a convenient loan channel with low interest rates, increasing domestic demand by promoting use of recycled products, developing a database and network of stakeholders in the recycling sector, notifying a 3R law that promotes waste separation at source. Local governments should cooperate with local stakeholders and waste buyers to increase awareness of residents of the benefits of separation of recyclables for sale for the environment and income generation for households. Once the image of the recycling business has been improved, the social status of stakeholders engaged in the recycling business will be improved and thus the problem of labour shortage can be reduced. Other recommendations are stated in **Annex I**.

In the PRC, recycling is also carried out by private sector. However, the national and local governments provide financial support and subsidies to improve the recycling sector. Therefore, the recycling business models in the PRC are diverse and can be classified into three models: (i) a conventional model carried out by individual businesspeople and private companies, (ii) state-owned companies where investment and profits mainly belongs to the government, and (iii) recycling industrial parks that aim to improve the infrastructure of the recycling sector as well as upgrading curbsides recycling practices to sophisticated recycling practices. Key constraints of the recycling business in the PRC are market volatility, low awareness of residents on the environmental impacts of improper waste disposal and recycling, and improper collection and recycling practices. The recycling sector in the PRC can be improved with national government intervention, for example, establishing a monetary incentive such as a subsidy scheme or tax exemption for certified facilities, setting up a system for real time price notification, strengthening recyclable waste separation at source. Local governments should, for instance, work closely with local stakeholders to promote waste separation at source and establish waste separation systems, provide training to small scale waste buyers on waste separation and pre-processing for value-

added in an environmentally sound manner. Detailed explanation of how to improve recycling businesses in the PRC is available in **Annex II**.

In India, recycling is mainly carried out by informal sector. Recycling businesses in India can be categorized into four models: (i) a conventional model run by the informal sector and private companies, (ii) an NGO oriented model that provides employment opportunities to waste pickers, (iii) a cooperative model where NGOs facilitate the formation of waste pickers cooperative and link this cooperative to local governments to secure accessibility of waste pickers to the source of recyclables and (iv) private companies with social responsibility. Key constraints of the recycling business in India are weak coordination among stakeholders, a lack of awareness and business skills, lack of accessibility to financial sources and no tax incentives, low priority on innovation in waste recycling technology, vulnerability of the market, lack of database and, where these exist, a lack of ease of accessibility for scrap dealers and recyclers to this data, labour requirements and policy issues. The recycling sector in India can be improved with national government intervention, for example, the establishment of a union or an association for informal recycling actors, setting a national policy or regulation on waste separation for recycling, providing tax exemption or subsidies to certified recycling facilities, making loans available for recycling businesses with a low interest rate, arranging subsidies to improve the working conditions of recycling business in slums, formulating a microfinance scheme for waste picker cooperatives, establishing research centres for technology innovation or providing special tax incentives to companies that invest on research and development on recycling (this centre could also establish a database of scrap dealers and recyclers to facilitate access to up-to-date price information and business negotiation), and initiate policy reforms to attract the interest of investors such as Extended Producers Responsibility (EPR) and promote the use of recycled products. Local governments should, for instance, facilitate the formalisation of waste pickers, offer contracts and subsidies for recyclable waste collection to waste picker cooperatives, provide training to waste pickers on environment and health safety issues, develop an awareness raising campaign on waste separation for residents which can also improve the working condition of waste pickers, monitor environmental, health and safety condition of waste pickers, waste buyers and recyclers. Other recommendations are available in **Annex III**.

In Malaysia, recycling businesses are mainly carried out by the private sector but recently the government of Malaysia has been trying to formalize recycling businesses by enacting Act 672. Recycling businesses in Malaysia can be divided into three models: (i) a conventional business model of private companies, (ii) charity organizations that collect recyclables and then directly donate them to disadvantage groups or sell them to earn cash for charity programmes, and (iii) government initiative that tries to establish a formal system for collection and recycling by qualified companies. Key constraints of recycling businesses in Malaysia are the fact that government initiatives are still ad-hoc, a lack of recycling data, a lack of a relationship between market actors and the government, low operational standards and labour quality, and market vulnerability. The recycling sector in Malaysia can be improved with national government intervention, by for example, sustaining its initiatives through financial supports, setting a legal requirement for data reporting and establish databases of all recycling stakeholders, implementing Act 672 through public-private partnerships, setting up standards for safety operations and

environmental controls of recycling facilities and waste buyer shops, setting a subsidy scheme for certified facilities, and creating a market for recycled products through green procurement by government agencies which could help minimise the fluctuation of recyclable waste prices. Local governments should, for instance, conduct an annual monitoring and evaluation to determine whether waste buyers and recyclers comply with the national standards and provide storage space for low price recyclables.

### ***Proposals to ADB***

Proper waste management and high standard recycling are important elements of sustainable urban development. The majority of postconsumer waste is generated in urban areas, especially for recyclable waste fractions, such as plastics, metals, glass and paper. Recycling can greatly reduce the amount of waste to be disposed of and thereby help municipalities in their efforts to establish environmentally safe and cost-effective waste management systems. It also generates low-cost materials that can be of benefit for local manufacturing industries. Additionally, recycling can in many cases also reduce greenhouse gas emissions (since recycling often requires less energy than production of new materials), create green jobs and contribute to poverty reduction.

This study covers four countries with recycling industries at different levels of sophistication. Despite these differences it found room for further expansion and improvement of recycling industries in all countries. Many barriers and challenges remain for the governments, enterprises and other actors to take effective action to increase recycling rates and to ensure that recycling is safe and beneficial.

As a part of its sustainable urban development initiatives, ADB can contribute to expand and improve the performance of the recycling sector in a number of ways. Overall, in its urban waste management initiatives ADB may consider including awareness raising on the importance of waste separation at source as well as a component on technical infrastructure and administrative systems for separate collection and management of recyclables. More specifically, ADB can provide support in a number of ways: (i) technical assistance for pilot projects on upgrading of recycling business practices and strengthening networking across countries, (ii) technical assistance for capacity building across the sector, (iii) loan programmes for medium to large scale waste buyers and recycling companies, (iv) microfinance loan programmes for small scale waste buyers, community based organizations and NGOs, (v) technical assistance for innovation and new technology development, and (vi) technical assistance on institution building. Proposals for each country are summarised in **Table 3**.

## Table of Contents

Preface .....	i
Executive Summary.....	iii
Background and Objectives.....	iii
Wongpanit Business Model .....	iii
Recycling Business in the Selected Countries and Way Forward .....	iv
Proposals to ADB.....	vi
<b>I. Introduction .....</b>	<b>1</b>
<b>II. Objectives of the study .....</b>	<b>2</b>
<b>III. Scope of study .....</b>	<b>2</b>
<b>IV. Wongpanit Group as an outstanding recycling business model.....</b>	<b>3</b>
Keys of success .....	4
<b>V. Existing recycling business model in studied countries .....</b>	<b>7</b>
Thailand.....	7
PRC .....	エラー! ブックマークが定義されていません。
India .....	10
Malaysia .....	12
<b>VI. Lessons learnt from Wongpanit versus other recycling business models .....</b>	<b>15</b>
<b>VII. Driving factors of recycling business in studied countries</b> エラー! ブックマークが定義されていません。	
<b>VIII. Barriers and Way Forwards .....</b>	<b>17</b>
<b>IX. Proposal for Follow-Up to ADB .....</b>	<b>26</b>
<b>Annex I. Recycling Business in Thailand .....</b>	<b>30</b>
1.1 Overview of municipal solid waste recycling .....	30
1.1.1 Recyclable waste generation and recycling rate .....	30
1.1.2 Separation and collection of recyclables.....	30
1.1.3 Waste recovery and recycling practices .....	31
1.1.4 Recyclable material flows .....	31
1.1.5 Recycling stakeholders.....	33
1.1.6 Recyclable prices.....	34
1.1.7 Recycling promotion laws and policies .....	34
1.2 Recycling business model in Thailand.....	35
1.2.1 Conventional recycling business model.....	35
1.2.2 Wongpanit recycling business model .....	39
1.2.1 Background .....	39

1.2.2 Scale of business .....	40
1.2.3 Business and marketing strategies .....	40
1.2.4 Source of recyclables, processing and value added .....	42
1.2.5 Technology and innovation .....	44
1.2.6 Social and environmental promotion activities.....	45
1.2.7 Wongpanit business extension in Thailand through a franchise system .....	47
1.2.8 Business extension in other countries .....	48
1.3 Driving factors, barriers and the way forward for recycling business development in Thailand .....	51
1.4 Support from ADB: Three proposals for follow-up.....	56
<b>Annex II Recycling Business in PRC .....</b>	<b>60</b>
2.1 Overview of municipal waste recycling .....	60
2.1.1 Recyclable waste generation and recycling rate .....	60
2.1.2 Separation and collection of recyclables.....	61
2.1.3 Waste recovery and recycling practices .....	61
2.1.4 Recyclable waste flows .....	62
2.1.5 Waste recycling stakeholders.....	65
2.1.6 Recyclable waste price .....	66
2.1.7 Recycling promotion law and policies .....	66
2.2 Recycling business model.....	70
2.2.1 Individual businesspeople .....	70
2.2.2 Private companies .....	72
2.2.3 State-owned company.....	77
2.2.4 Recycling industrial parks.....	80
2.3 Driving factors, barriers and way forward .....	85
2.4 Expected support from ADB: Three proposals for follow-up.....	88
<b>Annex III Recycling Business in India.....</b>	<b>92</b>
3.1 Overview of municipal solid waste recycling .....	92
3.1.1 Recyclable waste generation and recycling rate .....	92
3.1.2 Separation and collection of recyclables.....	92
3.1.3 Waste recovery and recycling practices .....	93
3.1.4 Recyclable material flows .....	94
3.1.5 Recycling stakeholders.....	95
3.1.6 Recyclable price.....	97
3.1.7 Recycling promotion law and policies .....	98
3.2 Recycling business model.....	99
3.2.1 Conventional small-to-medium enterprise .....	99
3.2.2 NGO oriented business model .....	102
3.2.3 Private Company .....	113
3.3 Driving factors, barriers and way forward for recycling business development in India .....	124
3.4 Support from ADB: Four proposals for Follow-Up.....	137
<b>IV. Recycling Business in Malaysia .....</b>	<b>142</b>
4.1 Overview of municipal waste recycling activities in Malaysia .....	142

4.1.1	Recyclable waste generation and recycling rate .....	142
4.1.2	Collection and separation of recyclables .....	145
4.1.3	Waste recovery and recycling practices .....	147
4.1.4	Recyclable material flows .....	149
4.1.5	Recycling stakeholders .....	151
4.1.6	Recyclable prices .....	153
4.1.7	Recycling promotion law and policies .....	154
4.2	Recycling business model.....	156
4.2.1	Recycling Business Model of Private Company .....	156
4.2.2	Charity organization .....	165
4.2.3	Government Initiative Recycling Model.....	172
4.3	Driving factors, barriers and way forward for recycling business development in Malaysia.....	178
4.4	Support from the ADB: Four Proposals for Follow-Up .....	184

## List of Figures

Figure 1.1: Common flow of recyclable materials in Thailand .....	32
Figure 1.2: Flow of each recyclable from generator to recyclers .....	32
Figure 1.3: Stakeholders in the recycling sector from the community to national levels in Thailand (Wanpen, 2012) .....	33
Figure 1.4: Domestic price of recyclable materials in Thailand .....	34
Figure 1.5: Tie Liang Heng recycling.....	37
Figure 1.6: Apichart Steel Trading, Muang Nakhon Si Thammarat .....	39
Figure 1.7: Historical timeline of Wongpanit Company.....	39
Figure 1.8: Recyclable supply chain through the Wongpanit business model.....	41
Figure 1.9: The company promotes products based on their environmental strengths.....	42
Figure 1.10: A collection of books by Wongpanit to promote waste separation for sale .....	42
Figure 1.11: Waste Processing at Wongpanit Company.....	43
Figure 1.12: Some waste recycling processes at Wongpanit Company .....	44
Figure 1.13: Simple and cheap technology in use at Wongpanit.....	44
Figure 1.14:Wongpanit provides information and training to the poor and student .....	45
Figure 1.15: Training courses of Wongpanit on waste separation for SME recycling business .....	46
Figure 1.16: Recyclable Waste Donation Programme, a religion - based waste management programme.....	47
Figure 1.17: “Wongpanit Society” - strategies for institutional strengthening .....	51
Figure 2.1: Some collectors of recyclables.....	61
Figure 2.2: Flow chart of collection and utilization of recyclables .....	62
Figure 2.3: Typical recyclable- plastic waste collection and utilization flow chart.....	64
Figure 2.4: The participation and actions of stakeholders in the recycling sector .....	65
Figure 2.5: Plastic waste piled along the road by individual businessmen .....	71
Figure 2.6 Collection site set up in communities .....	73
Figure 2.7 Trucks for transport of recyclables .....	73
Figure 2.8 Paper waste separation and baling facility.....	74
Figure 2.9: Parts of the Sichuan Renxin E-waste resource recycling and utilization company .....	75
Figure 2.10: Main flow of E-waste treatment process of Sichuan Renxin e-waste resource recycling and utilization company .....	77
Figure 2.11: Main gate of the Recyclable Collection and Separation Centre of Haidian District of Beijing .....	79
Figure 2.12: Collection site in community of the Recyclable Collection and Separation Centre of Haidian District of Beijing.....	79
Figure 2.13: Main recycling industrial parks in PRC .....	80
Figure 2.14: Qingdao Xintiandi Recycling Industrial park.....	81
Figure 2.15: The main gate of PRC Southwest Recyclable Industrial Park.....	82
Figure 2.16: Shop area of individual businesspeople in the recycling industrial park.....	83

Figure 2.17: Automatic operation line of PET bottles: separation, cleaning and baling .....	83
Figure 2.18: Compacted PET bottles after the automatic operation line.....	84
Figure 3.1: Generic flow chart of recyclable material flow .....	94
Figure 3.2: Recycling activities by SME.....	100
Figure 3.3: NGO oriented model-Conserve India .....	102
Figure 3.4: Recycling activities at Conserve .....	104
Figure 3.5: Cooperative Supported Recycling Model .....	107
Figure 3.6: Private company model for sourcing recyclables for Recycling .....	114
Figure 3.7: Recycling activities at Daman Ganga.....	118
Figure 3.8: E-Waste Recycling model in India .....	119
Figure 3.9: Recycling activities at Eco-Recycling Limited .....	123
Figure 4.1: Quantity of Waste and Recyclables Flow in Malaysia .....	144
Figure 4.2: The Collection System of Recyclable Materials .....	145
Figure 4.3: The Trading System of Recyclable Materials .....	146
Figure 4.4: Reuse and Recycling of Recyclable Materials .....	148
Figure 4.5: Material Flow for Ferrous Metals (Irons).....	149
Figure 4.6: Material Flow for Plastics .....	150
Figure 4.7: Street Collectors, Scavengers and Waste Pickers .....	153
Figure 4.8: Example of Communal Bin Provided by Company X to the Industry Client .....	158
Figure 4.9: General Flow of Recyclable Materials in Company X .....	159
Figure 4.10: Recycling activities at company Y .....	162
Figure 4.11: Segregation Works at Recycling Centre by Buddhist Tzu Chi Foundation .....	166
Figure 4.12: Charity activities for recycling in Malaysia .....	166
Figure 4.13: Services provided by P.A.S.S .....	167
Figure 4.14: Recycling activities at P.A.S.S .....	169
Figure 4.15: Promotion of waste separation.....	173
Figure 4.16: Recycling Centres Operated by the Local Authorities.....	174
Figure 4.17: Buy Back System Practised by the Ministry .....	175
Figure 4.18: 3-R Truck for Collection of Recyclables from Communities.....	175

## List of Tables

Table 1.1 Types of recycling business model found in this study.エラー!ブックマークが定義されていません。	
Table 1.2 Main barriers of recycling business development in studied countries .....	17
Table 1.3 Proposals for ADB intervention to expand and improve recycling in the studied countries .....	エラー!ブックマークが定義されていません。
Table 2.1: Rough price given by individual collectors in Beijing community .....	66
Table 2.2: Key points of main laws and regulations relevant to recycling .....	67
Table 2.3: E-waste management laws and regulations in PRC .....	68
Table 3.1: Rates of recyclables in the retail market in India.....	97
Table 3.2: Solid Waste Management Rules in India.....	98
Table 4.1: List of Prices for Recyclable Materials indicated by Alam Flora Sdn Bhd.....	154

## I. Introduction

Recycling is an important element of the 3Rs (reduce, reuse, recycle) to enhance the recirculation of resources that are being discarded from production and consumption. Recycling can significantly contribute to various development agendas including sustainable waste management, resource efficiency, green economy, and climate change mitigation.

In terms of waste management, recycling businesses can divert a significant amount of waste from the collection and disposal systems of municipalities and thus save costs in waste management and extend the lifetime of landfills.

In terms of resource efficiency, recycling businesses help utilise recyclables as materials for replacing virgin materials and reducing natural resource extraction. Therefore, it can significantly prolong resources for humanity.

In terms of the green economy, recycling businesses can create jobs for a wide range of stakeholders including the poor to millionaire investors. It can significantly contribute to poverty reduction and resilience.

In terms of climate change mitigation, recycling businesses help avoid greenhouse gas emissions due to virgin material production, natural resource extraction, and collection and disposal of waste.

As recyclables have a market value, recycling in developing countries is mainly carried out by the informal and private sectors. Recycling businesses exist in most countries. They involve a wide range of stakeholders from individuals such as waste pickers and residents to large scale recycling manufacturers.

Recycling businesses are increasingly contributing to sustainable solid waste management in the countries studied. At the same time, improper practices of recycling businesses are generating serious health hazards and environmental impacts. There are many reports about environmental and health hazards generated by informal recycling, especially PRC and India, where the informal sector is heavily involved in the recycling sector.

There is therefore a clear need to promote the scaling up of recycling businesses in an environmentally sound manner to achieve sustainable waste management in Asia. Among the many recycling business models, Wongpanit, a large and successful waste trader in Thailand, is recognized as particularly outstanding due to not only investing in trading recyclables for monetary benefits but also significantly contributing to social development and environmental conservation. Lessons learnt from this model would be useful and applicable in efforts to improve other recycling business models. Nevertheless, intervention from governments, NGOs and multilateral development banks such as ADB are important in improving the recycling sector in the region.

## II. Objectives of the study

ADB understands the importance of recycling businesses and thus financed this study under its RETA 7450 Project Preparations Support for Liveable Cities. The objectives of this technical support are:

- i) To investigate and extract the lessons learnt from the Wongpanit recycling business model and other models in selected countries: Thailand, PRC, India and Malaysia
- ii) To identify driving factors and barriers and of recycling business development in selected countries
- iii) To develop recommendations for establishing and developing an environmentally and socially sound recycling sector that can be extended to encourage 3R implementation

## III. Scope of study

### *Definition of recyclables*

In this study, the term ‘recyclables’ in developing Asia context refers to waste discarded from households, markets and institutes that has a market value and can be sold into the recycling business chain. Categories of recyclables in each country may be different depending on the existence of recycling markets.

E-waste, generally classified as a hazardous waste, is a recyclable in the developing Asia context as it is collected and sold through the general recycling business chain. If no buyers existed, this waste would be disposed together with other municipal solid waste or simply dumped. Improper handling and recycling practices of e-waste is a serious issue in developing countries especially in PRC and India. Therefore, e-waste recycling is included in this study.

### *Focus on the recyclable supply chain: collection*

There are many stakeholders in the recycling business chain including residents, waste pickers, itinerant waste buyers, waste buyers’ shops and recyclers. This study selects Wongpanit, a waste buyer in Thailand, as an outstanding recycling business model. The study analyses how Wongpanit operates and scales up its business. Lessons learnt from Wongpanit are identified to improve other recycling business models. Therefore, the study scopes the stakeholder’s analysis mainly on the recycling business supply chain (e.g. collection, sorting, cleaning, baling, pre-processing of recyclable materials), and not on recycling technologies and material recovery as such. However, the study to some extent refers to recycling technologies and recyclers where appropriate.

### *Policy recommendations and proposals for ADB intervention*

The study analyses recycling business models and government interventions in selected countries: Thailand, PRC, India, and Malaysia. A set of policy recommendations is developed to overcome each key barrier found in selected countries. Lessons learnt from each country are also extracted and identified to improve recycling businesses in other countries. Finally, the study provides proposals for ADB support.

## **IV. Wongpanit Group as an outstanding recycling business model**

Wongpanit is a waste buyers' shop in Phitsanulok Municipality that started business in 1974. Wongpanit has scaled up its business from being an itinerant recyclables waste buyer to a large scale waste buyer and then to an international waste dealer. Wongpanit has received various awards such as international awards like the Worldaware Business Awards 2004 - the P&ZO Nedlloyd Award for Infrastructure and national awards such as the Prime's Minister's Industry Award 2001, Thailand Business Council for Sustainable Development – TBCSD Award 2003, and the National Outstanding Organization in Social Development 2005.

Wongpanit began its business as a conventional practice (buy and sell), similar to other waste buyers in Thailand with an initial investment of only 50 USD. Over the years, Wongpanit has gradually changed from conventional buy and sell practices to a strategic waste buyer that collaborates with local governments and communities to secure waste inputs both in terms of quantity and quality. In 1995, Wongpanit registered as a limited company with an investment of around 1.67 million USD. Furthermore, Wongpanit has enlarged its business from a single family business to a national scale one that provides business opportunities to anybody who is interested.

Wongpanit deals with all kinds of recyclables and all levels of stakeholders from individuals to recyclers in Thailand and also to international markets. The headquarters negotiates with dealers and recyclers to get a premium price for the materials and then provides access to these markets to their franchise shops under the name of the 'Wongpanit Group'. Generally, Wongpanit does not recycle itself, but sells materials to recyclers. Additionally, treatments for each waste item are different depending on market incentives. For instance, dismantling is carried out for e-waste which can significantly increase monetary benefits compared to selling the whole set of waste.

Wongpanit is recognized as a role model business for social and environmental benefits under the slogan of 'waste is gold' and 'recycling business for society and the environment' and has obtained the ISO14001 international environmental standard. Nowadays, many high social status people (e.g. graduates from abroad, PhDs, bank managers etc.) are interested in investing in the recycling sector, a break from the past when only poor people were engaged in this work. This is an indicator that recycling business is highly recognized as a good business opportunity in Thailand.

If a sustainable recycling business model is a model that can earn enough to sustain the business operation as well as significantly contribute to social development and environmental conservation, then it is not overstating to classify the Wongpanit business model which consists of (i) capacity building and awareness raising campaigns (social aspect); (ii) a franchise system that enables anybody to engage in the recycling business and become a shop owner (economic aspect); and (iii) environmental protection measures (environmental aspect) as a sustainable recycling business model. This model may be suitable for developing countries where the government has insufficient budget for investment and subsidies for recycling and related activities. However, the authors do not intend to promote extension of Wongpanit business in Thailand or other countries but intend to encourage all waste buyers or investors to adapt Wongpanit business strategies for the improvement of their business towards a sustainable approach.

More information regarding Wongpanit is presented in **Annex I**.

### **Keys of success**

With the leadership of the Chief Executive Officer (CEO), Wongpanit has introduced a number of initiatives that make it different from others. These are the key strengths of Wongpanit business model. Some examples are:

- 1) *Cooperating with local governments in promoting recyclable waste separation at source for sale.*

Wongpanit was a conventional waste buyer in Phitsanulok and it is well-known due to its cooperation with Phitsanulok Municipality (in the form of a public-private partnership) to promote recyclable waste separation at source for sale. Many initiatives were developed to increase the awareness of residents such as school waste banks and waste donations. Additional efforts to improve the social status of waste pickers were undertaken by providing training on health safety and environmental conservation to waste pickers and itinerants. Later on, Wongpanit developed its own business strategy such as the slogan "Waste is Gold" and the win-win franchising system.

This public-private partnership strategy can create a significant number of benefits as follows:

- a. Increasing the quantity of recyclables to the recycling business chain
- b. Improving the quality of recyclables
- c. Changing social attitudes towards recycling businesses from that of a dirty job to environmental protection work
- d. Generating income for residents and creating jobs related to recycling such as waste buyers and labourers in waste buyers' shops and recycling facilities
- e. Decreasing waste to a final disposal site
- f. Saving local government budgets on waste collection, transport and disposal

2) *Increasing public interest through the slogan of ‘waste is gold’ and ‘waste separation for society and the environment’*

This initiative is a part of a campaign to promote recyclable waste separation at source. The slogan of ‘waste is gold’ has a greater impact than other slogans that emphasize environmental benefits because it clearly illustrates the monetary value of the recyclables and the direct benefits that each will receive. This slogan not only promotes separation of the recyclables at source but also increases the number of people investing in the recycling sector. As a result, many highly educated people in Thailand (e.g. those with Master’s degrees, PhDs, and those who graduated abroad) have invested in the recycling sector.

3) *Providing capacity building services to various stakeholders: residents, communities, governments, investors*

Usually, waste buyers only buy recyclables from sellers without engagement in awareness raising campaigns and training services. However, Wongpanit considers social activities as a marketing strategy to increase its supply. Wongpanit has developed a series of capacity building packages for residents, communities, schools, and government organizations to increase awareness and strengthen their capacity to separate recyclable waste for sale. Furthermore, a business course is provided for a fee to applicants interested in the recycling business. There is no requirement that these trainees start a business with Wongpanit or sell waste to Wongpanit. Communities and residents have the freedom to sell their recyclables to any buyer that they prefer. There are multiple reasons why trainees are motivated to undertake the business training course - some trainees enrol to start their own recycling business under the Wongpanit brand; some start their own businesses; and some just come to learn. However, the capacity building programme help spreads the name of Wongpanit as a business for society and the environment, enabling them to engage wider stakeholders and increase the quantity of quality recyclable waste supplied to their business.

4) *Extension and scaling up the business through a franchise system that can distribute income for wider stakeholders under the concept of a ‘win-win business model’.*

Generally, the recycling business in Thailand is a family business and there is no formal education in this sector. Additionally, not many people want to teach others, making it hard for new enterprises to be established. Moreover, there is no subsidy from the government, so extending the business is very difficult and relies on the investment capacity of private enterprises.

Wongpanit has broken down these barriers by using a franchise system to minimize capital investment and operational costs of the main business and distributing the business opportunity to anybody who is interested. Compared to other waste buyers who can generally extend their business to a few shops, Wongpanit has been able to establish

1,000 branches nationwide and in other countries such as the USA, Lao PDR, Malaysia etc. Having franchises located across the country (like a convenience store) can increase access to recyclable waste generated elsewhere.

Additionally, each franchise has the freedom to operate their shops under the agreement as long as their actions are not derogatory to the reputation of Wongpanit. This is called the 'win-win business model'. Franchises can scale up and earn according to their performance, Wongpanit can increase their reputation and have more negotiating power with recyclers both domestically and internationally. Any Wongpanit franchise can directly sell recyclables to recyclers or large scale buyers under a quota. By this, Wongpanit franchises can also offer a higher price to their suppliers.

Wongpanit headquarters can spend time looking for new market opportunities, franchises will work locally to increase the flow of recyclables to market and supply them to Wongpanit when the price is attractive. This business model can create and distribute income to larger numbers of people.

5) *Increasing value of recyclables through fine segregation of waste to meet recyclers' requirement*

A major problem of recycling is contamination so price highly correlates with the cleanliness of the materials. Wongpanit tries to increase the value of materials by training individuals and encouraging them to separate good quality waste at the household level thus minimizing expenses and process for cleaning and segregation at Wongpanit branches. Wongpanit provides training on how to separate waste neatly according to destination of each material. Additionally, Wongpanit offers prices depending on the quality required by recyclers. While typical waste buyer shops have about 10-20 categories, Wongpanit has 203 categories: 20 for steel, 13 for paper, 32 for glass, 37 for plastics, 45 for metals, 44 for e-waste, and 8 for others. These fine segregation practices help increase recycling efficiency leading to Wongpanit receiving a higher price. Additionally, it can reduce pressure on the environment.

6) *Public announcement of real-time recyclable prices: board, webpages, SMS*

As prices fluctuate, waste buyers offer very low prices to waste pickers, individuals and itinerant waste buyers who rely this for daily income. Normally, there are no price announcements and thus the buyers can easily change the prices offered to different sellers.

Wongpanit has changed this traditional practice by publicly announcing the price of recyclables. Sellers can use the Wongpanit price as a reference for negotiation with other buyers before making a sales decision. Additionally, Wongpanit offers a premium price to Wongpanit franchises and regular customers who constantly supply a certain amount of recyclables to Wongpanit.

### *7) Purchasing all recyclables and identifying opportunities in new recyclable materials*

Wongpanit buys all types of recyclable materials and tries to identify opportunities in new recyclables that are required by manufacturers, for instance, coconut residues and used oil for biodiesel factories, clean fish sauce bottles for refilling by fish sauce factories, whole sets of specific beer bottles and cartons for refilling by the beer manufacturers, etc. This strategy has increased Wongpanit marketing opportunities. Individuals and small waste buyers prefer to sell recyclables to Wongpanit as a one stop service, they don't need to travel around to sell different items to different shops.

## **V. Existing recycling business model in studied countries**

Recycling business is practiced in most countries in Asia. The way of practicing the recycling business is varied based on local conditions, market availability and governmental intervention in each country. There are both distinct differences and similarities. This section provides an overview of recycling rates in the studied countries and a brief explanation of each recycling business identified during the course of this study. More explanation of recycling businesses in each country is provided in **Annexes I to IV**.

### ***Thailand***

#### ***Overview***

Recycling business in Thailand is mainly carried out by private sector which contributes to the national recycling rate of approximately 21% of total waste generation and 71% of recyclable materials. The government of Thailand aims to achieve a 30% of recycling rate by 2016 by promoting 3R implementation.

In general, recyclables are being segregated and sold by residents, itinerant waste buyers and waste buyer shops. In some cities, local governments cooperate with the private sector to promote recyclable waste separation at source for sale to minimise final site disposal. However, the government does not create formal routes for the collection of recyclables except for some promotional campaigns such as aluminium collection for handicrafts and so on.

In 2009, the Pollution Control Department of Thailand estimated that there were 10,200 waste buyer shops, 110,070 itinerant waste buyers and 50,000 employed workers in the recycling sector. Waste buyer shops are scattered across the country: 30% are in Bangkok and the vicinity, 28% in the central and eastern areas, 18% in north-eastern areas, 16% in northern areas and 8% in southern areas.

## ***Recycling business models***

Recycling businesses in Thailand can be divided into two types: i) conventional business model and ii) Wongpanit business model.

### *i) Conventional business model*

Generally, conventional recycling businesses focus on monetary profit with less attention to environmental and social activities. Commonly, they are family businesses, with no course or training for the public or new entrants. Learning and information sharing are based on personal relations. Therefore, it is a closed business model that is very difficult for new entrants.

As there is less intervention from the national government, recycling businesses in Thailand are heavily reliant on private investment. Due to investment capacities and competition in the market, conventional recycling businesses can be sub-divided into two models.

#### *a. Buyers of multiple types of recyclables*

This model is commonly found in Thailand. Itinerant waste buyers and small waste buyers use this type of business to secure more recyclables from households and communities. Most waste buyers in each city are buyers of multiple types of recyclables as an incentive for itinerant and small waste buyers. Furthermore, buying multiple types of recyclables can reduce the risk from a price drop of a particular recyclable. However, this model needs a lot of cash for buying multiple types of recyclables. Therefore, the itinerants and small waste buyers buy and sell recyclables within a day to make a daily cash return. Normally, these buyers cannot sell recyclables directly to recyclers but sell them to dealers. However, some waste buyers have been engaged in this business for many years and can secure a sufficient quantity of a particular type of waste and directly deal with the recyclers to obtain a better price.

#### *b. Buyers of single type of recyclables*

This model is a model that large scale waste buyers and buyers in highly competitive areas use to secure a particular type of recyclables and sell it directly to recyclers. However itinerant waste buyers and small waste buyer shops often want to sell all recyclables in one place to realise cost and time efficiencies. Therefore, the single type buyers can be successful only the shop offers higher prices that are attractive for itinerant waste buyers and small waste buyer shops. Therefore, many single type buyers end up buying a few types of recyclables to satisfy sellers.

### *ii) Wongpanit business model*

Wongpanit was a conventional recycling business that purchased multiple types of recyclables. It has gradually distinguished its business model from others by

collaborating with local governments to promote recyclable waste separation at source, providing training for the public, and developing a franchise system for new entrants in late 1990s.

## **PRC**

### ***Overview***

Recycling business in PRC is well established across the countries. Recyclables are considered as a resource and thus the management of recyclable waste belongs to the Ministry of Commerce, different from other countries. There are no systematic records regarding how much of the recyclable waste generated in the municipality is being recycled. However, there is a report that municipal solid waste recycling is about 30%.

Specific collection systems for recyclables and used products have been established since the 1950s. The promotion of the circular economy has helped the recycling sector expand more rapidly in recent years. The government encourages various enterprises to engage in collection and recycling and has promoted the upgrading of curb side practices to a more sophisticated recycling system. For example, the government has allocated budget for recycling industrial park development. In 2011, the PRC National Resources Recycling Association (CRRA) reported that there are more than 200,000 collection branches and more than 10,000 recycling enterprises.

### ***Recycling business models***

Recycling is a traditional lifestyle of the Chinese. Due mainly to government efforts to increase the recycling rate and upgrading traditional recycling practices toward a sustainable approach, the recycling business model in PRC ranges from a ‘simple buy and sell’ model to more complicated ones with intervention from the government.

This study identified four types of current practices in PRC as follows:

#### *i) Conventional - individual businesspeople*

Individual businesspeople are key stakeholders in the recycling sector in PRC. It is a typical recycling business model that is usually invested in and operated by one person or one family. It may employ many labourers for collection, separation, cleaning and pre-processing of the recyclables. Different from individual collectors, a business license is required for individual businesspeople from the Local Industrial and Commercial Registration Department. Compared to private companies, the scale of operations is rather small; the tax submitted to government is calculated as personal income tax.

*ii) Conventional - private company*

Private companies are profit making organizations invested in by individual people and recruit labour for their operations. The profit (after tax payment) belongs to the company. Compared to individual businessmen, the private company is a legal entity and has larger operation scales.

*iii) State-owned company*

Recycling activities and operations are similar to recycling companies and larger than the individual businesspeople. However, the total assets of the company belong to the government, and investor is the government. The staff salary is regulated and paid for by the government, and most of company's profit is submitted to government with a small part is owned by company.

*iv) Recycling industrial park*

Recycling industrial parks are developed based on 'Opinions of the State Council on Promotion of Circular Economy Development in 2005'. It is established jointly between the National Development and Reform Commission and the Ministry of Environmental Protection and Provincial Governments. Recycling industrial parks aim to provide good infrastructure for sustainable recycling business development and the elimination of curb-side recycling practices. The government provides subsidies for the development of recycling industrial parks such as land and parts of the construction cost. Operation of recycling industrial parks is similar to other industrial parks. Soft loan programmes and capacity building are offered to individual businesspeople and companies as incentives to join the parks.

## ***India***

### ***Overview***

Recycling businesses in India are mainly found in the informal sector which handles approximately 70% of plastic waste and up to 56% of all recyclable waste generated in India. Some municipalities, such as Ahmadabad, have begun a formal route to segregate recyclables at source and provide incentives to residents by granting door-to-door collection through the Resident Welfare Association (RWAs), association of sanitation workers and women's organizations.

In some cities, the Urban Local Bodies (ULBs) involves the private sector in waste management, which includes resource recovery as a package under the public-private partnership (PPP) model. However, private sector involvement in waste recycling activities is small and mainly in paper, plastics and metals. Private investment in the recycling sector is seen to have potential, but it requires financial support such as softer loans, grants, or other forms of financial incentives.

It is obvious that waste recycling practices by informal sectors does not include the environmental and health and safety considerations. To minimise the impact from the recycling sector, the national government has announced e-waste management and handling rules. However, much of the e-waste is being traded through the informal sector.

### ***Recycling business models***

Generally, waste buyer shops in India handle one particular type of waste in contrast to Thailand where waste buyer shops generally buy all types of recyclables. This practice might be influenced by the investment capacity of waste buyers.

This report provides examples of four recycling business models in India as follows:

*i) Conventional small to medium enterprises (SME)*

Conventional SME constitute the majority of recycling business models in India. This model consists of local scrap shops, retail scrap traders, whole sale scrap dealers, re-processors and small scale recyclers. The waste pickers play an important role for the operations of these business enterprises. All of these players are mainly located in slum areas. There are neither environmental nor health safety measures.

*ii) NGO oriented model*

This model is established by NGOs and implemented in partnership with waste pickers. It also combines an innovative strategy of integrating fashion, design and manufacture of useful products from waste with the participation of waste pickers. Generally, this model is a small-scale waste recycling initiative that received initial financial support from either international or domestic donors. Waste pickers are employed to work under the supervision of the NGO, thus a regular source of income is assured and income is higher and working conditions are generally better than individual practices without NGO interventions.

*iii) Waste picker cooperative model*

Waste picker cooperatives are formed with support from NGOs to secure waste collection contracts with the municipality. This model improves the working conditions of waste pickers from day-to-day work on landfills or streets to more secure work in door-to-door collection which enables them to access recyclable waste from contracted households. Under this model, the waste pickers can earn a higher income. The municipality provides an area for a material recovery centre or waste buyer shops that are operated by the cooperative are used. Other support from the municipality mainly depends on municipal policy and negotiation with the NGO that provides support to the waste picker cooperative.

#### *iv) Private company*

Private companies engage in the recycling sector due to potential benefits from the increase in waste generation and the rising price of recyclables. Private companies try to access recyclables by conducting awareness raising campaigns and securing contracts with generators. These activities include one or both of the following.

- Sourcing of recyclables through contracts with generation point sources such as institutions, offices, schools and, to some extent, households. This model replaces the role of scrap dealers because the wastes collected by these companies are directly delivered to recyclers.
- Safe recovery and recycling of materials such as mixed plastic waste that previously had no market value, safe recovery and the recycling of e-waste, etc. These companies try to carry out business along with health and environmental safety in contrast to the informal sector. Additionally, in response to the e-waste management and handling rules 2011 of India, there are certified private companies for e-waste recycling that meets these new standards.

## ***Malaysia***

### ***Overview***

The recycling sector in Malaysia is mainly carried out by the private sector and to some extent by charity organizations, NGOs and the government. It has been reported that the recycling rate in Malaysia is approximately 18.6%. Amongst this, private business initiatives contribute 14.1% and public initiatives 4.5%. Currently, the government of Malaysia aims to increase the material recycling rate to 40% of total waste by 2020 through enforcement of Act 672.

Until now, recyclable waste separation at source is carried out on a voluntary basis. The government aims to establish a formal recycling collection system in 2014 called the 2+1 scheduled collection system (collection of non-recyclable waste two days a week and recyclables one day a week).

Currently, there is no data available about the total number of recycling facilities in the country. Some information about recycling facilities is available at the local level due to business licensing, however, this information is not integrated and therefore not known by the federal government.

## ***Recycling business models***

Recycling businesses in Malaysia can be divided into three categories of stakeholders: private companies, NGOs and government initiatives.

### *i) Conventional business model of private companies*

Similar to other countries, the conventional business model of private companies mainly focuses on monetary benefits with less attention to health and environmental impacts.

### *ii) Charity organizations*

Charity organizations collect and receive reusable and recyclable waste from donors and sell those items for cash but sometimes donate them to disadvantaged groups. The cash is used for charity programmes. This kind of activity is widespread in Malaysia especially among Christians and Buddhists.

### *iii) Government initiative*

The government launched a national recycling programme in 2000 to promote recyclable waste separation at source and delivery to local recycling centres operated by the government. The initiative has included awareness raising campaign and distribution of brochures and posters to residents. The management of the local recycling centre is varied depending on the local authorities. Some operate as a buy-back centre but some are drop-off centres. This initiative continues but some aspects are inactive or have been handed over to charity organizations.

Recycling business models found in this study are summarised in Table 1.

**Table 1 Types of recycling business model found in this study**

Initiators	Business model	Thailand	PRC	India	Malaysia
Private sector	Conventional model: individual, small scale, company	√	√	√	√
Private sector with social responsibility	Wongpanit	√			
	Business with awareness raising campaigns			√	
NGOs	NGO oriented			√	
	Waste picker cooperatives			√	
	Charity organization				√

Government	State owned company		√		
	Recycling Industrial Park		√		
	E-waste recycling (including disassembly and material recovery)		√	√	
	Public collection centre				√

## VI. Driving factors of recycling business in studied countries

Overall, recycling businesses in the studied countries are on the rise and associated business opportunities are expanding. The sector is also gradually becoming more diverse with many different kinds of recycling undertaken side-by-side and sometimes in competition. Informal waste collection and back-yard recycling, which have existed for a long time, are still common, especially in India. At the same time, professionally managed recycling enterprises using more advanced technology have entered the scene especially in e-waste recycling. A sector that used to be driven mainly by poverty and the economic value of recyclables is becoming more complex due to new drivers and concerns. In the current situation, there is a multitude of recycling activities along a wide spectrum from informal and low-tech to formal and technologically advanced. Each of these activities has its own set of drivers and its own challenges. In the competitive environment, private sector initiatives to scale up businesses in an environmentally sound and socially acceptable manner such as the Wongpanit recycling business model seem to be very successful.

As illustrated in **Annex I to IV**, the recycling sector is growing at quite a considerable rate but there is potential for further expansion. There are good reasons to increase the recycling rates of many materials further since this can dampen demand for virgin natural resources, reduce waste to be disposed in landfills, and also create employment. At the same time, there is a need to improve the performance of the sector – to reduce negative repercussions on health and the environment, to get rid of child labour and human exploitation, to enhance efficiency and financial viability, and to stimulate innovation and investment. Further expansion of the sector needs to go hand in hand with a widespread upgrading of its environmental and social performance – these two tasks should be addressed simultaneously.

Our analysis identifies three main drivers of the expansion of the recycling sector in the studied countries:

i) Economic value of recyclables

Economic value of recyclables is the primary driver of recycling businesses in developing countries. Many people especially those living in poverty are engaged in the collection of recyclables from the street and dumpsites to sell it to local scrap dealers. Nowadays, many stakeholders are engaged in the recycling sector especially

in Thailand where highly educated people invest in this sector as they see clear economic benefits.

ii) Social movements regarding the environment and socio-economic development

This driver has influenced recycling businesses in many ways. For instance, many NGOs and charity organizations are engaged in the recycling sector to earn a profit for charitable activities or to improve working conditions and the social status of waste pickers. In some cases, such as Thailand, residents' participation in recycling businesses is increasing as a result of awareness raising. The number of waste buyers has increased and has become more competitive, thus they need to provide social services and promote environmental conservation to create a good reputation for the company to attract more customers, especially institutions.

iii) Government policies

National policies significantly impact the behaviours of residents and stakeholders engaged in the recycling sector. For instance, Act 672 of Malaysia will promote a formal collection route for recyclable waste and phase out unqualified waste buyers and recyclers. This policy will enhance more recyclable waste separation at source and deliver it to qualified recycling facilities. The Government of PRC provides subsidies to improve recycling businesses especially in e-waste and the development of recycling industrial parks, motivating recyclers and investors to invest in sophisticated recycling facilities.

These drivers correspond largely with the three main groups of actors: the private sector (including the informal sector), civil society (NGOs and community based organisations, and the government (at central, state and local levels). Efforts to address the sector's challenges and improve its performance need to be based on a thorough understanding of how these drivers influence the sector, including how the different drivers interact – sometimes supporting, sometimes conflicting – with each other. Specific discussions on each driver for each country is available in **Annex I to IV**.

## **VII. Lessons learnt from Wongpanit and other recycling business models**

Despite significant contribution of the conventional recycling business practices, its negative impacts to environment are also obvious. Therefore, there are various interventions from either governments, NGOs, and to some extent by the private sector to improve the condition of the recycling sector, decrease environmental impacts, and improve social condition of waste pickers and relevant stakeholders engaged in recycling business.

Wongpanit is a representative of a private sector initiative that primarily improves its business by collaborating with local governments to promote waste separation at source,

providing training to the public to increase accessibility to recyclable waste, and providing training to new entrants to open opportunities to scaling up its business. However, these strategies can also provide co-benefits in social development and environmental conservation. Other private sector actors that practice conventional recycling business models can utilise these successful strategies to increase the profitability of and scale up their business.

NGOs also play a significant role to improve recycling business practices especially to waste pickers that have no capacity to follow the same approach of Wongpanit due to capacity and financial constraints. In India, NGO intervention is very important to support waste pickers to improve working conditions either in the form of employment or receiving support in forming cooperatives. However, NGO intervention is heavily reliant on external funds and local government cooperation in providing contracts and subsidies to the waste pickers.

In Malaysia, NGOs play a different role to that of India. NGOs in Malaysia engage in the collection of reusable and recyclable waste from donors and sell it for cash or directly donate to the disadvantaged. Income from the selling of waste is used for charity purposes. These organizations work as campaigners to motivate waste separation at source and supply recyclables to the recycling business chain. The activities are on a voluntary basis and thus business practices are not so serious compared with private sector actors.

In PRC and Malaysia, government intervention is relatively high but it is still at the initial stage. In PRC, the government provides subsidies to improve recycling businesses such as the establishment of state owned companies for recyclable waste collection, subsidies to certified e-waste recyclers, and subsidies for recycling industrial park development. Due to high intervention from the government, private companies are reluctant to be proactive and prefer to wait for government support. In Malaysia, the government tries to formalise recyclable waste separation at source and phase out unqualified waste buyers and recyclers. Public collection centres have been established across the country, with some successful but some are inactive. However, Act 672 was issued to develop a formal route for recyclable waste collection and recycling which will be fully implemented in 2014.

In all cases, Wongpanit strategies in awareness raising to achieve public participations are valid. Furthermore, multi-stakeholder cooperation and public-private partnerships are important to achieve sustainable development of recycling business models in each country.

Specific recommendations to apply Wongpanit strategies and also lessons learnt from other recycling business models and interventions from NGOs and government organizations to overcome barriers in each country is provided in **Annex I to IV**.

The recommendations presented in the following sections suggest ways to address the complex and diverse situations in the recycling sector and identify opportunities to capitalise on the key drivers to further expand and improve the recycling sector in studied countries.

## VIII. Barriers and Way Forwards

Each country faces similarities and differences in barriers (**Table 2**). Even though some barriers are similar in all the countries, sometimes the same recommendations are not applicable to all due to differences in local circumstances. Therefore it is very difficult to regionalise recommendations to address each barrier. This section discusses common barriers that are found in the studied countries. Some recommendations are provided but specific recommendations for each barrier in each country are available in **Annex I to IV**.

**Table 2 Main barriers of recycling business development in studied countries**

Barriers	Thailand	PRC	India	Malaysia
i) Vulnerability of the recyclable market	√	√	√	√
ii) Lack of awareness of both residents and businesses and lack of business skills (including low operational standards)	√	√	√	√
iii) Weak coordination among stakeholders	√		√	√
iv) Lack of access to market data	√		√	√
v) Labour shortage	√		√	√
vi) Lack of accessibility to financial sources	√		√	
vii) Lack of tax incentives	√		√	
viii) Lack of regulations or enforcement to promote recyclable waste separation at source	√		√	
ix) Low priority in innovating waste recycling technology			√	
x) Government initiatives are ad-hoc and not sustained, leading to weak government control				√

### i) Vulnerability of the Recyclables Market

In all studied countries, the recycling business is subject to considerable price volatility. This is critical to business planning and willingness to invest in proper recycling practices. Cost of wages and fuel are rising. Regulations are getting stricter and investments in improved technology are needed. Price fluctuations for recycled materials add to these challenges and hamper further investments.

### Lesson learnt from Wongpanit

Wongpanit tries to overcome this barrier by buying a wide range of recyclable materials to lower the risk of price fluctuation on particular waste items and materials. Additionally, Wongpanit has developed an SMS system to provide real time price information to all franchise members, enabling the members to quickly change the price and making a decision whether to sell or to stock the recyclables. Additionally, Wongpanit creates channels to both domestic and international markets which enable the company to take the decision whether to sell domestically or export.

### Lesson learnt from China

The Chinese Government provides subsidies to certified companies on recycling electronic waste. The subsidy is based on the quantity of recycled materials. This subsidy helps companies compete with informal actors which normally can offer higher prices to household than certified companies because informal actors do not invest in environmental protection. Also, the subsidy helps maintain reasonably stable profits despite price volatility.

### Recommendations:

- National governments should set up a subsidy scheme for certified facilities, especially for recycling of materials where there is serious risk for harm to human health and the environment. However, modifications to suit each country's condition are required.
- Similar to the Wongpanit strategy, a system for real time price notification should be set up which will help minimize the risk of waste buyers and recyclers. This could be done through the setting up of a national alliance of recycling businesses with government support.
- Small waste buyers that do not have enough waste storage space are more vulnerable to price fluctuations. Local governments can help these small actors either by buying at a minimum price or by providing storage for those recyclable items that have serious price drops. Funding could be derived from the savings made by not needing to collect and dispose the recyclables.
- A mechanism to promote use of recycled products, such as green public procurement, could stabilise markets and make a significant contribution to minimising the fluctuation of recyclable waste prices.

## **ii) Lack of Awareness of Residents and Businesses, Lack of Business Skills and Low Operational Standards**

In general, people's awareness regarding recyclable waste separation is generally low and more efforts are needed to raise awareness. The informal sector is unorganized, lacks training and a systematic approach to business, leading to lower productivity. Furthermore, operation of waste buyer shops and recycling facilities have too low standards and often lack any environmental and health and safety measures.

#### Lesson learnt from Wongpanit

Wongpanit has overcome this barrier by provide training to residents, waste pickers, and governmental organizations as social services. Also, Wongpanit provides business training to those who would like to engage in the recycling business as well as developing a franchise system to support the investment of new entrants and scale up its business.

Residents are free to sell recyclables to whichever waste-buyers they prefer. Nevertheless, Wongpanit provides training on waste segregation to all stakeholders including local governments, itinerant waste buyers, waste pickers and residents. In collaboration with the local government, trained itinerant waste buyers and waste pickers are registered and upgraded to environmental volunteers.

Recommendations: Regarding awareness, residents need to understand the importance of waste segregation for recycling. Capacity building of recycling businesses is also required for new entrants or existing enterprises. The training needs to ensure participants understand the political, social, cultural, economic, technological, environmental, health, safety, and legal aspects of waste management and the recycling business. This is especially true for the entrepreneurs and investors. Local stakeholders can play a significant role as follows:

#### *Awareness raising and waste separation at source:*

- National governments may set a national policy or regulation on waste separation for recycling and increase recycling rate targets. In countries where the regulation on waste separation at source exists, governments should make stronger efforts to facilitate source separation and to enforce the law.
- Local governments and local NGOs may develop awareness raising campaigns on waste separation targeting residents. Furthermore, campaigns should try to improve the social status of waste pickers and other stakeholders engaged in the recycling business.
- Local governments, NGOs and large scale waste buyers may help train waste pickers and small scale waste buyers on waste separation, pre-processing and other value-added techniques. In this case, the large scale waste buyers may enjoy a supply of better quality of recyclables to their business as well as receive more recyclables from trained waste pickers and small scale waste buyers.

- Experienced companies may formulate a training course for their clients and new business entrants. It may utilize the Wongpanit franchise system tailored to suit local conditions.
- Local governments may introduce local rules or by-laws for waste separation at source, such as in Mumbai. However, the local government should also prepare a logistical system to serve the collection of separated waste.

*Operational standards:*

- The government should set up standards for safe operations and environmental control of waste buyer shops and recycling facilities. In countries where these standards exist, inspections should be carried out on a regular basis.
- Nevertheless, the government should provide capacity building on the impact of recycling on the environment and health and provide technical support to upgrade recycling practices and facilities. These standards should apply for issuing certificates or licenses to waste buyers and recyclers.

### **iii) Weak Coordination Among Stakeholders**

Many different stakeholders are engaged in the recycling business, however the coordination among these stakeholders is relatively weak. For instance, most recycling activities in India are initially done in the informal sector through waste pickers, and local scrap shops and wholesalers in slums. These activities often compromise the environment, health and safety of the neighbourhood and their low costs give them an unfair advantage over the formal sector that has to comply with basic environmental, safety and health regulations. Currently, the informal sector is generally ignored by the formal sector; there are few attempts to bridge the gap between these two groups of actors and to build partnerships. The recycling business and overall urban waste management would be significantly improved if the formal sector coordinated its activities with the informal sector and collaborated with these actors. Similar disconnection between the private sector and government are also found in all studied countries which brings to light the lack of full creation and implementation of regulations. In some cases, the private sector and NGOs are reluctant to invest in the recycling sector without good support from local governments. This requires that local governments establish a trusting relationship with these organizations, work towards increased collaboration among stakeholders (e.g. waste pickers, residents, communities, waste buyers, and, to some extent, recyclers), and facilitate a shift to environmentally and socially acceptable recycling practices.

#### Lesson learnt from Wongpanit

Wongpanit has overcome this barrier by partnering with local governments in promoting waste separation at source. The activity improves the relationship between the waste buyers, local governments, and residents. As a result, the local government can

Recommendations:

- Learning from the experiences of the Wongpanit business model, national and local governments and big scale recyclable waste dealers should put more efforts to coordinate among each other to improve the status of the recycling sector. However, interaction methods may differ between each country based upon local conditions. For instance, in India, the government should encourage the establishment of a union or an association for informal recycling actors, if possible in collaboration with NGOs. Once constituted, these entities can partner with the city administration and/or with corporate clients to assist in Extended Producer Responsibility (EPR). It is important however that capacity building of informal businesses is part of this process. Partnerships between formal sector associations and the government with the informal sector would assist in expanding waste recycling activities. Furthermore, local authorities and businesses need to partner with waste picker organizations so as to make waste management socially acceptable and economically viable. Memorandum of Understanding (MoU) between Pune Municipal Corporation and Kagad Kaach Patra Kashtakari Panchayat (a waste picker cooperative) is one good example to consider as a template for partnership with the city administration.

- More recommendations to overcome this barrier in India and other countries are available in **Annex I to IV**.

#### **iv) Lack of Access to Market Data**

The recycling chain needs transparent information about the market, recyclables, the volume of recyclables, transactions and the operational businesses. Existence and location of scrap traders, retailers and recyclers is not known to all. It is difficult for potential new entrants to estimate costs and revenues. It is also difficult to establish the right connections and to find sellers and buyers. Due to these high entry barriers and information asymmetry the competition is low and the established players can capitalize on their exclusive knowledge base.

##### Lesson learnt from Wongpanit

Wongpanit tries to overcome this barrier by announcing the buying price to the public (e.g. price board, webpage), collaborate with local governments, and use public events and media to advertise the company. Therefore, the company is well known and many stakeholders contact Wongpanit to do business.

Additionally, Wongpanit has developed a franchise database, sending information of waste dealers and price offered from each dealer to all franchises which helps the franchise know which dealers offer the best price for which item.

##### Recommendations:

- A database of scrap dealers and recyclers should be established to support the networking of relevant stakeholders for the direct sourcing of waste and reducing the long supply chain. In the current situation, there are middle-men who benefit from having an information advantage while adding little actual value to the handling of the recyclables. Making the sector, and its network structure and prices, more transparent would ensure better returns to the poor and also help in expanding waste recycling activities. Negotiations on waste quality, quantity, pricing, and logistics development would be easier once a database is established. Furthermore, a database would assist new investors in understanding and investing in the waste recycling business.
- Additionally, an effective market also requires that all players have access to up-to-date price information. In order to reach as many as possible information should be accessible by mobile devices, including regular mobile phones

#### **v) Labour Shortages**

Segregating recyclables in mixed waste is labour intensive. Also, working conditions in this sector is poor with health and safety risks. This is coupled with a lack of social support, lack of recognition and disrespect in the community for workers in the waste sector. Therefore, it is very difficult to find good workers on this field especially in Malaysia where the locals refuse to do this job.

#### Lesson learnt from Wongpanit

Wongpanit has overcome this barrier by coordinating with local governments on promoting waste separation at source for sale. The company trains residents, community and waste pickers on waste separation for value added and thus the company can reduce labour requirements for waste separation at the company. Furthermore, the company uses a franchise system to scale up its business so jobs are not all concentrated in one area but distributed across the country.

The company has also improved the image of the recycling business, leading to a greater interest from labour. The company also offers reasonable salary, skill training, safety and health insurance as similar to other business. These strategies can reduce risk of labour shortages and enable the company to continue scaling up its business.

#### Recommendations:

- The government should provide protective gears and health and life insurance for waste pickers. There should be regular health checks for those working in waste handling. In addition, other social services should be provided such as child care.
- Environmental, health and safety conditions in waste facilities need to be paid attention to with regular monitoring and the establishment of a management system. Guidelines or standards may be needed to enhance this practice.

#### **vi) Lack of Access to Financing**

There are huge investments required in waste recycling which are currently mostly being made by the private sector. Although the recycling sector has positive externalities in the form of waste reduction, the support available from the government is limited. The necessary investments will only be made by private actors if they make sense from a business perspective, and thus many of them put less emphasis on environmental control. Access to finance of small to medium enterprises is an obstacle for the expansion of waste recycling industries, especially those working on decentralized basis and dealing with small volumes because these entities operate their business based on cash payments to meet the demand of primary recyclable waste collectors, itinerants and junkshops. Therefore, their financial documentation and situation are not attractive for financial institutes and banks who are usually unwilling to providing loans to them. If any loans from financial institutions and banks are available, there is no particular support or special consideration for waste recycling projects such as a low interest rate. Conditions in PRC seem to be better than other countries

because the government provides some subsidies to certified company on e-waste recycling and recycling industrial park development.

Many decentralized, waste picker based programmes are NGO initiated and developed towards social improvement. They are supported by external funding which enables the initial start-up of activities and are expected to scale-up using other sources of funding for investment. Many NGO programmes that cannot secure budget for continued operations and scaling-up gradually terminate after the initial project funding runs out. Improving access to preferential finance to strengthen these NGO programmes, and to make them viable over the long term, should be a priority.

#### Lesson learnt from China

The Chinese Government provides a subsidy for the development of recycling industrial parks. Companies clustered in each recycling industrial park can share basic infrastructure, get support with technology innovation, management and other services, which decrease investment needs and operation costs of each company. Each park must establish a block for small scale waste buyers to relocate the curb-side recycling business into a proper environmental control area. Several incentives are provided to those small scale waste buyers, including awareness raising, study tours, loans, etc.

#### Lesson learnt from Wongpanit

Thailand does not have a good channel to access finance for recycling businesses. Wongpanit has overcome financial problems by deciding not to expand its activities into investment-heavy recycling processes but to remain as scrap dealers. Pre-processing is invested in only if there is significant value-added to the products. Simple and cheap technologies were invented upon budget availability. This system is an alternative where the government does not provide support to recycling businesses.

Secondly, Wongpanit tries to scaling up its business by develop a franchise system where investment is mainly done by the franchise members. Through these franchises, Wongpanit can increase negotiation power with manufacturers and obtain premium prices. Overall, Wongpanit's profit has increased with minimum investment. This lesson learnt may be applicable for other countries where the public system does not sufficiently facilitate the development of recycling businesses.

#### Recommendations:

- For national governments
  - Governments may study the recycling industrial park policy in PRC and analyse whether this subsidy system is also appropriate for their country or not. For instance, the recycling industrial park model, with some modifications to reflect local conditions, seems suitable to improve recycling business in slums in India.
  - Considering that environmentally sound recycling facilities need a lot of investments especially for e-waste, such initiatives should be supported by the government by concessional loans, tax exemptions and subsidies.
  - Microfinance schemes should be established for small scale recycling businesses including waste pickers, small waste buyers, etc. A special recycling loan scheme should be set for large scale recycling businesses to enable them to scale up their business in an environmentally sound manner.
  - Governments can provide funding assistance and grants for supporting research and technology innovation. Alternatively, a special interest rate could be applied to loans for technology innovation.
  - Governments can provide financial assistance to support capacity building of the informal sector.
- For the entrepreneurs and private sector
  - The entrepreneurs and private sector may develop an alliance system to support each other and reduce logistic costs. The alliance system may increase the negotiation power to the recyclers, improve the image of the sector, and increase access to financial institutes or government assistance.

#### **vii) Unfavourable Tax Systems**

The current tax system in some countries does not encourage improvement of recycling business toward environmental protection. For instance, recycling businesses in Thailand must pay a special tax for businesses that may generate a public nuisance and a permission fee for the establishment of used product purchasing company, in addition to all taxes that other businesses must pay. Moreover, the income tax for waste buyers is charged based on the quantity of waste purchased not net profit. As a result, many buyers do not declare the real data of waste purchased and do not keep concise records.

##### *Recommendations:*

- The national government should set a special tax exemption or tax reduction for recycling businesses especially those who implement environmental protection and social services activities such as providing training on waste separation for sale and installing environmental measures to minimize impacts.
- Additionally, the government should provide tax exemptions or reduction (lower VAT) for environmentally sound recycled products. This would help waste recycling businesses compete with products manufactured from virgin materials.

- National governments should reform the tax calculation system to motivate businesses to keep concise records of recyclables and pay the proper amount of tax. Also, the government can use the concise records of waste buyers for the development of a national database on recycling, the planning of national strategies to improve recycling businesses, etc.

#### **viii) Lack of Regulations or Enforcement to Promote Recyclable Waste Separation at Source**

Currently, recyclable separation at source is practiced on a voluntary basis in most countries. The formal system to encourage recyclable separation at source is in an early stage in some countries such as Malaysia. In some cases, the local government tries to promote separation at source, but there is no mechanism to collect the waste separately. Therefore, many recyclables are discarded into the collection system. In all countries, there are some waste pickers who segregate recyclables from the pile of wastes; however the quality is relatively low compared to one that is being separated at source. As a result, many recyclables are buried in landfills.

##### *Recommendations:*

- The national government should set up a national regulation scheme to promote recyclable waste separation at source and provide mechanisms to facilitate and enforce the implementation of the separation system by local governments.
- The local government should establish local regulations to enhance the establishment of the national policy and the law to promote the 3Rs. The local regulation should also include an element of individual cooperation and raising awareness of residents to fully practice the 3Rs and separate reusable and recyclable waste for selling or delivering to recycling business chain.

## **IX. Proposal for Follow-Up to ADB**

Recycling is an important element of sustainable urban development because the majority of waste generation is occurring in urban areas especially in mega-cities. Additionally, recycling can contribute co-benefits to various aspects of global concerns including resource circulation, climate change, poverty reduction, green growth and sustainable waste management. Based on this study, it can be concluded that the four targeted countries are at different development stages of their recycling sectors but there is room for further expansion and improvement in all countries. However, many barriers remain as challenges for the governments, enterprises and other actors in each country. As a part of its urban development initiatives, ADB can contribute to expanding and improving the performance of the recycling sector in various ways. Importantly, in its urban waste management initiatives ADB may consider introducing awareness generation for waste separation at source and also including a component for

separate collection and management of recyclables. More specific proposals for each country are summarised in **Table 3**.

**Table 3** Proposals on how ADB can contribute to expanding and improving recycling toward sustainable urban development and climate change mitigation in the studied countries

Proposals	Thailand	PRC	India	Malaysia
i) Technical assistance for pilot projects for upgrading recycling business practices and strengthening networking	√	√	√	√
ii) Technical assistance for capacity building across the sector (e.g. through twinning arrangements for local governments)	√	√	√	√
iii) Loan programmes for medium to large scale waste buyers and recycling companies to improve recycling business practices	√	√	√	√
iv) Microfinance loan programmes for small scale waste buyers, community based organizations and NGOs (India includes waste pickers for this programme)	√	√	√	
v) Technical assistance for innovation and new technology development		√	√	
vi) Technical assistance for institution building				√

Overall, all countries would benefit from technical assistance to implement pilot projects for upgrading recycling business practices and strengthening networking among stakeholders. However, the detailed proposals for each country are different. In India the recommended action is a pilot project to improve the recycling conditions of Dharavi Slum. In Thailand a pilot project could focus on developing a public-private partnership recycling business model in one province as a model for a sustainable recycling business. In PRC there is a need for stimulating R&D and for improving the recycling rate of recyclables with a low market value such as fluorescent lamps and dry batteries. In Malaysia the objective of the pilot could be to develop a model of public-private partnership by using lessons learnt from Wongpanit.

All countries are suitable for establishing a loan programme for medium to large scale waste buyers and recycling companies to improve recycling practices. Also, Thailand and India would be good candidates for microfinance loan programmes for waste pickers, small scale waste buyers, community based organizations and NGOs to enable them to improve their working conditions and scaling up their businesses.

PRC and India are in a situation where technical assistance for innovation and technology development could be very beneficial. These countries expect that the improvement of recycling technologies will increase the recycling rate, improve the working conditions of workers and minimise environmental impacts.

Furthermore, it would be timely for Malaysia to improve the institutional setup and capacity of the national department toward implementation of several important strategies to enforce the Act 672 and significantly increase recycling rate.

**ANNEX I**  
**Recycling Businesses in Thailand**

## Annex I. Recycling Business in Thailand

### 1.1 Overview of municipal solid waste recycling

#### 1.1.1 Recyclable waste generation and recycling rate

Thailand covers an area of 514,000 square kilometres with a total population in 2011 of approximately 69.5 million. Amongst this, urban population is 34%, slightly increase from 33% in 2008<sup>1</sup>. Total waste generation in 2010 was approximately 16 million tonnes. Recyclables comprise approximately 30% of municipal solid waste: 17% plastic, 8% paper, 3% glass, 2% metals (including aluminium). Amongst these, 3.4 million tonnes was being traded through the recycling business chain (PCD, 2011<sup>2</sup>).

The material recycling rate was 21% of total waste generated and 71% of recyclable materials. Thailand has been able to achieve this high material recycling rate through the continuous expansion of private sector recycling businesses.

#### 1.1.2 Separation and collection of recyclables

Collection of recyclable waste is done by individuals or waste buyers. There is no formal collection system for recyclable waste. Recyclables are generally separated by individuals and sold to waste buyers located nearby. In some cities, communities arrange recyclable collection sites and sells recyclables to waste buyers. Some recyclables discarded into the municipal solid waste collection system are segregated by individuals, companies and groups which often include waste collection crews and waste pickers. There are a number of waste pickers who segregate recyclables at final disposal sites.

The Pollution Control Department (PCD) of the Ministry of Natural Resources and Environment (MONRE) estimated that there were 10,200 waste buyer shops; 110,070 itinerants (mobile waste buyers) and 50,000 employed workers in the recycling sector in 2009. It was estimated that this sector generated a total income of 325 million THB (10.83 million USD) per month or 3,900 million THB (1,300 million USD) per year (PCD, 2011). There is no reliable data on the number of waste pickers, however it is likely to have decreased due to the influence of various initiatives that have promoted recyclable waste separation at source for sale. For instance, Phitsanulok municipality has reported a decrease in the number of waste pickers in the town but an increase in the number of itinerant waste buyers and junk shops (Sang-Arun, 2011<sup>3</sup>).

Examples of initiatives to promote recyclable waste separation at source for livelihoods and the environment are ‘Recycling for Eggs’, ‘Waste Bank’, ‘Waste Donation Event’, ‘Appointed Waste Market’, etc. These activities are implemented in schools, slums, and communities. These programmes were initiated by the private sector and/or NGOs, and later

---

<sup>1</sup> Worldbank, 2013 <http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>

<sup>2</sup> PCD, 2011 [http://infofile.pcd.go.th/waste/23Jul2011\\_waste\\_1.pdf?CFID=9491985&CFTOKEN=58744544](http://infofile.pcd.go.th/waste/23Jul2011_waste_1.pdf?CFID=9491985&CFTOKEN=58744544)

<sup>3</sup> Sang-Arun, 2011 Participatory recycling business model: where the informal and the formal meet. At ISWA Beacon Conference on Waste Prevention and Recycling. 21-22 June 2011. Buenos Aires, Argentina.

on were adopted and promoted by the government once it has proved efficient in awareness raising.

### ***1.1.3 Waste recovery and recycling practices***

Waste recovery and recycling practices are done at various levels and involve different stakeholders depending on the type of waste and recycling products. The recovery and recycling is basically carried out by the private sector without a subsidy from the government. However, there are a few examples where waste recovery is subsidised by the government, such as plastic waste conversion to liquid fuel where private companies have entered into contract with local governments. The remainder of the activities solely rely on private investment. Therefore, the expansion of the recycling sector in Thailand is fully driven by market demands and monetary profits.

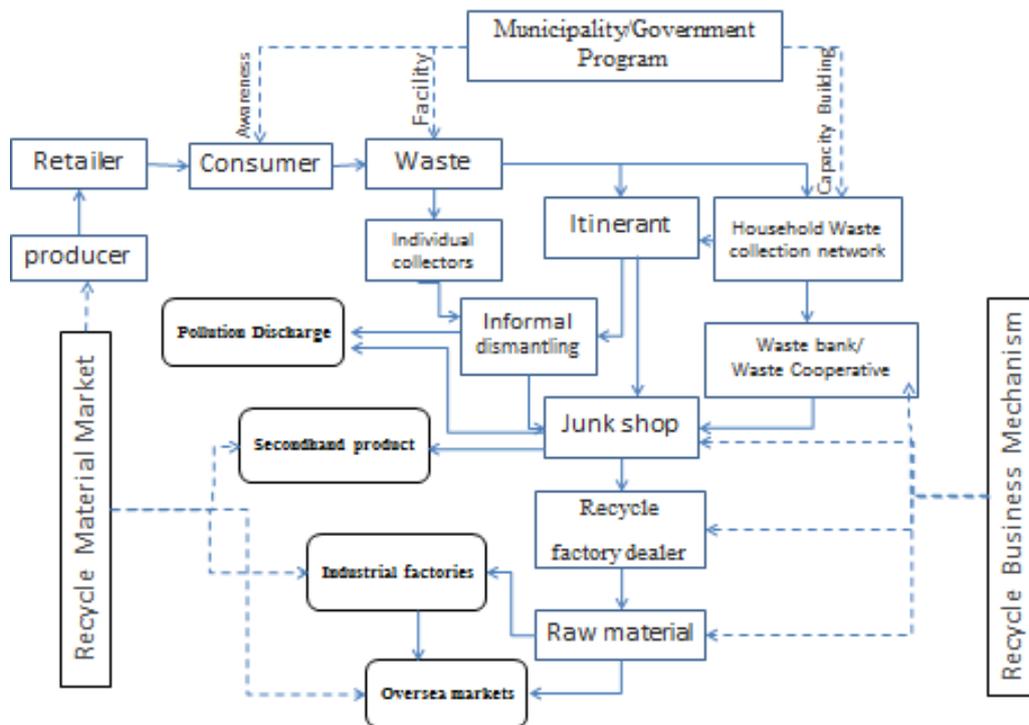
Based on a survey by the Pollution Control Department (PCD) in 2007, approximately 30% of waste buyer shops are located in Bangkok and the vicinity, 28% in the central and eastern areas, 18% in north-eastern areas, 16% in northern areas and 8% in southern areas. Wongpanit, a nationwide waste buyer company, comprises almost 10% of the total number of shops.

Thailand has facilities to recycle most materials including steel, aluminium, copper, paper, plastic, glass, etc. Thailand does not have sophisticated e-waste recycling facilities, but e-waste is being traded and parts that difficult to be recycled are exported to, for example, PRC, Taiwan and Japan. Nowadays, there are more than 1,000 shops that buy e-waste for dismantling before sending parts to recycling facilities and/or exporting. This practice significantly adds value to the waste, but there is also the possibility of negative environmental impacts particularly where it is carried out by small-scale waste buyers who have less awareness concerning health and the environment.

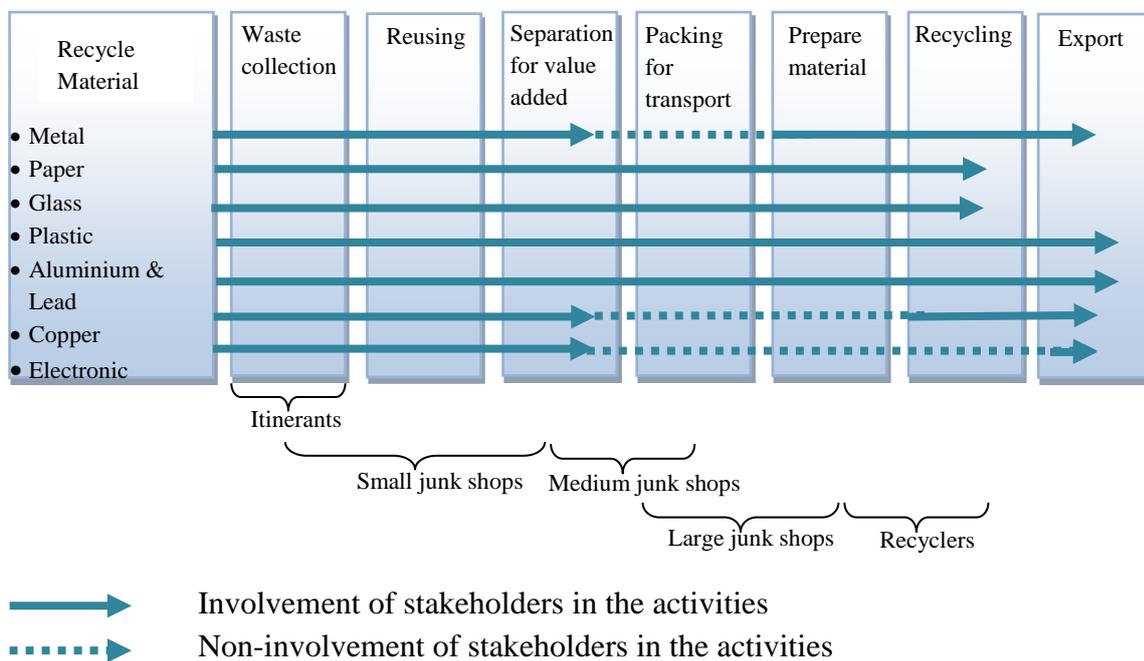
### ***1.1.4 Recyclable material flows***

Recyclable material flows in Thailand are driven by 3 factors: recycling business mechanisms, recyclable materials market, and municipality and government programmes (**Figure 1.1**). Recycling businesses are the main driver of recycling practices in Thailand as they add value to waste. Government programmes that provide knowledge, capacity building and raise awareness of residents to promote recyclable waste separation at source for sale is also a supporting factor that has stimulated the rapid increase of waste buyers.

Some residents separate recyclable waste for sale. Some discarded waste will be collected by waste pickers or waste collection crews. These recyclables are sold to waste buyers (itinerants and shops) before being later sold to larger scale waste buyers before delivery to factories and manufacturers using this waste as a substitute for virgin materials. However, each material has a different flow route depending on the nature of the waste and the need for cleaning and packaging (**Figure 1.2**). Some materials are exported.



**Figure 1.1: Common flow of recyclable materials in Thailand**



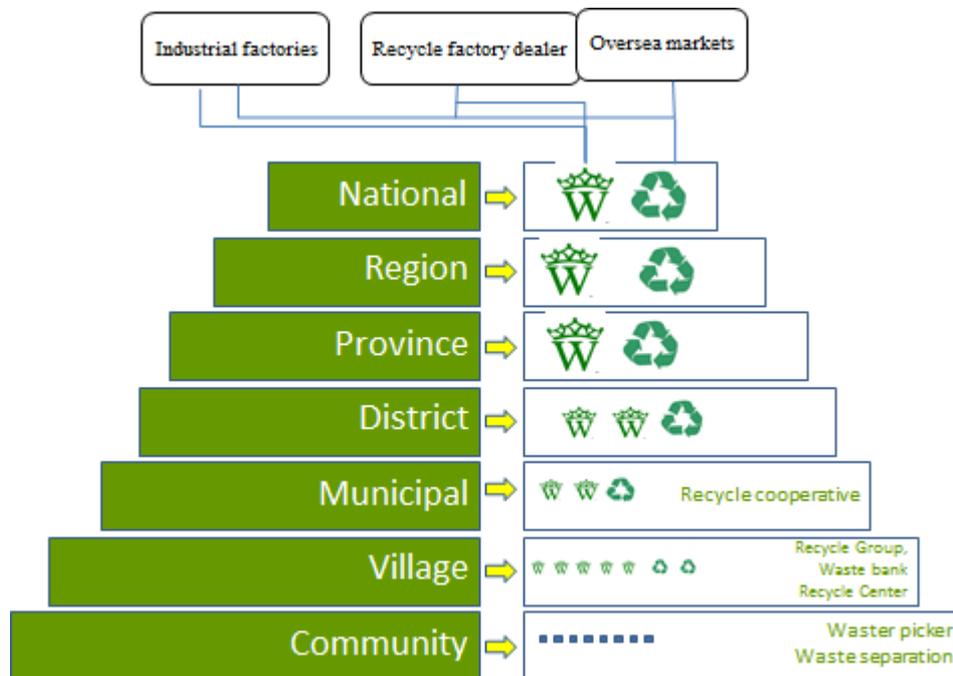
**Figure 1.2: Flow of each recyclable from generator to recyclers**

### 1.1.5 Recycling stakeholders

There are many stakeholders involved in the recycling sector from the local to national level (**Figure 1.3**). At the community level, there are residents and waste pickers that segregate recyclables and sell them to recycling markets. At the village level, there are waste buyers - either itinerants or shops. At the municipality, province, regional and national level, there are a number of bigger scale waste buyers.

Overall, main stakeholders in the recycling sector can be divided into 5 groups.

- i) Waste generators: consumers, residents.
- ii) Waste collectors: residents, waste pickers
- iii) Waste buyers: itinerants, junkshops
- iv) Recyclers: factories, manufacturers
- v) Policy makers: local government, national government



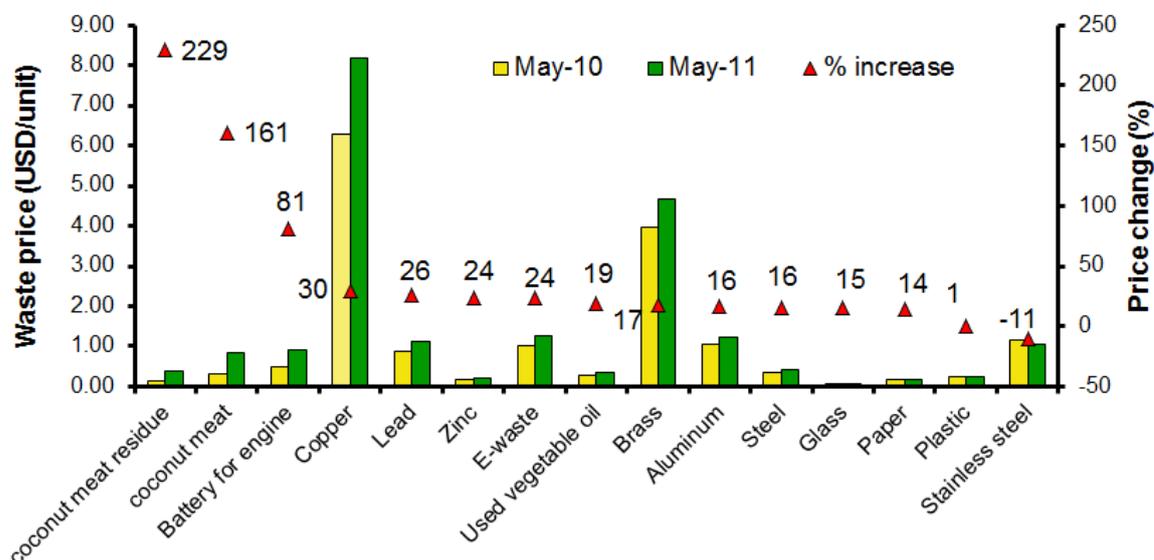
 - Wongpanit Group       - Other waste buyers

**Figure 1.3: Stakeholders in the recycling sector from the community to national levels in Thailand (Wanpen, 2012<sup>4</sup>)**

<sup>4</sup>Wanpen, P. (2012) Wongpanit Business model. Presentation. Seminar on Waste Recycling, held on 21 June 2012 in Mumbai.

### 1.1.6 Recyclable prices

Local recyclable prices fluctuate with both domestic and global market. However, the price of recyclables in Thailand has been on an increasing trend (**Figure 1.4**).



**Note:** Domestic price of recyclable materials in Thailand (Wongpanit's price)

1 unit = 1 kg for most of materials expect for E-waste and glass that the unit price is per piece

**Figure 1.4: Domestic price of recyclable materials in Thailand**

Source: Sang-Arun, 2011<sup>5</sup>

### 1.1.7 Recycling promotion laws and policies

There is no specific recycling law in Thailand. The Pollution Control Department is trying to have the 3R Promotion Law that will enhance recycling of municipal solid waste passed. However, there is uncertainty whether this law will be approved.

In terms of policy, Thailand has established a guideline for the country's environmental administration, namely "The Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality B.E.2540-2559 (1997-2016) (ECNEQ)". This policy has been particularly influenced by the Agenda 21 framework and the 3Rs society initiative, and is currently being implemented. To assure the implementation of the sustainable development concept, the Ministry of Natural Resource and Environment (MONRE), the responsible authority according to the ECNEQ policy, formulated the national plan named "Environmental Quality Management Plan (EQM)" which covered a 5 year period.

<sup>5</sup> Sang-Arun, Janya. 2011/06. [Participatory recycling business model: where the informal and the formal meet](#). Presentation. At *ISWA Beacon Conference on Waste Prevention and Recycling*. 21-22 June 2011. Buenos Aires, Argentina. 16 P.

Currently, a new EQM plan (2012 – 2016) aimed towards the effective implementation of the Green Economy concept is currently being implemented with a target of increasing the reuse and recycling rate to at least 30% by 2016. The plan will be used as the direction for all agencies to follow, in connection with the current 11<sup>th</sup> National Economic and Social Development Plan. This new pollution management plan has been designed to prevent pollution, ease the country's pollution problems more effectively and to keep pace with global trends. It also aims to encourage all sectors of society to take part in pollution management. The objective is to improve the country's environment and maintain it at an acceptable standard. The plan proposes to apply a Polluter Pays Principle (PPP) and economic instruments such as a deposit refund system and emission trading systems incentive measures to reduce pollution and promote pollution-free production processes. A major boost is also given to environmental friendly services, production, and consumer behaviour.

## **1.2 Recycling business model (supply side) in Thailand**

This report classifies recycling business models in Thailand into two types: i) conventional recycling businesses that focus on monetary incentives with less attention to the environment and social activities and ii) the Wongpanit business model that uses the slogan of 'waste is gold' and 'recycling for social and environment' and introduces a franchise system to scale up the business.

### ***1.2.1 Conventional recycling business model***

The conventional recycling business model is a model that focuses on the collection and selling of recyclables for monetary benefits, similar to typical recycling businesses in other countries. Its operations pay less attention to environmental and social issues. This kind of model often generates a public nuisance, creates an eyesore, and releases pollutants. However, these businesses contribute significantly to resource recovery and reduce pressure on natural resource extraction. In recent years the conventional recycling business model has, to some extent, become concerned about the environment and social activities.

Furthermore, the conventional recycling business model is practiced as a family business. There are no courses or training for the public or new entrants. Learning and information sharing are based on personal relations. Therefore, it is a closed business model that is very difficult for new entrants.

As there is less intervention from the national government, the recycling sector in Thailand is heavily reliant on private investment. Due to investment capacities and competition in the market, conventional recycling businesses can be divided into two groups as detailed in the following sections below.

#### ***1.2.1.1 Buyers of multiple types of recyclables***

This model is commonly found in Thailand. Itinerant waste buyers and small waste buyers use this type of business to secure more recyclables from households and communities to sell on. Furthermore, buying multiple types of recyclables can reduce risk from price drops of a particular recyclable. However, this model needs a lot of cash for buying multiple types of recyclables. Therefore, the itinerants and small waste buyers buy and sell recyclables within a

day to make a daily cash return. Normally, these buyers cannot sell recyclables directly to recyclers but sell them to dealers. However, some waste buyers that have been engaged in this business for many years and can secure enough of a particular type of waste will directly deal with the recyclers to obtain a better price. An example of this model is Tie Liang Heng recycling, Phitsanulok Province.

#### **1.2.1.1.1 Tie Liang Heng recycling, Phitsanulok Province**

##### **Background**

This shop is one of the oldest waste buyer shops in Phitsanulok Municipality (**Figure 1.5**). The current owner is the 3<sup>rd</sup> generation of the family which started the recycling business over 50 years ago. Before moving to the current location, the shop was located in the town centre.

##### **Scale of business:**

This is a medium-scale waste buyer shop that has a monthly cash flow of approximately 2-3 million THB per month (66,666 - 100,000 USD). There are 9 labourers working in this shop with an area of 3.5 rai (0.56 hectares).

##### **Business and marketing strategies**

Within the surrounding 10 kilometres, there are many waste buyers' shops, giving a large amount of competition. The shop buys second-hand products such as used bicycles and vehicle parts.

The shop is located in an urban-fringe area that is not easy to find. Therefore, the shop must provide a friendly service to keep current custom and to be attractive for new customers. The shop tries to avoid competition with other waste buyers in the vicinity by targeting different groups of customers and different types of recyclables. Additionally, the owner tries to keep up with trends in the markets and immediately offers prices based on the current market. However, if the market price is low, the shop will keep the waste and wait for a better price.

This shop demonstrated that high technical skills are not necessary, with friendly service being the main concern for this business especially in a highly competitive area.

##### **Source of recyclables, processing and value added**

This shop buys paper, plastic, glass and steel. The main customers are regular customers, being mobile waste buyers (e.g. tricycles, pick-up trucks) who work within a 30 kilometre radius. On average, the monthly waste flow is about 30-50 tonnes of paper, 10 tonnes of plastic, 100 tonnes of steel and 60 tonnes of glass.

##### **Technology and innovation**

The shop has pick-up trucks available for long distance transportation to recyclers about 2-3 times per week. Furthermore, the shop tries to reduce costs by using low cost machines (2 compressors for pre-treatment of recyclables and 1 tractor) that can minimize labour requirements.

## Social and environmental promotion activities

The shop owner does not participate in any social and environmental promotion activities.

## Business extension and scaling-up strategies

The shop does not have business extension strategies because their children do not want to continue this business.



**Figure 1.5: Tie Liang Heng recycling**

### *1.2.1.2 Buyers of single type of recyclables*

This model is one that large scale waste buyers and buyers in highly competitive areas use to secure a particular type of recyclables and sell it directly to recyclers. However, it seems difficult to buy only a single type of recyclable because itinerant waste buyers and small waste buyers' shops want to sell all their recyclables at one place to achieve transportation time and cost efficiencies. The single type buyers can be successful only if shops offer a higher price that is attractive for sellers. Therefore, many buyers end up buying a few types of recyclables to satisfy sellers. An example is Apichart Steel Trading that is located in Muang district of Nakhon Si Thammarat province which can only manage to buy steel.

#### **1.2.1.2.1 Apichart Steel Trading, Nakhon Si Thammarat**

##### **Background**

Apichart Steel Trading was established in 2001 to buy and sell steel scrap. At that time, a lot of shrimp farms were abandoned due to an economic crisis in Thailand, making a lot of steel scrap available. Therefore, the owner started to buy steel scrap with an initial investment of 200,000 THB (approximately 6,667 USD). In the first two years, the shop earned a large profit due to an absence of competition. However, profits have drastically decreased as the number of steel buyers has increased in tandem with a significant drop in the price of steel. Many steel scrap buyer shops faced serious problems and went bankrupt. Some shops that have remained in the market have shifted to buying other types of recyclables. This shop is a good example of this shift from buying metal scrap for recycling to buying second hand steel

goods or parts for reuse, however workers require technical knowledge regarding machinery and parts as well as repair skills for this model to be successful.

### **Scale of the business**

This is a small scale waste buyer shop (**Figure 1.6**) that had an initial investment of 200,000 THB (6,667 USD) and an area of 2 rai (0.32 hectares). The monthly cash flow is 500,000 THB per month (16,667 USD) and there are 3 labourers employed.

### **Business and Marketing strategies**

In the vicinity, there are about 5 waste buyer shops. Since it is competitive, this shop gives priority to customer service especially to regular customers and keeping good relations with other waste buyer shops in the vicinity for long term business cooperation.

Although this shop offers a price based upon the fluctuations in the market, sometimes the shop offers a special price to customers based on their personal relations and negotiations to keep the custom. Also, this shop bids with organizations or factories that want to discard used steel.

Since prices fluctuate, the shop sometimes throws away some purchased products that do not make profits due to rapid changes in market prices and inadequate storage space.

### **Source of recyclables, processing and value added**

This shop buys mobile parts and used iron goods from mobile waste buyers and small waste buyer shops who are living or located within 20 kilometres. These materials are sent for reuse to manufacturers in Bangkok. Sometimes customers come to buy from the shops directly. The waste flow is 10-15 tonnes per month with waste being stored for 1-2 weeks on average.

### **Technology and innovation**

No machinery is used in this shop.

### **Social and environmental strategies**

No participation in any social activities.

### **Business extension and scaling-up strategies**

Major challenges of this business are the shortage of skilled labourers, high competition due to the increasing number of waste buyers, and the increase in fuel price that discourages distant customers from coming. Therefore, the owner does not have a concrete plan for scaling-up.



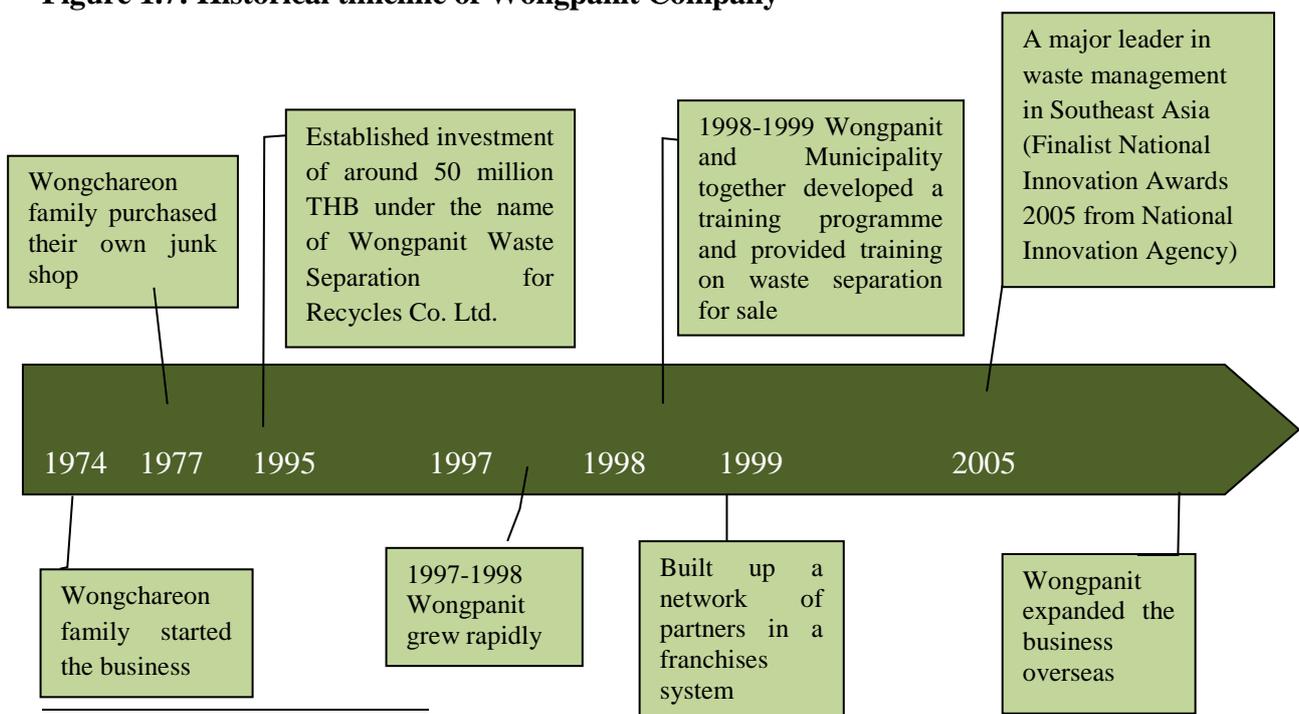
**Figure 1.6: Apichart Steel Trading, Muang Nakhon Si Thammarat**

## 1.2.2 Wongpanit recycling business model

### 1.2.1 Background

Wongpanit initially was a conventional recycling business that purchased multiple types of recyclables that started in 1974 in Phitsanulok City, Thailand. It was a small scale family business buying second hand products and recyclable wastes. The initial investment was 1,500 THB (approximately 50 USD at current exchange rates<sup>6</sup>). This business grew step-by-step from being itinerant waste buyers to a waste buyer's shop and then to becoming a registered company in 1995 with an investment of around 50 million THB (1.67 million USD) under the name of Wongpanit Waste Segregation for Recycling. **Figure 1.7** presents the history of Wongpanit.

**Figure 1.7: Historical timeline of Wongpanit Company**



<sup>6</sup> The average conversion rate use in this report is 30 THB for 1 USD

### ***1.2.2 Scale of business***

Wongpanit is a large-scale waste buyer in Thailand. There are 300 staff at the headquarters and 14,000 staff nationwide. Among these, there are a number of poor, beggars and disadvantaged people employed for simple tasks.

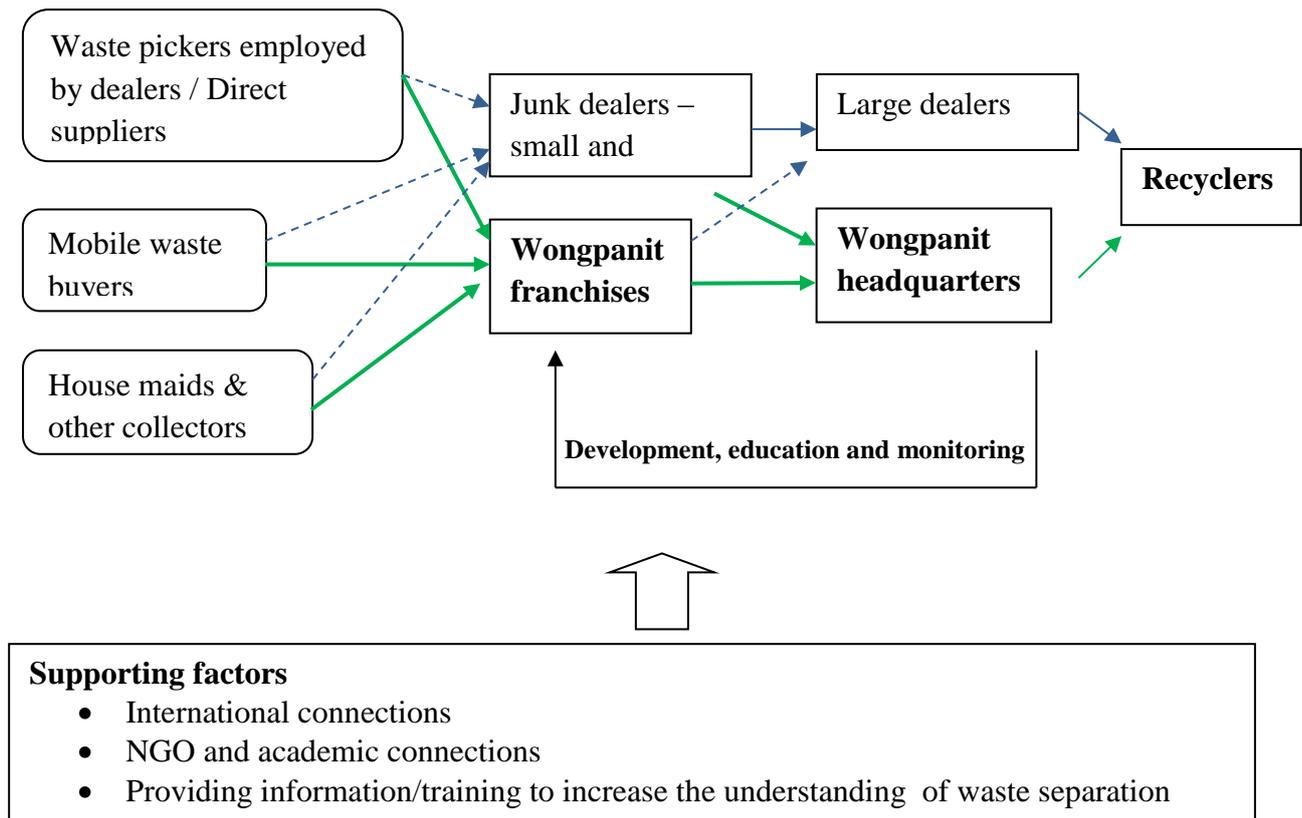
Wongpanit trades all kinds of recyclable materials such as metals, papers, plastics, glass bottles, e-waste and so on. At present, the quantity of recyclable purchased at the headquarters is 65,000 tonnes/year, and more than 100,000 tonnes/year are traded by Wongpanit franchises. Unfortunately, there are no systematic records for the quantity of waste purchased at the regional and franchise branches.

### ***1.2.3 Business and marketing strategies***

The marketing strategy of Wongpanit is aligned with the company motto on ‘Business for society and sustainable environmental conservation based on the 3Rs (reduce, reuse, recycle)’. Wongpanit applies many strategies towards its motto.

- Buying and selling multiple types of recyclables and identifying opportunities to buy and sell waste that lacks interest from waste buyers such as selling fish sauce bottles directly back to the fish sauce factories instead of selling it to glass recyclers.
- Providing practical training to residents, students, the poor, the disadvantaged and waste buyers on how to separate waste for sale. This initiative helps expand the scale of the Wongpanit business to reach a number of residents and small scale waste buyers and secure a larger amount of recyclables. Furthermore, this practice contributes to the social and economic development of the city.
- Collaborating with local governments to increase residents’ awareness of segregation of recyclables for the environment. Nowadays, the recycling sector is growing in Thailand. The number of new investors in this sector is increasing, but Wongpanit has been able to gradually expand its business through this strategy.
- Introducing the concept of ‘Waste is Gold’ to motivate public participation in recyclable waste separation for sale. This concept can increase the amount of recyclable waste sold to Wongpanit and improve the social status of stakeholders engaged in the recycling sector in Thailand.
- Initiating many programmes to motivate recyclable waste separation by individuals such as schools and community based waste bank programmes and the religion-based Recyclable Waste Donation Programme which has raised public awareness on environmental conservation. It has ensured integrated cooperation between the public and private sector including community and religious organizations in solving waste problems. Many companies such as Pepsi, Coca-Cola, Singha, Heineken, department stores and shops sponsored this programme. The income received from selling recyclable waste is used for charity such as scholarships for poor students and funds for communities to use for elderly people, environment conservation and religious activities, leading to a self-reliant community.

- Paying attention to individuals as ‘working ants’ who collect recyclables that are scattered piece by piece, stock and deliver it through recycling business chains from domestic to international. The company mentioned that the key factor for the success of this business is to make people understand the value of waste and separate the waste to sell it to the recycling business supply chain. **Figure 1.8** presents recyclable’s supply chain through Wongpanit.



**Figure 1.8: Recyclable supply chain through the Wongpanit business model**

- Offering transparent prices to the public through a price notice board that is displayed in front of the shop and also on Wongpanit’s website.
- Offering recycling business training to the public and establishing a franchise system for trained people who would like to invest in the recycling business under the Wongpanit Brand.
- Offering a premium price for Wongpanit’s franchises and allowing franchise members to sell directly to recyclers
- Providing additional services based on demand of their client such as door-to-door collection services, destroying and recycling confidential documents, providing

consulting services, organizing study tours and providing training related to recycling business.

- Paying attention to public relations. Several PR strategies were applied such as public awareness raising campaigns, community based recycling campaigns, household manuals for waste separation, leaflet, books, and so on (**Figure 1.9** and **Figure 1.10**).
- Obtaining a ISO14001 certificate which has enabled the company to export recyclables. The company creates a good reputation by obtaining ISO certification. This reputation makes Wongpanit successful in extending their business within Thailand and also abroad.



**Figure 1.9:** The company promotes products based on their environmental strengths



**Figure 1.10:** A collection of books by Wongpanit to promote waste separation for sale

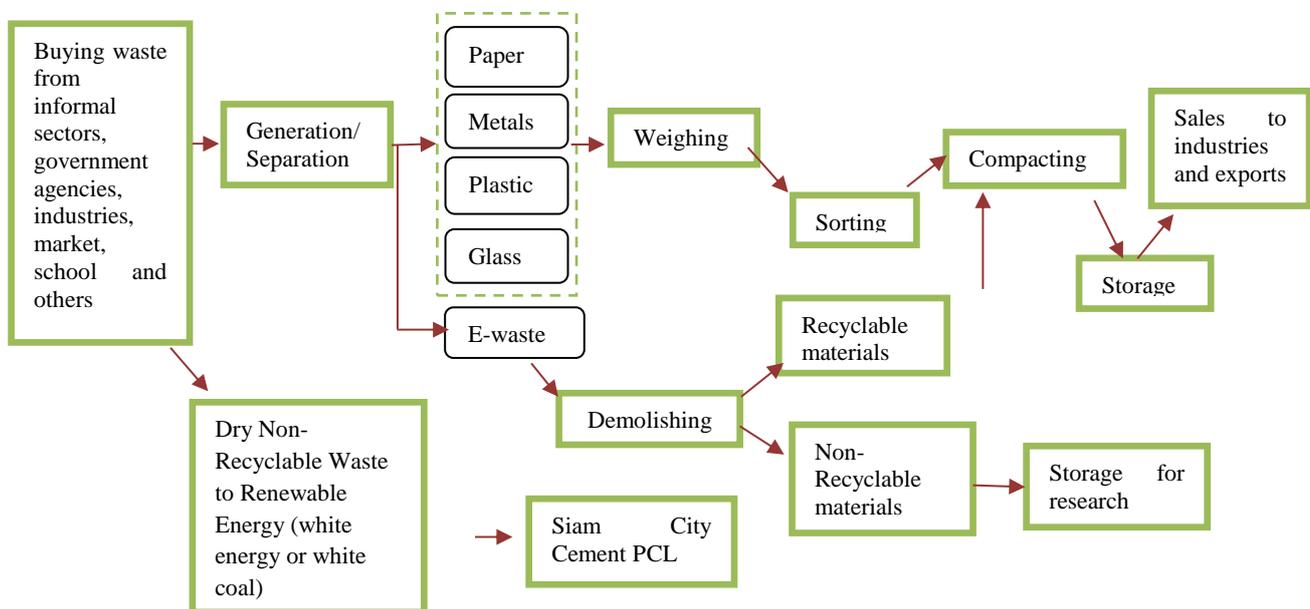
#### **1.2.4 Source of recyclables, processing and value added**

Wongpanit buys all recyclables from residents, informal sectors (waste pickers, mobile waste buyers), industries, department stores, hotels, government agencies, schools, universities, and so on. Waste is segregated into sub-categories based on the shape, toughness, specific density and composition; for instance, plastics are sorted into polypropylene (PP), polystyrene (PS),

polyethylene (PE), and polyvinylchloride (PVC). This process can increase value of the materials since it minimizes pre-treatment for recyclers. However, the price paid for the different types of recyclable materials can fluctuate with demand by between 1-25% each day. The waste processing process is shown in **Figure 1.11 and 1.12**.

Wongpanit delivers the purchased waste to recycling facilities in Thailand and abroad including PRC, India, Bangladesh, Taiwan, Singapore, Japan and Malaysia. Currently, international clients comprise 60% of Wongpanit’s market. The processed and sorted waste has been sold mainly to manufacturing industries.

Furthermore, Wongpanit has signed a contract with Sansui Co., Ltd. (Japan), one of the leading companies in e-waste recycling. The e-waste handling section will expand in the near future.



**Figure 1.11: Waste Processing at Wongpanit Company**



**Figure 1.12: Some waste recycling processes at Wongpanit Company**

### ***1.2.5 Technology and innovation***

Since Wongpanit’s recycling business receives no subsidy from the government, it tries to use simple and cheap technology (**Figure 1.13**) that is locally available and avoids using high end imported technology. Low-tech solutions usually cost less to put in place, in case of failure losses are lower and easier to write off, easy to dismantle and it is easy to understand whether higher level technology is required. In addition, Wongpanit tries to improve management efficiency and chooses to employ skilled labourers.



**Figure 1.13: Simple and cheap technology in use at Wongpanit**

## 1.2.6 Social and environmental promotion activities

### *Occupational health safety*

For in-house operations, Wongpanit provides protective gear for employees such as masks, hats, gloves, etc. to reduce the risk of occupational health hazards. Safety measures are also applied. Wongpanit provides training of such health protection measures to other stakeholders engaged in the recycling sector including waste pickers.

### *Social services*

For social services, Wongpanit has engaged in the community based waste management programme of Phitsanulok Municipality since inception in the late 1990s. Wongpanit plays a role in changing the attitude of the residents to be positive and to see the economic and environmental values of recyclable waste. In addition, Wongpanit is involved in community-based waste management programmes by providing training for waste separation at source in schools and communities, establishing waste banks in schools, buying used articles and recyclables, creating jobs for waste pickers and disadvantages, providing training for waste pickers and mobile waste buyers, etc. (**Figure 1.14**). These activities contribute to significant reduction of waste to landfill, increase quantity of recyclable waste flow in the market, creating income for residents and stakeholder engaged in waste separation for sale.



**Figure 1.14:** Wongpanit provides information and training to the poor and student

The company also provides training and lectures to government organizations, private organizations and communities (**Figure 1.15**). Training courses of Wongpanit are pragmatic and easy to understand. In general, there are 4 training courses:

- 1) Waste separation for recycling at the household and community level (2 days)
- 2) Waste separation for SME recycling businesses (5 days)
- 3) Waste separation for industrial recycling businesses (7 days)
- 4) Special training course for the poor and homeless, handicapped, prisoners, unemployed, beggars and disadvantaged people to enable them to make a living through the

recycling business. After training, Wongpanit employs some of the poor and the disadvantaged to work in the company.



**Figure 1.15: Training courses of Wongpanit on waste separation for SME recycling business**

Wongpanit has also participated as a main partner in the Recyclable Waste Donation Programme, a religion-based recycling campaign (**Figure 1.16**). Target groups in this activity are all stakeholders such as primary and secondary schools, colleges and universities, communities, households, retailers, distributors, department stores, offices, hotels, hospitals, industrial factories, government organizations, and religion organizations. The programme has raised public awareness on environmental conservation. It has ensured integrated cooperation between the public and private sector including community and religious organizations in solving waste problems. Many companies such as Pepsi, Coca-Cola, Singha, Heineken, department stores and shops sponsored this programme. The income received from selling recyclable waste is used for charity such as scholarships for poor students and funds for communities to use for elderly people, environment conservation and religious activities, leading to a self-reliant community. The programme was initiated in Phitsanulok at Wangmasra Temple in 2000 and it is widely practiced in Thailand.



**Figure 1.16: Recyclable Waste Donation Programme, a religion-based waste management programme.**

### *1.2.7 Wongpanit business extension in Thailand through a franchise system*

As many people are interested in the concept of ‘Waste is Gold’, Wongpanit opened training courses for individuals who are interested in investment in the recycling business. As a result, Wongpanit has provided 52 training courses over the last 11 years. The key for the continuity of the training programme is due to the successful business implementation of trainees who attended the first three training courses who later on invested in the recycling business under the Wongpanit franchise. The training programme thereby received a good reputation from society and greater numbers of people applied to the training course.

Wongpanit established a franchise system under the concept of ‘win-win solution’ to expand their business in 1999. This strategy originated from numbers of visitors and trainees that were interested in Wongpanit. In addition, private waste collection businesses have grown since the Asian Financial Crisis in 1997 which influenced people to start looking for new way to earn their living.

Many trained people have applied to open a Wongpanit franchise after completing the training programme, which has led to Wongpanit quickly expanding its business across Thailand. This achievement has motivated Wongpanit into aiming to expand their business by 100 branches each year. As of 2011, Wongpanit has 926 franchise branches across Thailand. In addition, Wongpanit aims to establish its franchise branches in all sub-districts of Thailand in as SMEs.

The franchise system offers business opportunities for different levels of investment capacity. Each franchise member must pay an insurance fee of 50,000-500,000 THB (1,667 – 16,667 USD) to use the logo and brand of Wongpanit depending on the size of the shop. This insurance fund will be returned to the investor when they desist from trading and there is no record of behaviour derogatory to the interests of the Wongpanit Group. The Wongpanit Group has already set up their own franchise package, which includes training courses for conducting the business, standardized practices and a marketing system.

Franchise branches of Wongpanit are diverse both in terms of scale and administrative system. Some branches are working solely on the business aspect but some are working for social services in parallel with doing business. Some of them collaborate with local governments on awareness raising, training residents to separate waste for sale, organize recyclable waste buying fairs, and so on. Franchise branches of Wongpanit are different from traditional waste collectors, with their capital resources, they bypass traditional jobs and start as a change agent of recycling businesses for society and the environment. They apply mainstream business administration, have a service mentality, are transparent, and create proactive marketing which has significantly improved the reputation of the recycling sector. Some strengths of their franchise are:

- i) promoting separation of recyclable at source among households with a straightforward message about the monetary benefit derived from specific items with a combination of the sense of ‘doing something good for the environment’, and
- ii) Keeping close contact with communities, government offices and private organizations. The result is that Wongpanit is highly regarded as an environmentally oriented business and one that works for society, rather than just being an ordinary waste buyer shop.

The headquarters allows franchise members to use the Wongpanit brand which is well-known across society and provides know-how and other necessary supports to their members. This is totally different from those in other franchise systems. While other franchisors sell products and technical support to their franchisees, as the Wongpanit headquarters gives freedom to all franchises on selling their products.

Wongpanit’s franchises use many channels of selling based on incentives, some selling to Wongpanit headquarters, some to Wongpanit regional centres but some selling to others who offer better prices. However, all Wongpanit franchises operate under the Wongpanit business strategy of environmental friendly operations and maintain a good reputation in society. By having franchise members, Wongpanit has a stronger negotiation power with recyclers and thus Wongpanit members can obtain a premium price.

### ***1.2.8 Business extension in other countries***

Wongpanit considers country specific laws and potential for business opportunities prior to establishing a branch in any country. Developed countries (e.g. the USA) that are promoting the recycling society are of interest as Wongpanit could fit in well with the national policy.

Nevertheless, responses from least developed countries are even more positive as the Wongpanit model could create jobs and open a new business line for the poor in those countries as well as decreasing income gaps between the poor and the rich.

In response to the trend of free trade zones, Wongpanit plans to increase the share of international clients from 60% to 80% and decrease domestic clients from 40% to 20% by 2015.

As a result of dealing with international clients and receptions of foreign visitors, Wongpanit expanded the business into many countries such as Lao PDR (4 branches), USA (1 branch), Myanmar (1 branch), Dubai (1 branch) and Malaysia (2 branches). Wongpanit is also interested in initiating businesses in India, the United Arab Emirates and Eastern Europe.

In Laos, the Wongpanit recycling business is well received by the government and all levels of stakeholders including residents. The national government assigns Wongpanit as an advisor for their waste management plan.

In Malaysia, environmentalists are interested in the recycling sector and would like to increase the recycling market through the International Green Purchasing Network (IGPN). In addition, the national government allocates a lot of budget for waste management. Therefore, investment in Malaysia would be possible in form of public-private partnerships for recycling activities and the inclusion of recycling businesses into formal waste management system.

In USA, Wongpanit invested 100 million THB (approximately 3.2 million USD). Wongpanit has two marketing strategies in USA:

- i) Free door-to-door recyclable collection service for households, convenient stores, department stores and offices. This service is based on an appointed schedule. If any stakeholder collects sufficient recyclables to fill 1 pick-up truck, an on demand recyclable waste collection service is available through the call centre.
- ii) Recyclable waste buying centres purchase the collected waste based on global market.

Wongpanit plans to expand the number of branches in USA to 100 in five years because many cities in the USA actively promote recycling operations.

Wongpanit believes that the introduction of the term of ‘waste is gold’ would be successful in many countries. Many countries, especially one that do not have effective waste collection systems invited Wongpanit to deliver a presentation in their workshops such as Laos, Cambodia, Viet Nam, Myanmar, PRC, India, Indonesia, Romania and so on.

### **Keys to the success of the Wongpanit recycling business model**

Wongpanit has gradually developed from an itinerant waste buyer to a company and then to an international waste dealer over the past few decades. The company has initiated many activities to scale up its business. This study analysed the 4 key factors for the success of Wongpanit as described as follows:

### **1) Cooperation with local governments**

Usually, waste buyers' shops and local governments do not cooperate with each other. However, Wongpanit has had an opportunity to cooperate with Phitsanulok Municipality since 1998 because the municipality received international funds for technical support on improving municipal solid waste management under a concept of public participation and community based waste management. The company has actively worked with the local government to provide training to waste pickers and residents on separating recyclable waste for sale. The successes of this project make it easier for Wongpanit to create similar relationships with other local governments in Thailand.

### **2) Receiving active participation from residents and other waste generators**

Wongpanit distinguishes itself from other waste buyers by cooperating with local governments and providing free training service to residents, waste pickers, disadvantaged, the poor, governmental institute and so on. At the same time, the company has initiated several activities to increase the awareness of residents and other stakeholders such as the waste bank programme, the waste donation event, and the slogan "Waste is Gold". These activities increase trust from residents and changing attitude of residents and other stakeholders on recycling business.

### **3) Fair benefit sharing and tight networking with franchise members**

Many people show interest in the recycling business, so Wongpanit organized training courses for recycling businesses. After training, many of participants expressed an interest in starting a recycling business. Therefore, Wongpanit has initiated a franchise system for new entrants. Wongpanit headquarters provides many services and shares the benefit to franchise members. Some examples are as follows:

- Training service to the public enabling interested parties learn about the business before deciding to join as a franchise
- Free consultation services to all franchises with no time limit
- Tight networking and good support between the headquarters and all franchise members (**Figure 1.17**),
- Franchise members received a premium price from Wongpanit headquarters and also can directly sell recyclables to recyclers under the quota of Wongpanit Group,
- On-time price notification through SMS through which all franchises can quickly change the price according to the market's demand. They can avoid the risk of losing money by buying at a high price but can sell lower
- The income of each franchise belongs to the owner of the franchise. Wongpanit headquarters will benefit only from the trading of recyclables that they buy from each franchise. As the quantity of recyclables sold to Wongpanit headquarters increases, the headquarters has more power to negotiate with recyclers, getting higher prices and higher profits.



**Figure 1.17: “Wongpanit Society” - strategies for institutional strengthening**

**4) Good reputation of the company in environmental conservation**

Wongpanit has demonstrated its concerns regarding the environment since the company collaborated with the local government to provide training in waste separation at source for sale. Furthermore, the company has obtained ISO14001 certification. These efforts have led to the company building a good reputation. Therefore, many people and businesses want to cooperate with Wongpanit and it is straightforward for Wongpanit to expand its business domestically and internationally.

**1.3 Driving factors, barriers and the way forward for recycling business development in Thailand**

**1.3.1 Driving factors**

Our analysis identifies three main drivers for the improvement of the recycling sector in Thailand:

*1) Market value of recyclables*

As shown in this report, the expansion of recycling in Thailand is mainly due to the monetary benefits of recycling. Waste buyers from small to large scale are the key drivers of the market. They use various approaches and technologies to gain added value for recyclables such as fine segregation, direct sale to manufacturers and so on.

2) *Social movement on environmental concerns*

As a result of awareness raising and campaigns on environmental conservation, residents in Thailand are more aware of the significant impact of recycling on the environment. Therefore, the quantity of recyclable waste separated for sale to recycling businesses has increased. Also, the number of waste buyers has increased leading to a more competitive sector, and thus waste buyers need to provide a social service and promote environmental conservation to create a good reputation for the company to attract more customers, especially from institutions.

3) *Government policies on promoting the 3Rs*

Since the national government tries to promote the 3Rs, most local governments include recycling as one of waste management policies. This driver makes it easier for recycling businesses to access the waste generators and receive more cooperation from the local government and other stakeholders.

Even though the recycling sector in Thailand is on the rise with a great contribution from businesses, residents, local government and to some extent the national government, there are a number of barriers mentioned by many waste buyers in Thailand. Examples of the barriers and the recommendations presented in the following sections suggest ways to strengthen the development of sustainable recycling business practices in Thailand.

### **1.3.2 Barriers and Way Forward**

#### **i) No Tax Incentives**

The current tax system does not encourage transparent accounting of the recycling business. In addition to all taxes that recycling business must pay similar to other businesses, waste buyers must pay a special tax for businesses that may generate a public nuisance and a permission fee for the establishment of used product purchasing company. Moreover, the income tax for waste buyers is charged based on the quantity of waste purchased not net profit. As a result, many buyers do not declare the real data of waste purchased and do not keep concise records.

#### *Recommendations:*

- The national government should set a special tax exemption or tax reduction for recycling businesses especially those who implement environmental and social services such as providing training on waste separation for sale and installing environmental measures to minimize impacts.
- The national government should reform the tax calculation system for recycling businesses by charging from the net income, which can motivate the businesses to keep concise records of recyclables and pay the proper amount of tax. Also, the government can use the concise records of waste buyers for the development of a national database on recycling, the planning of national strategies to improve recycling businesses, etc.

## **ii) Lack of Accessibility to Financial Sources**

Many small to medium scale waste buyers and businesses cannot afford to pay for machinery to improve or scale up their businesses. Most of them end up simply buying, doing simple sorting and then selling to bigger scale buyers. Furthermore, some banks do not approve loan proposals from small waste buyers. In some cases, it requires at least 3-5 years of continuous business operations before getting approval for a bank loan. Therefore, it is very difficult for small scale waste buyers to upgrade their businesses.

### *Recommendations:*

- Related government organisations at the national level should set up a convenient channel for recycling businesses to access loans to improve their businesses.
- Considering that environmentally sound recycling facilities need a lot of investment especially for e-waste, such initiatives should be supported by the government by concessional loans, tax exemption and subsidies.
- A Recycling Business Assistance Centre should be set up to provide services and assistance regarding loans, licenses, taxes, and regulations pertaining to the recycling sector.
- As similar to the Wongpanit franchise system, entrepreneurs and the private sector may develop an alliance for mutual support and reduced logistic costs. The alliance system may increase the negotiation power to the recyclers and increase accessibility to the financial institutes or government assistance.

## **iii) Market Vulnerability**

Price fluctuation is a serious problem in the recycling sector because the market is reliant on global demand. Small scale waste buyers are vulnerable to the market and rely on a daily waste flow to reduce risk. Only large-scale waste buyers can stock recyclables and wait for high prices to return.

### *Recommendations:*

- As similar to the Wongpanit strategy, a system for real-time price notification should be set up which will help minimize the risk to waste buyers and recyclers. This could be done through the setting up of a national alliance of recycling business with government support.
- Small waste buyers who do not have enough area for the storage of waste are more vulnerable to price fluctuations, local government interventions to buy and/or provide storage for those recyclable items that have serious price drops would be helpful. This budget could be derived from the savings of waste collection and landfill operation costs from not disposing these recyclables into the collection and disposal system.
- Mechanisms to promote the use of recycled products such as green procurement would significantly contribute to minimize the fluctuation of recyclable waste prices.

- Furthermore, the national government should promote the establishment of recycling facilities to increase domestic use of recyclables which can reduce the vulnerability of the recyclable markets and also increase the recycling rate of the country.

#### **iv) Lack of Databases and Ease of Accessibility to Recyclers**

It is very difficult for small waste dealers to get access to recyclers. In general, each material must go through a market chain that involves numbers of middlemen. Therefore, local prices for small waste dealers are very low.

On the other hand, the recyclers, waste dealers and investors cannot secure a sufficient supply of recyclables as it is difficult to identify and analyse the quantity of recyclable waste that is generated in each district.

#### *Recommendations:*

- The national government should facilitate the formulation of a database and network of stakeholders in the recycling sector. The government may extract lessons learnt from Wongpanit on overcoming this barrier by developing a franchise system that enables members to directly negotiate with the recyclers and thus can offer a high price to their customers.
- Nowadays, Thailand Institute of Packaging and Recycling Management for Sustainable Environment (TIPMSE) is engaged in facilitating formation of itinerant waste buyers' network. This formation has increased the negotiation power of the itinerant waste buyers, improved interaction with other stakeholders and increased potential supports from both the government and non-government organisations. Similar programmes should be promoted nationwide. Furthermore, TIPMSE is now developing a database relating to waste buyers, recycling facilities and waste disposal operation by local governments. Once this database is open to public access, it can assist the government in creating development plans and assist the private sector in identifying business opportunities in each province.

#### **v) Weak Interaction between Business and Local Government**

Cooperation among the private sector and the local government to promote recycling businesses is very limited and thus lots of recyclables are delivered to final disposal sites. The government has tried to promote recycling by encouraging residents to separate waste but there are often no buyers in place. Moreover waste buyers need lots of recyclables but do not receive enough material.

#### *Recommendations:*

- The local government should cooperate with waste buyers to promote recyclable waste separation at source for sale. The success story of cooperation between Phitsanulok Municipality and Wongpanit is a good example of the effectiveness of public-private partnership for promoting recycling business and reducing the amount of waste entering the collection and disposal system of the municipality.

- The private sector has much more knowledge regarding the recycling business than the local government and can play a significant role in awareness raising and mainstreaming recyclable separation for sale. However, the national and/or local governments should provide subsidies or facilitate training.

#### **vi) Lack of regulations to promote recyclable waste separation at source**

Separation at source for sale is practiced on a voluntary basis. Many projects go well during the campaign only to decline after the project ends. In some cases, residents are very keen on separating waste but there is no mechanism to collect the waste separately. Therefore, many recyclables are discarded into the collection system. There are some waste pickers who segregate recyclables from the pile of wastes; however the quality is relatively low compared to one that is being separated at source. Additionally, many of recyclables are buried in the landfill.

##### *Recommendations:*

- The Parliament should approve the 3R law drafted by the Pollution Control Department and enforced the implementation of the law by all stakeholders including the national government, local government, private sector and residents.
- The local government should notify local regulation to enhance the establishment of the national policy and the law to promote the 3Rs. The local regulation should also include an element of individual cooperation and raising awareness of residents to fully practice the 3R and separate reusable and recyclable waste for selling or delivering to recycling business chain.

#### **vii) Labour Shortage**

Many waste buyers are confronted with a shortage of labour in terms of quantity and quality especially in Southern Thailand. Working in waste buyer shops is hard and not attractive. Therefore, it is very difficult for the owner to secure good staff. Additionally, the waste buyers must increase the minimum wage of all staff according to the new regulation (10 USD/day). Therefore, many waste buyers cannot scale-up their business. Some waste buyers employ foreign labourers from Myanmar who are cheaper and regarded as more industrious than Thai labourers.

##### *Recommendations:*

- The government should invest in awareness raising to improve public attitudes to recycling businesses, improving the social status of workers in this business. Once the social status of this business is improved, labourers will be more willing to work in this sector.
- An alternative to solve this barrier is to promote waste separation at source, significantly improving the quality of recyclables and thus reduce labour requirements for pre-treatment such as cleaning and segregation as well as improving the working conditions of the labourers.

- Furthermore, the government should create financial channels to support investment in machinery by the private sector which can significantly reduce labour requirements.

#### **1.4 Support from ADB: Three proposals for follow-up**

ADB could play an important role in improving the recycling business in Thailand in an environmentally and socially sound manner. This study has identified four key interventions through which the Bank could offer significant assistance.

- (i) *Microfinance loan programme for grass root stakeholders: itinerant waste buyers, local waste buyer shops, community based organization, and NGOs*

Grassroots stakeholders such as itinerant waste buyers, local waste buyers' shops, community based organisations and NGOs that are engaged in supporting the development of the recycling sector are key players in collecting recyclable waste that is being generated by households and bringing it into the recycling business chain. These groups in general do not have investment power and it is very hard to scale up their activities. They often have limited managerial skills and ability to attract 'risk capital' for investment.

A microfinance programme for the grass root stakeholders could help increase the scaling-up their activities at the community level and increase the recycling rate as a whole. However, the microfinance programme should be linked with a training programme on the significance of recycling businesses on environment, good recycling business practices, financial management, maintaining databases, proper handling of recyclables, value-added to recyclables, regulations and laws related to recycling businesses, protective measures for health and the environment, cooperate social responsibility for creating a good reputation for recycling businesses (e.g. awareness raising for residents, etc). The costs for the training may be borne partly by the local governments, the national government, other organisations or supported by ADB (see proposal ii).

In supporting the active awareness raising at local level by the local government and grass root stakeholders, ADB technical assistance for knowledge management, such as media outreach, smart phone applications, and publication for outreach should be provided. These materials should be available to all stakeholders and the waste buyers and recyclers can print them and disseminate them for awareness raising.

#### ii) Technical assistance for capacity building across the sector

It is necessary to implement a capacity building programme for both small-scale and large-scale players, to enhance local skills and reduce the reliance on foreign workers, as well as to improve performance and efficiency. Such capacity building should not

only emphasise the technical aspects of solid waste management and recycling but should also focus on health, safety issues and environment. Capacity building could focus on the Wongpanit model and lesson learnt from the pilot project implementation.

*iii) Technical assistance for pilot project implementation*

A pilot project should be implemented in one province in Thailand to test the proposed microfinance and loan programme for sustainable recycling business practices under the concept of public-private partnerships and multi-stakeholder participation. The selected province should generate a large amount of recyclables and have many stakeholders engage in the recycling sector such as small scale waste buyers, recyclers, etc. Wongpanit may play a role as a mentor for other small scale waste buyers, community based organization and NGOs. National governments and academics should provide technical support and media development for training to stakeholders and outreach to residents. The training curriculum, microfinance and loans should be developed based on surveys and dialogues with stakeholders to ensure their suitability with target stakeholders and contribute to the development of a sustainable recycling business model. Thailand Institute of Packaging and Recycling Management for Sustainable Environment (TIPMSE) should also participate in the pilot project especially in database development and knowledge sharing.

*iv) Loan programmes for medium to large scale waste buyers and recycling companies to improve recycling business practices to an environmentally and socially acceptable model*

Medium to large scale waste buyers and recycling companies have more investment power than grassroots stakeholders; however upgrading a recycling business towards an environmentally and socially acceptable practice requires a high level of investment. Therefore, a loan programme for medium to large scale enterprises will enable these companies to invest in improvements or the scaling up of its business model. As similar to the microfinance programme, the qualified borrower should pass a training programme that could cover the following topics: the significance of recycling businesses for the environment, good recycling business practices, financial management, maintaining databases, proper handling of recyclables, creation of value-added to recyclables, procuring technology, strategic planning, regulations and laws relating to the recycling sector, protective measures for health and the environment, cooperate social responsibility for creating a good reputation for the recycling business (e.g. awareness raising for residents, etc). The costs of the training may be borne partly by the local governments, the national government, other organisations or supported by ADB. The details of the course and contents should be different from that provided to grassroots stakeholders to make it best value and useful for participants.



## **ANNEX II**

### **Recycling business in PRC**

## Annex II Recycling Business in PRC

### 2.1 Overview of municipal waste recycling

#### 2.1.1 Recyclable waste generation and recycling rate

PRC covers an area of 9,706,961 square kilometres with a total population in 2011 of approximately 1.34 billion. Amongst this, urban population is 51%, which increase from 47% in 2008<sup>7</sup>. Total waste generation in 2011 was approximately 163 million tonnes<sup>8</sup> not including recyclable waste. Another report stated that municipal solid waste in PRC was as high as 250 million tonnes<sup>9</sup> in 2010 (including recyclables). It is estimated that this municipal solid waste consists of the following recyclables: 4-15% paper, 3-20% plastic, 0.6-8% glass, and 0.2-3% metal<sup>10</sup>.

According to the provisions of “Administrative Measures for the Recovery of Recyclables” issued in 2007 by the Ministry of Commerce and 5 other ministries, the definition of a recyclable is “All kinds of waste generated from industrial production and daily consumption which has lost part of its original use value, and which could regain use value after recycling.” Recyclables mainly include waste metals, e-waste, waste mechanical machines and their components, waste paper, waste light chemical raw materials (such as rubber, plastics, packaging materials, animal bones, hair), waste glass.

According to a report by the PRC National Resources Recycling Association (CRRA) in 2011, the collected quantity of main recyclables including iron and steel scrap; nonferrous metal; plastics; tyres; paper; e-waste; scrapped car and ships reached 162 million tonnes, two-folds that of in 2005. Total value reached 571.5 billion RMB (approximately 91 billion USD), 12.7% higher than that of 2010. These numbers included recyclables from municipal, industrial and imported waste<sup>11</sup>. It is difficult to estimate the actual quantity of recyclable waste that is generated by municipal activities because recyclables are under the responsibility of the Ministry of Commerce whereas as general municipal solid waste is under the responsibility of the Ministry of Housing and Urban-Rural Development, and the statistical methods used for recyclable and municipal solid wastes are different.

However, it is predicted that the recycling rate in PRC could be relatively high due to the influence of the recycling sector that is well established in all cities. Xu (2008)<sup>12</sup> estimated that recycling of municipal solid waste in PRC could be as high as 30%.

---

<sup>7</sup> Worldbank, 2013 <http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>

<sup>8</sup> China Environment Statistical Yearbook, 2012

<sup>9</sup> Recycling status and outlook of plastic waste in China 我国塑料废弃物资源化现状及前景 (In Chinese), 2011

<sup>10</sup> Municipal solid waste management in China: Status, problems and challenges, 2010

<sup>11</sup> China National Resources Recycling Association (CRRA), on the year of 2011

<sup>12</sup> <http://www.waste-management-world.com/articles/print/volume-9/issue-4/features/all-the-waste-in-china-the-development-of-sanitary-landfilling.html>

### ***2.1.2 Separation and collection of recyclables***

Starting in the 1950s, a specific collection system for recyclables and used material was established in PRC. In the beginning, packaging materials such as cigarette boxes and wine were collected from households by sellers and then returned to distributors and producers who reused it to produce new packaging. Gradually, other reusable and recyclables were collected and separated by many collectors and sold to the business chain according to the types of recyclables such as used furniture, paper, plastics, wood and e-waste. **Figure 2.1** shows mobile waste collection trucks and waste buyer shops.



**Figure 2.1: Some collectors of recyclables**

Collection and reusing networks and systems has been formulated in all cities and counties. There are two types of collection: (i) collection sites established by large companies and (ii) individual collectors. After preliminary separation, the recyclables are sold to terminal markets and then transported to recycling companies.

Recently, online requests for the collection of all types of recyclable waste and used products has grown in many cities, which can provide recyclable collection services to families and public institutions. People can submit requests through internet and make appointments for drop-in collection. Reference prices are published on the website to give direct information to residents. This system is planned to be disseminated on a wider scale.

### ***2.1.3 Waste recovery and recycling practices***

Waste recovery and recycling practices in PRC are largely contributed by the private sector. In 2011, the PRC National Resources Recycling Association (CRRA) reported that there are

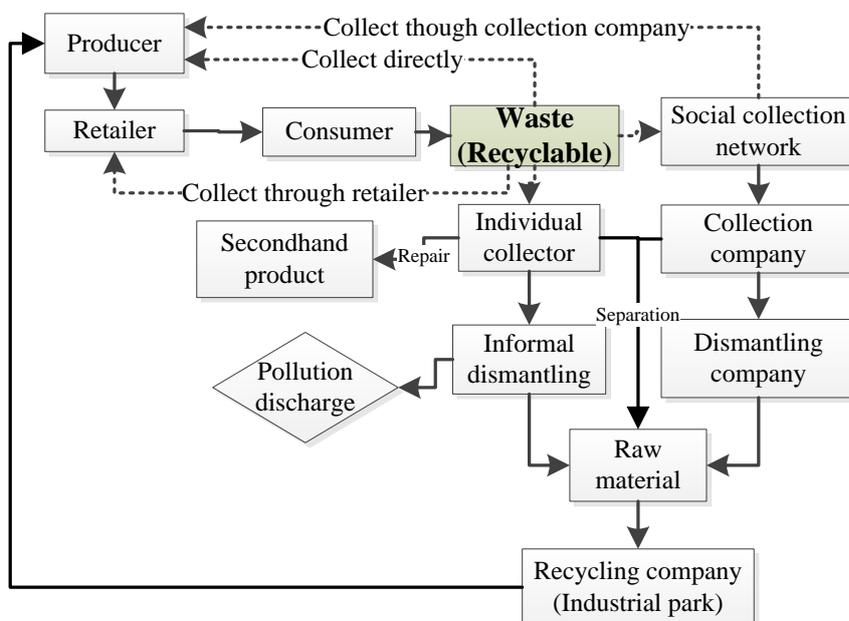
more than 200,000 collection branches, more than 10,000 recycling enterprises, and more than 18 million employees across the country.

Under the Circular Economy Promotion Law, the government has prioritized the recycling under the 12<sup>th</sup> National Five-Year Plan 2011-2015 (See Table 3-2). The government encourages various enterprises to engage into waste collection and recycling, and promotes various collection systems to improve the efficiency and reduce impact of improper practice for recyclable waste collection, etc. Nowadays, collection and recycling of recyclables covers more types of waste and recycling practices have been upgraded from curb side to advanced systems.

After the establishment of pilot recyclable collection and recovery systems both in 2006 and 2009, some cities have established recyclable collection and recovery systems that include collection, sorting and pre-processing. Both the pilot projects and subsequent efforts have been implemented with the support of the central and local governments. Waste buyers have gradually expanded from a simple model of buying and selling, to the installation of machinery for processing and producing high-quality products. For example, plastic waste is recycled into plastic raw material after sorting, cleaning, drying and prilling. The e-waste is dismantled and separated into pure metals.

### 2.1.4 Recyclable waste flows

Collection and utilization of recyclables include lots of steps and could be classified into four main steps: collection, transport, processing and utilization, and final disposal (**Figure 2.2**).

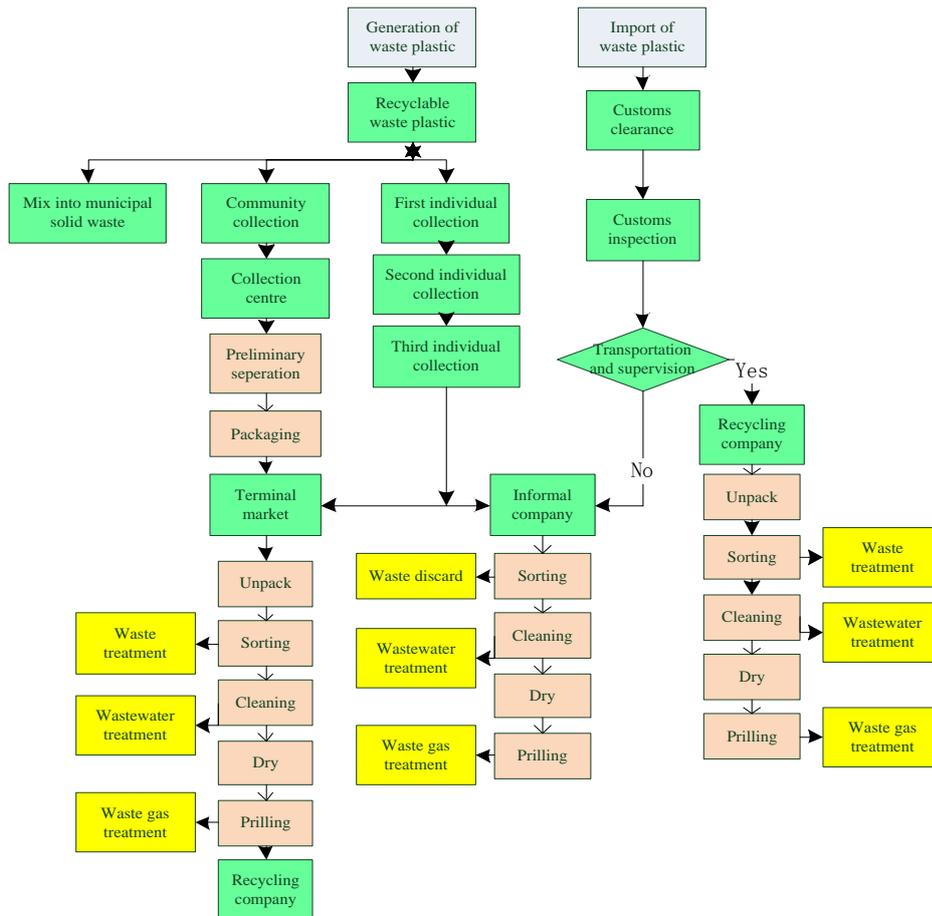


**Figure 2.2: Flow chart of collection and utilization of recyclables**

Waste is generated from household daily consumption with some recyclables thrown into the garbage bin, and some stored by individual families. Next, some recyclables are purchased from households either by individual collectors or collection networks established by governments and recycling companies. Third, some recyclables collected by individual collectors such as used electrical and electronic equipment are sold to second hand markets after repair, other recyclables which cannot be repaired are sold to dismantling companies (e.g. e-waste) or segregation facilities (e.g. paper, plastics). Raw materials are sold to recycling companies and manufacturers. Some recyclables (e.g. glass bottles, batteries) are directly purchased by producers and retailers.

Detailed collection and utilization steps of one typical recyclable, plastic waste, is specified in **Figure 2.3** to give a more comprehensive understanding. Plastic waste recycling in PRC is carried out for both domestic and imported waste (Box 1). There are three sources of domestic plastic waste: i) production processes, such as scrap, leftover materials, and rejects; ii) packaging materials from households and markets, including parts of e-waste; iii) daily life consumption, such as PET bottles and plastic sheets.

There are three main methods of treatment for domestic plastics: i) bought or collected by individual collectors and then sold to small scale or informal recycling companies; ii) bought by social collection networks and then sold to terminal markets and recycling companies after preliminary treatment; and iii) discarded as municipal solid waste and then send for incineration or landfill.



**Figure 2.3: Typical recyclable- plastic waste collection and utilization flow chart**

*Box 1 Import of plastic waste for recycling in China*

According to the imported waste management list updated in July 2009<sup>a</sup>, China prohibited the import of plastic waste from households and municipal solid waste. However, plastic parings and scrap are permitted if certain criteria are met. Imported plastics are usually transported to certified recycling companies after clearance and inspection by customs, but are sometimes illegally sold to informal recycling companies. According to the Management Regulation on Environmental Protection of Imported Plastic Waste<sup>b</sup> issued in January 2013 and enacted in April 2013, four kinds of enterprises could apply for permission to import plastic for recycling: i) chemical fibre production enterprises using PET as materials; ii) plastic article production enterprises; iii) plastic recycling granulation enterprises; iv) reproductive PET sheet enterprises with a production capacity of more than 30,000 tonnes per year in one production area.

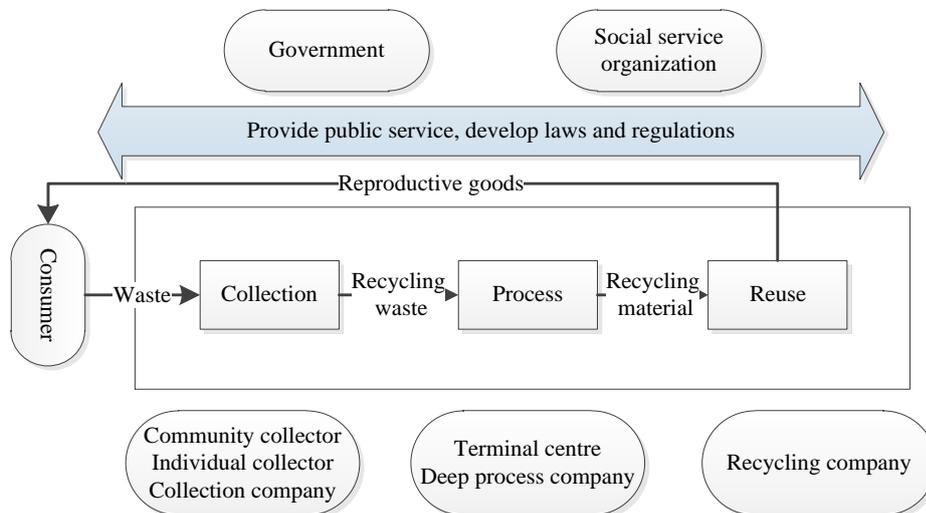
<sup>a</sup>关于调整进口废物管理目录的公告

[http://www.mep.gov.cn/info/bgw/bgg/200907/t20090716\\_156257.htm](http://www.mep.gov.cn/info/bgw/bgg/200907/t20090716_156257.htm)

<sup>b</sup>进口废塑料环境保护管理规定

### 2.1.5 Waste recycling stakeholders

There are many stakeholders engaged in the recycling business chain. The participation and activities of each stakeholder is indicated in **Figure 2.4** below.



**Figure 2.4: The participation and actions of stakeholders in the recycling sector**

- (1) **Consumer:** Consumers are users of products and generators of recyclable waste. Consumers can be individuals, families, markets, enterprises and public institutes. Consumer behaviour and awareness (both economic and environmental) is important to the quantity and efficiency of waste collection and recycling.
- (2) **Collector and recycler:** Community collectors, individual collectors and collection companies are different kinds of collectors. Terminal centres, deep process companies and recycling companies are stakeholders related to recycling. They are the most important stakeholders involved in the recycling business chain. The collection methods, treatment processes and technologies have a significant influence on the operation and efficiency of the recycling system.
- (3) **Government:** The government leads the developmental trend of the recycling system by enacting policy, issuing permits, providing subsidies, etc. The Chinese government's role has become more and more important to recycling development, particularly in the last ten years, with the enacting of a series of policies related to the circular economy and recycling promotion, involving the National Development and Reform Commission (NDRC), Ministry of Commerce, and Ministry of Environmental Protection.
- (4) **Social service organizations** such as recyclable industry associations and information and service companies support and coordinate the recycling sector by providing consultations, information, guidance and monitoring.

### **2.1.6 Recyclable waste price**

The collection price of recyclables varies over time and area to area, and increases step by step from individual collectors to terminal markets to recycling companies. **Table 2.1** gives approximate prices of main recyclables given by individual collectors in some communities in Beijing.

**Table 2.1: Rough price given by individual collectors in Beijing community**

No.	Category	Unit of measurement	Price (RMB)
1	Paper	Kg	0.5-1
2	PET bottle	Unit	0.07-0.1
3	Iron	Kg	1.5-2
4	Copper	Kg	30-40
5	Plastic	Kg	Around 0.5
6	Glass	Kg	Around 0.5
7	Wood	Kg	Around 0.5
8	Clothes	Kg	Around 0.5
9	Television	Unit	30-200
10	Refrigerator	Unit	100-300
11	Washing machine	Unit	20-100
12	Air conditioner	Unit	100-300
13	Computer	Unit	50-300

Note: 1 RMB = 0.16 USD (as of 29 November 2012)

### **2.1.7 Recycling promotion law and policies**

To promote recycling practices, the Chinese government has issued a series of legislation from the national level to the local level, including comprehensive management methods, industrial admittance conditions, collection and separation standards, technical requirements for processing, and several special regulations related to solid waste which could be imported as raw materials. The key points of the main laws and regulations are listed in **Table 2.2**.

Under the management framework, Ministry of Commerce is responsible for formulation and implementation of policy, standards and development plans for recycling. The National Development and Reform Commission's (NDRC) is responsible for research and formulating policy to promote recycling, and disseminate new technologies and equipment to enhance waste utilization and recycling. The Ministry of Environmental Protection is in charge of pollution prevention and control during the collection and recycling of the waste.

**Table 2.2: Key points of main laws and regulations relevant to recycling**

Legislation	Issue Date	Main contents
PRC 21st Century Agenda <sup>13</sup>	1994	Propose objectives for recyclable utilization and general activities
Law of the People's Republic of PRC on the Prevention and Control of Environmental Pollution from Solid Waste <sup>14</sup>	2004	Basic legislative authority on solid waste collection and utilization, establishes the principle of final disposal of solid waste: minimization, collection and utilization, and sound environmental disposal
Administrative Measures for the Recovery of Recyclables <sup>15</sup>	2007	The government encourages environmentally sound recycling by established a registration system, and confirms the role of industrial associations in recycling. Business licences must be obtained by meeting certain requirements prior to the collection and recycling of recyclables.
Circular Economy Promotion Law of the People's Republic of PRC <sup>16</sup>	2008	Establishes an Extended Producer Responsibility (EPR) system taking the producer as the principle stakeholder, to fulfil the goal of decreasing environmental costs and promoting utilization ratio, by applying the "Reduce, Reuse and Recycle" approach
Opinions of the General Office of the State Council on Establishment of Integrated and Advanced Collection Systems for Waste and Used Products <sup>17</sup>	2011	By 2015, a modern collection system of waste and used products shall be established comprising networking, advanced technology, well sorting operation and normative management, to achieve the goal of a 70% collection rate for the main types of waste and used products.
Twelve Five-Year Development Plan of National Strategic Emerging Industry <sup>18</sup>	2012	Prioritise recycling as one of the main development directions and tasks
Twelve Five-Year Special Plan on Scientific and	2012	Priority areas and key tasks are: 1. Recycling technology of recyclables: metal, e-waste, machines

<sup>13</sup>中国 21 世纪议程(Zhong Guo 21 Shi Ji Yi Cheng), <http://www.acca21.org.cn/cca21pa.html>

<sup>14</sup>中华人民共和国固体废物污染环境防治法(Zhong Hua Ren Min Gong He Guo Gu Ti Fei Wu Wu Ran Huan Jing Fang Zhi Fa), [http://www.gov.cn/flfg/2005-06/21/content\\_8289.htm](http://www.gov.cn/flfg/2005-06/21/content_8289.htm)

<sup>15</sup>再生资源回收管理办法(Zai Sheng Zi Yuan Hui Shou Guan Li Ban Fa), [http://www.gov.cn/ziliao/flfg/2007-03/30/content\\_566242.htm](http://www.gov.cn/ziliao/flfg/2007-03/30/content_566242.htm)

<sup>16</sup>中华人民共和国循环经济促进法(Zhong Hua Ren Min Gong He Guo Xun Huan Jing Ji Cu Jin Fa), [http://www.gov.cn/flfg/2008-08/29/content\\_1084355.htm](http://www.gov.cn/flfg/2008-08/29/content_1084355.htm)

<sup>17</sup>国务院办公厅关于建立完整的先进的废旧商品回收体系的意见(Guo Wu Yuan Ban Gong Ting Guan Yu Jian Li Wa Zheng De Xin Jin De Fei Jiu Shang Pin Hui Shou Ti Xi De Yi Jian), [http://www.gov.cn/zwgk/2011-11/04/content\\_1986158.htm](http://www.gov.cn/zwgk/2011-11/04/content_1986158.htm)

<sup>18</sup>“十二五”国家战略性新兴产业发展规划(Shi'Er Wu Guo Jia Zhan Lve Xing Xin Xing Chan Ye Fa Zhan Gui Hua), [http://www.gov.cn/zwgk/2012-07/20/content\\_2187770.htm](http://www.gov.cn/zwgk/2012-07/20/content_2187770.htm)

Technical Project on Waste Recycling <sup>19</sup>	and high polymer materials; 2. Recycling technology of industrial solid waste: Coal ash and gangue, smelting waste residue, industrial gypsum by-product, industrial biomass; 3. Recycling technology of municipal solid waste and sludge; 4. Overall process control technology of waste recycling; 5. Theoretical research on clean technology for recycling
Opinions on Acceleration of the Establishment of Collection and Utilization System on Waste and Used Products under the Chinese Supply and Marketing Cooperative Society <sup>20</sup>	2012 Propose objective and key tasks for the collection and utilization system on waste and used products under the Chinese Supply and Marketing Cooperative Society

### *E-waste management policy in PRC*

E-waste is a typical kind of recyclable generated and collected from households and is an emerging issue in PRC. The Chinese government has issued a series of specific laws and regulations, which are listed in **Table 2.3**. Among all of the kinds of recyclables generated in PRC, the management of e-waste has the most comprehensive regulations and system, so the e-waste management policy has been listed separately as below.

**Table 2.3: E-waste management laws and regulations in PRC**

Legislation	Issuing date	Purpose
Technical Guideline for Pollution Control of Battery Waste <sup>21</sup>	2003	To guide the development of environmental management, treatment and recycling technology for battery waste, and to regulate the treatment and recycling activities of battery waste
Technical Guideline for Pollution Control of Appliance and Electrical Waste <sup>22</sup>	2006	To reduce the quantity of appliance and electrical waste, improve the recycling rate, and control the environmental impacts during recycling and disposal

19 废物资源化科技工程“十二五”专项规划(Fei Wu Zi Yuan Hua Ke Ji Gong Cheng ‘Shi’er Wu’ Zhuan Xiang Gui Hua), [http://www.zhb.gov.cn/gkml/hbb/gwy/201206/t20120619\\_231910.htm](http://www.zhb.gov.cn/gkml/hbb/gwy/201206/t20120619_231910.htm)

20 关于加快推进供销合作社废旧商品回收利用体系建设的意见(Guan Yu Jia Kuai Tui Jin Gong Xiao He Zuo She Fei Jiu Shang Pin Hui Shou Li Yong Ti Xi Jian She De Yi Jian), <http://www.chinacoop.gov.cn/HTML/2012/04/25/75703.html>

21 废电池污染防治技术政策(Fei Dian Chi Wu Ran Fang Zhi Ji Shu Zheng Ce), [http://www.zhb.gov.cn/info/gw/huanfa/200310/t20031009\\_86653.htm](http://www.zhb.gov.cn/info/gw/huanfa/200310/t20031009_86653.htm)

22 废弃家用电器与电子产品污染防治技术政策(Fei Qi Jia Yong Dian Qi Yu Dian Zi Chan Pin Wu Ran Fang Zhi Ji Shu Zheng Ce), [http://kjs.mep.gov.cn/hjbhbz/bzwb/wrfzjzsc/200607/t20060720\\_91676.htm](http://kjs.mep.gov.cn/hjbhbz/bzwb/wrfzjzsc/200607/t20060720_91676.htm)

Management Method of Electrical Product Pollution Control <sup>23</sup>	2006	To control and reduce pollution after electrical products are discarded, and to promote the production and sale of low polluting electrical products
Management Method of E-waste Pollution Prevention and Control <sup>24</sup>	2007	To prevent and control e-waste pollution, strengthen the environmental management of e-waste during dismantling, recycling and disposal
Regulation on the Administration of the Recovery and Disposal of Electrical and Electronic Waste <sup>25</sup>	2009	To manage the recycling and related activities of listed e-waste properly; encourage multiple channels for collection, carry out centralized and qualified treatment; establish a subsidy system for e-waste recycling
Implementation Method of Appliances Old-to-New policy and its revision <sup>26</sup>	2009 and 2010	From June 2009 to December 2011, subsidies are given to citizens when they buy electrical products and return e-waste including televisions, refrigerators, washing machines, air conditioners and computers to licensed e-waste treatment companies
Guideline on Qualification, Examination and Permission on E-waste Treatment Company <sup>27</sup>	2010	The purpose is to guide and regulate the examination and permission work of the Local Environmental Protection Bureau when e-waste treatment companies apply for certification
Guideline on Subsidy Procedure for E-waste Treatment Company <sup>28</sup>	2010	The purpose is to guide the Local Environmental Protection Bureau on how to regulate and monitor the performance of e-waste treatment facilities.
Guideline on Establishment of Data and Information Management System and Submission of Information of E-waste Treatment Company <sup>29</sup>	2010	The purpose is to guide and regulate e-waste treatment companies in establishing data and information management systems and the submission of information to receive subsidies

23电子信息产品污染控制管理办法(Dian Zi Xin Xi Chan Pin Wu Ran Kng Zhi Guan Li Ban Fa), [http://www.gov.cn/ziliao/flfg/2006-03/06/content\\_219447.htm](http://www.gov.cn/ziliao/flfg/2006-03/06/content_219447.htm)

24电子废物污染环境防治管理办法(Dian Zi Fei Wu Wu Ran Huan Jing Fang Zhi Guan Li Ban Fa), [http://www.zhb.gov.cn/info/gw/juling/200709/t20070928\\_109698.htm](http://www.zhb.gov.cn/info/gw/juling/200709/t20070928_109698.htm)

25废弃电器电子产品回收处理管理条例(Fei Qi Dian Qi Dian Zi Chan Pin Hui Shou Chu Li Guan Li Tiao Li), [http://www.gov.cn/zwgk/2009-03/04/content\\_1250419.htm](http://www.gov.cn/zwgk/2009-03/04/content_1250419.htm)

26家电以旧换新实施办法(Jia Dian Yi Jiu Huan Xin Shi Shi Ban Fa), [http://www.gov.cn/zwgk/2009-07/02/content\\_1355598.htm](http://www.gov.cn/zwgk/2009-07/02/content_1355598.htm)

27废弃电器电子产品处理企业资格审查和许可指南(Fei Qi Dian Qi Dian Zi Chan Pin Chu Li Qi Ye Zi Ge Shen Cha He Xu Ke Zhi Nan), [http://www.zhb.gov.cn/gkml/hbb/bgg/201012/t20101222\\_198999.htm](http://www.zhb.gov.cn/gkml/hbb/bgg/201012/t20101222_198999.htm)

28废弃电器电子产品处理企业补贴审核指南(Fei Qi Dian Qi Dian Zi Chan Pin Chu Li Qi Ye Bu Tie Shen He Zhi Nan), [http://www.mep.gov.cn/gkml/hbb/bgg/201011/t20101119\\_197717.htm](http://www.mep.gov.cn/gkml/hbb/bgg/201011/t20101119_197717.htm)

29废弃电器电子产品处理企业建立数据信息管理系统及报送信息指南(Fei Qi Dian Qi Dian Zi Chan Pin Chu Li Qi Ye Jian Li Shu Ju Xin Xi Guan Li Xi Tong Ji Bao Song Xin Xi Zhi Nan), [http://www.mep.gov.cn/gkml/hbb/bgg/201011/t20101119\\_197728.htm](http://www.mep.gov.cn/gkml/hbb/bgg/201011/t20101119_197728.htm)

Guideline on Compilation of Development Plan on E-Waste Treatment <sup>30</sup>	2010	The purpose is to guide the compilation of development plans on e-waste treatment for the Local Environmental Protection Bureau
Management Method on Treatment Fund Collection and Usage of E-waste <sup>31</sup>	2012	The requested of fund is submitted by electrical product producers and importers. Submission criteria are 13 RMB/unit for television, 12 RMB/unit for refrigerator, 7 RMB/unit for washing machine and air conditioner, 10 RMB/unit for computer. Qualified e-waste treatment companies could apply for subsidy when treating e-waste listed. Subsidy criteria are 85 RMB/unit for television, 80 RMB/unit for refrigerator, 35 RMB/unit for washing machine and air conditioner, 85 RMB/unit for computer.

1 RMB = 0.16 USD

## 2.2 Recycling business model

Recyclable collection and recycling companies in PRC can be classified into four kinds: individual businesspeople, private companies, state-owned companies and industrial parks.

### 2.2.1 Individual businesspeople

Individual businesspeople are key stakeholders of the recycling sector. Individual businesspeople usually conduct pre-processing such as cleaning, separation and baling. It is a typical recycling business model in PRC which is usually invested in and operated by one person or one family. It may employ many labourers for collection, separation, cleaning and pre-processing of the recyclables. Different from individual collectors, individual businesspeople need a business license from the Local Industrial and Commercial Registration Department. Compared to private companies, the scale of operations is rather small and tax submitted to government is calculated as personal income tax. Different types of recyclable waste flows to different places. Terminal markets of each recyclable were established across the country (**Figure 2.5**), a result of market-oriented recycling businesses that were initiated by the private sector. For example, large-scale terminal markets of plastic waste were established in Neijing city in Sichuan Province, Linyi city in Shandong Province and Changzhou city in Jiangsu Province; large-scale terminal markets of e-waste were established in Guiyu County in Guangdong Province and Taizhou city in Zhejiang Province. These terminal markets are convenient for individual collectors and buyers to meet and conduct recycling business in various forms such as selling, buying, pre-processing, etc.

30废弃电器电子产品处理发展规划编制指南(Fei Qi Dian Qi Dian Zi Chan Pin Chu Li Fa Zhan Gui Hua Zhi Nan), [http://www.mep.gov.cn/gkml/hbb/bgg/201011/t20101116\\_197563.htm](http://www.mep.gov.cn/gkml/hbb/bgg/201011/t20101116_197563.htm)

31废弃电器电子产品处理基金征收使用管理办法(Fei Qi Dian Qi Dian Zi Chan Pin Chu Li Ji Jin Zheng Shou Shi Yong Guan Li Ban Fa), [http://www.gov.cn/gzdt/2012-05/30/content\\_2149195.htm](http://www.gov.cn/gzdt/2012-05/30/content_2149195.htm)



**Figure 2.5: Plastic waste piled along the road by individual businessmen**

The operations of an individual businessperson are highly influenced by the situation of the national economy, the price of virgin materials and market demand. Individual businesspeople buy recyclables mainly from individual collectors or sometimes directly from households, and sell to manufacturers or large scale recycling companies such as private companies or industrial parks after cleaning, separation and pre-processing using a simple technique.

To reduce operational costs, individual businesspeople usually have no pollution control equipment and measures, which results in serious impacts on the environment and public health. Nowadays, the government pays a lot of attention on individual businesspeople and tries to encourage them to move into recycling industrial parks, which is a current development trend in PRC.

#### 2.2.1 An example of an individual businessperson:

##### a) **Background**

The owner of this shop entered the plastic waste collection business in 2008, because the private sector established a terminal market of plastic waste in her hometown in the last ten years and lots of her neighbours are involved in this business.

In 2010, a recycling industrial park was established in her city. The local government and the manager of the recycling industrial park encouraged her to move into this park from 2011. The recycling park offered a loan to her to buy a space in the park, which she accepted.

##### b) **Scale of business**

The owner initially invested 2 million RMB (322,000 USD) including the house and equipment. Currently, there are 20-30 labourers in this shop, which has an area of about 400 square meters. The monthly cash flow is approximately 400,000 RMB (64,380 USD), and the monthly net profit is about 10,000 RMB (1,610 USD).

**c) Business and marketing strategies**

There are 200-300 individual businesspeople involved in plastic waste collection and processing in the city. The plastic waste is classified into PET bottles, sheets, packaging bag, etc. Each shop collects and processes a specific type of plastic waste. There is some competition but it is not very serious. As the terminal market has been established for ten years, lots of sellers and buyers from nearby provinces and cities know it well and usually come here for business.

**d) Source of recyclables, processing and value added**

This shop mainly buys plastic sheets from individual collectors, who come from nearby provinces and cities, and undertakes pre-processing of recyclables such as fine segregating, cleaning, baling, melting, drawing, and then sells it to recyclers.

**e) Technology and innovation**

The shop has machines for chopping, cleaning, drying, melting and pelletizing of plastic waste.

**f) Social and environmental promotion activities**

The owner doesn't participate in social activities.

**g) Business extension and scaling-up strategies**

The owner does not have a plan to expand the business and scale-up activities due to a lack of funds and market instability.

### **2.2.2 Private companies**

A private company is a profit making organization with investment by an individual or groups of people and recruits labour for operations. Private companies are a key driver of the national economy. The profit (after tax payment) belongs to the company. It has a larger operation scale than individual businesspeople.

Following are examples of two private companies that deal with recyclable waste.

#### **2.2.2.1 Beijing Tiantian Jie Recyclable's Recycling and Utilization Company**

**a) Background**

This company was established in June 2007. It is a pilot recycling company of the Ministry of Commerce and the local government of Beijing. It has received certification from the local government such as a certificate for collection and destroying confidential documents. The company obtained an ISO9001 certification in 2007.

**b) Scale of business**

The total investment is 2.88 million RMB. This company has the capacity to treat 50,000 tonnes of paper waste per year. The company employs about 80 staff. The monthly turnover is about 1 million RMB.

### c) Business and marketing strategies

The company applied a brand marketing concept into its business. The “TTJie” Brand has been created under the slogan of “Zaisheng Zhishang” (Regeneration is best). A business website was established (<http://www.ttjie.com/>) to advertise the company’s business activities.

The company has established more than 100 collection sites in communities in Chongwen District in Beijing (**Figure 2.6**). The company developed standard operational procedures such as buying recyclables at a transparent price (giving the same price to all customers), wearing a uniform, and using tricycles and trucks that have been designed under the company brand (**Figure 2.7**), etc.



**Figure 2.6** Collection site set up in communities



**Figure 2.7** Trucks for transport of recyclables

#### **d) Source of recyclables, processing and value added**

The company buys recyclables through their own collection sites (80-90%) and some from public collection centres (10-20%). People could make appointments for a door-to-door recyclable collection service through the telephone or website. The company also set up lots of collection sites in large organizations and buys recyclables periodically. The purchased recyclables comprise approximately 80%-90% paper, 10% plastics bottles, and less than 10% others, such as metal scraps and e-waste. The main source of recyclables are households (50%) and large organisations (50%).

The company sells recyclables to recycling facilities without pre-processing, except for paper waste. The company has a facility for pre-processing (fine segregation and baling) before selling to a paper manufacturer (**Figure 2.8**). In return, the company buys recycled paper from the manufacturer and sells it to customers.

#### **e) Technology and innovation**

The company has a paper waste separation line and baling machine.



**Figure 2.8 Paper waste separation and baling facility**

#### **f) Social and environmental promotion activities**

The company engages in lots of social activities. Every month, different communities are selected to carry out awareness raising activities. Together with the University Environmental Union, the company jointly carries out a series of activities in tens of universities, such as quizzes.

#### **g) Business extension and scaling-up strategies**

The company plans to expand their collection sites in large organizations and promote selling of recycled paper. However, the company faces some difficulties during daily operations

which maybe affect their extension plan: (1) low profit; (2) no tax privileges; (3) high competition with individual collectors; and (4) high staff turnover rate.

#### 2.2.2.2 Sichuan Renxin E-waste resource recycling and utilization company

##### a) Background

This company (**Figure 2.9**) starts constructing facilities from 2005. In 2008, the construction was completed and operations started. The company is an assigned appliance “old-to-new” dismantling company, one of five certified E-waste treatment companies in Sichuan province.



**Figure 2.9: Parts of the Sichuan Renxin E-waste resource recycling and utilization company**

##### b) Scale of business

The total investment is 40 million RMB (6.4 million USD) in an area of 2.4 hectares. Treatment capacity is 30,000 tonnes per year (more than 1 million units of e-waste). This company employs more than 150 staff. The general manager keeps the cash flow and profit as confidential data.

### **c) Business and marketing strategies**

This company secures their income by being registered as a licensed e-waste treatment facility by the Environmental Protection Bureau of Sichuan Province based on the ‘Management Method on Treatment Fund for Collection and Recycling of E-waste’. The certified e-waste treatment company receives a subsidy from the government based on the quantity of e-waste that is actually treated by the company.

The strengths of the company are stable e-waste sources and low competition because the limit to the number of government controlled certified e-waste treatment companies and provided subsidies to the recycling of e-waste. The disadvantages are complicated administrative requirements for the mandatory monitoring of e-waste recycling.

The company buys e-waste through their own collection system and also from individual collectors. The collection system is established across Sichuan province, with more than 300 collection sites having been established in the province and each city having one transfer centre. However, some generators sell e-waste to non-licensed recyclers because they can receive a higher price. The costs of non-licensed recyclers are lower than licensed recycling companies because they do not employ safety and environmental control measures.

### **d) Source of recyclables, processing and value added**

This company collects e-waste through their collection sites. Until now, five operation lines have been established including televisions, computers, refrigerators, air conditioners, washing machines, office electrical appliances, and printed circuit boards. The average quantity of e-waste per year is about 1.1 million units. The quantity of each type of e-waste was not disclosed. The treatment quantity and profit has a strong link with national regulations, especially the subsidies.

The main operation process is to separate different kinds of materials after classification, putting barcode, separating, cleaning, smashing, sorting, and then selling to electrical equipment manufacturers in PRC or abroad.

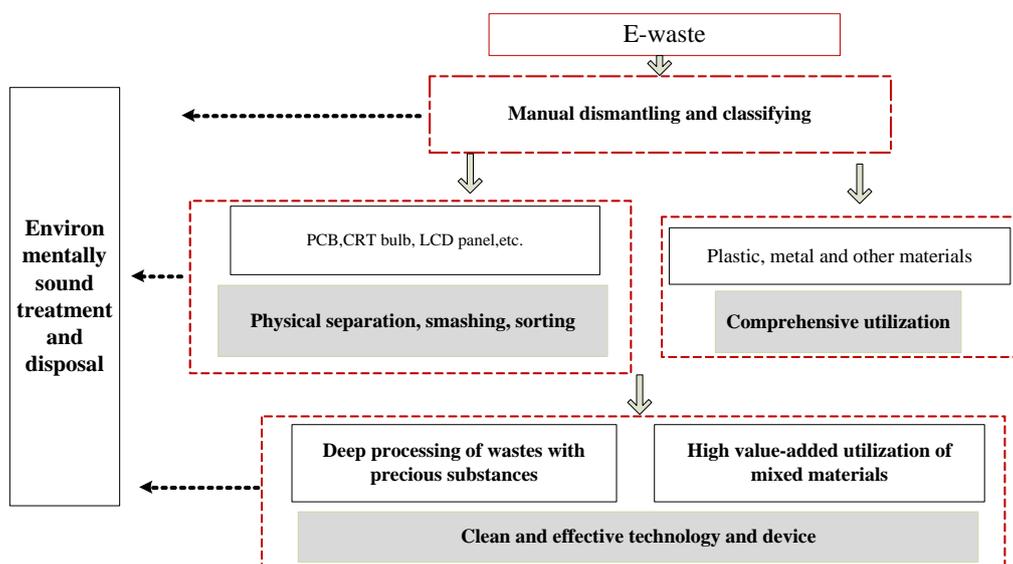
### **e) Technology and innovation**

According to the “Guidelines for Qualification, Examination and Permission of E-waste Treatment Company”, certified e-waste treatment companies should meet the following criteria:

- a. Having an integrated e-waste treatment facility, including its own plant areas, treatment facility, storage area, information management system (database), and pollution control facility;
- b. Having a separation, packaging and other facilities to treated e-waste, including vehicles, heavy machines, baling machines, special containers, central monitoring equipment, etc.;
- c. Having an environmental management regulation and measures, including disposal measures of untreated e-waste parts, pollution monitoring plan, emergency plan, etc.; and

- d. Having professional and technical staffs.

The general processing system of the company is shown in **Figure 2.10**.



**Figure 2.10: Main flow of E-waste treatment process of Sichuan Renxin e-waste resource recycling and utilization company**

In addition, the company is also a manufacturer of e-waste treatment equipment and can operate more than ten operation lines for different kinds of e-waste.

#### f) Social and environmental promotion activities

The company is involved in awareness raising activities organized by the local government to encourage residents to sell e-waste to licensed companies.

#### g) Business extension and scaling –up strategies

The company does not have a specific scaling up plan. The business is heavily reliant on national policies, subsidies and support.

### 2.2.3 State-owned company

In PRC, the state-owned company is a company where the government is the investor and owns the total assets of the company. Staff salaries are regulated and paid by the government, and most of company’s profit is submitted to government with only a small part remaining with the company.

The state-owned company is the most important body of the national economy. An example of a state-owned recycling business is provided as follows:

### 2.2.3.1 Recyclable Collection and Separation Centre of Haidian District of Beijing

#### a) Background

The Recyclable Collection and Separation Centre of Haidian District of Beijing (**Figure 2.11**) is a state-owned company belonging to the Beijing Federation of Supply and Marketing Cooperatives. It started operations in 2007.

In 2006, the Beijing Municipal Commission of Commerce and other 11 local governmental agencies issued the local legal document on “Implementation Opinion to Promote Development of the Beijing Recyclable Collection System”. Based on this document, Beijing Kaiyuan Commerce Company who belongs to Beijing Federation of Supply and Marketing Cooperatives established this Recyclable Collection and Separation Centre by using a special governmental fund from Haidian District and co-financing the company.

#### b) Scale of business

This company received an initial investment of 21 million RMB (3.38 million USD). There are more than 70 staff working for this company. The company has an area of 3.5 hectares. The monthly turnover is approximately 10 million RMB (1.6 million USD).

#### c) Business and marketing strategies

The company collects waste through both their own collection system and purchasing from individual collectors. By the end of 2010, more than 260 collection sites has been established in communities in Haidian District in Beijing (**Figure 2.12**) with approximately one collection site per 1,000 to 1,500 residents.

The company also participates in awareness raising activities organized by the local government to advertise company activities in communities.

#### d) Source of recyclables, processing and value added

The company buys almost every kind of recyclable. Its main source of waste input comes from the company’s collection sites and is bought from individual collectors.

Currently, it has 4 operation lines for pre-processing (separation, volume reduction, dismantling and baling) of recyclable waste: paper, metals, PET bottles, and e-waste. The treatment capacity of each line is different: 300 tonnes per day for paper, 40 tonnes per day for PET bottles, 12,000 tonnes per year for e-waste, and 10,000 tonnes per year for metals. These recyclables are sold to manufacturers.

#### e) Technology and innovation

The process of the paper line is to pick out non-paper waste (e.g. plastic) and classify it manually, followed by baling by automatic machines before selling to manufacturers.

The process of the metals line is to pick out non-metal waste and categorize types of metal manually, shear thick metal followed by baling by machine before selling to manufacturers.

The process of the PET bottles line is to pick out non-bottle waste manually, removing trademarks, baling and selling to manufacturers.

The process of e-waste line is to dismantle e-waste and then separate plastics, metals and glasses before selling them to manufacturers or waste disposers.

**f) Social and environmental promotion activities**

The company is involved in awareness-raising activities in communities organized by the local government to promote awareness on waste separation at source.

**g) Business extension and scaling-up strategies**

The company does not have a concrete plan to expand its business and just wants to maintain the current operations. The company operation faces some difficulties, such as a lack of governmental supervision on the waste recycling business, lack of residential interest, high competition with individual waste buyers, and high costs of transportation. The company benefits are not high because of high investment costs, high risk and recent decreases in market demand and prices.



**Figure 2.11: Main gate of the Recyclable Collection and Separation Centre of Haidian District of Beijing**



**Figure 2.12: Collection site in community of the Recyclable Collection and Separation Centre of Haidian District of Beijing**

### 2.2.4 Recycling industrial parks

After many years of development, the recycling industry has established a nationwide network. Many industrial parks were developed which has significantly improved the level of recycling business. According to the ‘Opinions of the State Council on Promotion of Circular Economy Development in 2005’, the National Development and Reform Commission jointly with the Ministry of Environmental Protection and Provincial Governments has implemented pilot projects in key industries, industrial parks and cities to promote implementation of the circular economy.

In accordance with the Circular Economy Promotion Law of the People’s Republic of PRC (2008), the State Council and provincial governments are establishing special funds for circular economy development. Local governments apply for special funds to establish recycling industrial park with companies. The National Development and Reform Commission organizes expert meetings for the assessment of the proposals and making decisions whether to approve or decline. The main recycling industrial parks (clusters of companies engaged in buying and processing recyclable waste) in PRC are shown in **Figure 2.13**.



**Figure 2.13: Main recycling industrial parks in PRC**

In 2006, the first two demonstration recycling industrial parks were set up: Qingdao Xintiandi Recycling Industrial Park (**Figure 2.14**) and Tianjin Ziya Circular Economy Industrial Park. Construction and development of the recycling industrial park could promote the creation of recycling clusters, decrease the use of industrial land, install electrical networks, and develop transportation in the city. Companies clustered in each recycling industrial park could share basic infrastructure, technology innovation, management and other services, which decreases the investment required from each company and could attract more customers.



**Figure 2.14: Qingdao Xintiandi Recycling Industrial park**

Different types of industrial parks have been established according to background and needs of recycling in different cities. For example, some recycling industrial parks have been established to improve the environmental condition of terminal markets; some are established because local industrial development needs recyclable materials; some are established because the government pays attention to and wants to promote the development of certain recycling industries. The investment generally comes from the special fund of central and local governments and private companies. There are lots of companies which have moved to or been established in the parks, so the management committee of industrial parks are set up to manage the whole operation and provide service to companies located in the parks, with the latter paying management fees. An example of a recycling industrial park is described as follows:

#### *2.2.4.1 PRC Southwest Recycling Industrial Park*

##### **a) Background**

This industrial park is the first batch of national urban mining demonstration projects (**Figure 2.15**).

There are hundreds of individual businesspeople who have been working in plastic waste recycling for more than 30 years, and who release pollution through improper plastic recycling processes. To solve this problem, the local government together with PRC Recycling Development Co., Ltd., a leading company in recycling, has established the recycling park. The total investment is planned to be 3.4 billion RMB (547 million USD).



**Figure 2.15: The main gate of PRC Southwest Recyclable Industrial Park**

**b) Scale of business**

Until now, the management committee of the recycling park has not been set up. However, the park plans to reach 10 billion RMB (1.6 billion USD) of annual production value.

At the first stage, the park has finished construction in an 800 acres area, with the Sichuan Branch of PRC Recycling Development Co., Ltd. and about 120 individual businesspeople who collect and separate plastic waste in Neijing city being the main tenant along with other individual business people. Annual trade quantity has reached 700,000 tonnes.

**c) Business and marketing strategies**

The park has an area of 5,000 acres which is planned to be divided into 3 zones: i) a terminal trading market which occupies 1,500 acres. This area is available for the local and nearby individual businesspeople to move into the park; ii) a processing area which occupies 2,000 acres. This zone is invested in by the PRC Recycling Development Co., Ltd. In this area, fine deep processing equipment is established; and iii) Production area occupying 1,500 acres. This area is opened for international and local large recycling companies.

Currently, Sichuan Branch of PRC Recycling Development Co., Ltd. is the only large scale recycling company in the park. The company was established in 2009 with an investment of 60 million RMB (9.6 million USD) provided by the PRC Recycling Development Co., Ltd. and Sichuan Agricultural Production Materials Co., Ltd. The company has almost 300 staff. It is a demonstration site for recyclable collection and utilization by the Ministry of Commerce. It is a certified e-waste treatment company, and a certified company for processing and utilization of imported e-waste such as hardware, wire and electrical machines.

#### **d) Source of recyclables, processing and value added**

The individual businesspeople located in the park (**Figure 2.16**) mainly work on plastic waste. Sichuan Branch of PRC Recycling Development Co., Ltd has processing lines to handle plastic waste that was purchased from individual businesspeople and sold to manufactures after separation, cleaning and baling (**Figure 2.17 and 2.18**). Also, the company has facilities to dismantle e-waste which is collected from their own collection sites and bought from individual collectors.



**Figure 2.16: Shop area of individual businesspeople in the recycling industrial park**



**Figure 2.17: Automatic operation line of PET bottles: separation, cleaning and baling**



**Figure 2.18: Compacted PET bottles after the automatic operation line**

**e) Technology and innovation**

The scope of operations includes the fine processing of plastic waste, processing of rubber waste, collection and separation of paper waste and metal scraps, etc. Until now, separation and processing of plastic waste and treatment of e-waste are in use.

**f) Social and environmental activities**

The management committee has not been set up, so the recycling park has not been much involved in social activities. Social and environmental activities will be increased once the management committee is established.

**g) Business extension strategies**

By 2015, the recycling park will finish the third-stage construction of the production area (1,500 acres). International and local large scale recycling companies will be introduced into the park. Annual processing volume target of recyclable may reach 1.85 million tonnes, the amount of dismantled e-waste can reach to 2 million units, the number of dismantled waste vehicles can reach to 50,000 and yearly sales revenue may reach 1 million RMB (0.16 million USD).

## 2.3 Driving factors, barriers and way forward

### Driving factors

As shown in this report, recycling in PRC is gradually shifting toward sustainable recycling business development under the high influence of the national policy on the circular economy. With high government intervention, simple buy and sell practices and curb side recycling has gradually changed to more complex practices that include development and installation of sophisticated processing machines.

Our analysis identifies three main drivers of the improvement of recycling business in PRC:

#### *1) Market value of recyclables*

Similar to other developing countries, the market value of recyclables is the key driver attracting many investors ranging from individuals to large companies to invest in recycling businesses on different scales. Furthermore, the Chinese Government has a policy to distinguish the recyclables from general municipal solid waste and assigned the responsibility of recyclable waste management to the Ministry of Commerce.

#### *2) Pressure on environmental concerns*

Widespread of the curb side recycling practices in PRC especially e-waste recycling creates significant environment impacts that are being investigated and broadcast worldwide. Therefore, the Chinese governments enacted a series of laws and regulations to minimize the environmental load from recycling activities.

#### *3) Government policies on circular economy*

The “Circular Economy” concept was proposed in the late 1990s in PRC, to efficiently utilize resources for economic development. Currently, this policy is dominant through both industry and environmental protection, with the promulgation of the Circular Economy Promotion Law and the Circular Economy Twelfth Five Year Plan. The essence of the circular economy is to create an ecologically friendly economy. Its core is to improve the efficiency of resource utilization and recycling. Minimization, reuse and resource recovery are its principles. The basic features are low consumption, low emissions, but high efficiency production and resource utilization. Hence, the recycling industry is promoted as an important element of the circular economy.

Against this background, leading enterprises will be established gradually, with better and further processing will be also promoted. Environmental pollution will be minimized through a better control system. The quality of recycled products will be improved. These drivers largely influence the business plans of stakeholders engaged in recycling activities. Investment in technology innovation for environmentally sound recycling practices has

increased and more recyclable waste collection sites were established. However, some problems and challenges still exist.

The recommendations presented in the following sections suggest ways to strengthen the development of sustainable recycling business practices in PRC.

## **Barriers and way forwards**

### ***(1) Market volatility***

Similar to other countries, price fluctuations are a barrier to scaling-up and extension of recycling businesses especially by individual businesspeople. Government intervention to subsidise e-waste in certified recycling facilities could help large scale companies to some extent. Large scale recyclers can cope with the price fluctuation better than small scale recyclers.

#### **Lesson learnt from Wongpanit**

Wongpanit has tried to overcome this barrier by buying all recyclable materials to lower the risk of price deduction on particular waste items. Additionally, Wongpanit has developed an SMS system to provide real time price information to all franchise members and thus the members can quickly change the price and make decisions whether to sell or to stock the recyclables. Additionally, Wongpanit has created channels to both domestic and international markets which enable the company to take a decision whether to sell domestically or export.

#### **Recommendations:**

- The national government should establish a subsidy scheme or give tax deductions or exemptions for certified facilities of all recyclable waste. The priority may be given to waste that has a high impact on the environment and needs a high cost for proper recycling, such as paper, glass, etc.

Similar to Wongpanit's strategy, the national government or recycling business alliances should set up a system for real time price notification which will help minimize the risk of waste buyers and recyclers. Currently, many companies and associations create a website with real time price notification in PRC. This practice should be more widely encouraged.

### ***(2) Low awareness of residents on environmental impacts of improper waste disposal and recycling***

Recyclable waste separation for sale is a common practice in PRC. However, residents' awareness of environmental impacts is relatively low. Residents discard low value waste such as plastic, glass and batteries into the municipality collection system. This waste is then sent to the final disposal site. Often, recyclable waste that is collected by individuals are of inferior quality and dirty. These practices lead to difficulty in pre-processing and recycling.

### Lesson learnt from Wongpanit

Wongpanit has overcome this barrier by coordinating with local governments through public-private partnerships to promote recyclable waste separation at source for sale and recycling for the environment. Moreover, Wongpanit provides training on waste segregation to all stakeholders including local governments, itinerant waste buyers, waste pickers and residents. In collaboration with the local government, trained itinerant waste buyers and waste pickers are registered and upgraded to being volunteers for the environment. This activity helps improve the relationship between the waste buyers, local governments and residents. As a result, local governments can significantly reduce waste collection and disposal at landfill sites, waste buyers receive a larger amount of recyclables, and residents earn extra income which can be used for private expenses or donate it to a community fund.

***Recommendations:*** Regarding awareness, focus needs to be given to citizens on the importance of waste segregation especially for recycling and environment conservation. Local stakeholders can play a significant role as follows:

- The current national policy has prioritized recycling for economic development. The national government may strengthen implementation of waste separation at source for recycling by establishing funds for awareness raising on recycling for the environment and proper practices of waste separation at source.
- Local governments should work closely with waste recycling stakeholders, waste dealers and recyclable waste collection companies in the city to develop and carry out awareness raising campaigns on waste separation for recycling to residents.
- Local governments and large scale waste buyers may help training small scale waste buyers on waste separation, pre-processing and other value-added techniques. In this case, large scale waste buyers may enjoy a better quality of recyclables received by their businesses as well as receive more recyclables from trained waste buyers.
- Experienced companies may formulate training courses for their clients and new business entrants. It may utilize the Wongpanit franchise system which is flexible to suit local conditions.
- Local governments may create local rules for waste separation at source to serve the recyclable waste collection and separation centre of each city. However, logistics systems to serve the collection of separated waste should be well prepared.

### ***(3) Improper collection and recycling practices***

Although the 'Management Method of Municipal Solid Waste' provision aims to promote separation at source its implementation is relatively slow. Currently, some cities are trying to establish separation at source such as Beijing, Guangzhou and Nanjing but many cities have not started to accomplish this.

Also, there are many recycling industrial parks that could promote the centralization of recycling businesses as there are still many individual collectors engaged in recyclable waste collection and implement improper pre-processing and recycling. These collectors are active with residents and can offer higher prices because they don't invest in environmental countermeasures. The traditional recycling business chain involves many stakeholders and common instances of fraudulent buying and selling (such as using false calibration of the scales, mixing recyclables with other materials such as water and sand) has a significant impact on the possibility of scaling-up environmentally sound recycling practices which have higher investment costs than the conventional recycling system.

Furthermore, there are lots of small to medium scale recycling companies in PRC that employ simple recycling technology which do not have environmental countermeasures. Small family companies treat recyclables mainly by hand and using simple equipment, which causes serious environmental impacts.

Recommendations:

- National and local governments should provide awareness raising for residents about the significant contribution of proper recycling to the environment and the adverse impacts of improper recycling activities.
- Local governments should establish a waste separation system to accomplish the implementation of the management method of municipal solid waste guided by Ministry of House and Urban-Rural Development
- National and local governments should enforce the implementation of environmental control measures to meet environmental standards set by the government. Furthermore, the government should conduct inspections of waste buyer shops and recycling facilities on a regular basis and apply a penalty system to those who do not meet the standards.

#### **2.4 Expected support from ADB: Five proposals for follow-up**

ADB could play an important role in improving the recycling sector in PRC in an environmentally and socially sound manner. This study has identified three elements to improve the recycling sector in PRC: i) decrease environmental impacts from recycling businesses ii) support recyclers in upgrading their recycling businesses and technology and iii) improve the awareness of residents and stakeholders regarding the recycling sector. To achieve these aims the following projects are proposed.

##### **(i) Loans for recycling companies and industrial parks to improve recycling business toward an environmentally and socially acceptable model**

Upgrading recycling businesses to environmentally and socially acceptable standards requires investment which can be a challenge for small-to-medium scale recycling companies. A long term preferential loan would enable these companies to invest in improvements or scale up. This loan could be made available also for large scale

companies but priority should be given to small scale companies to motivate them to move toward a sustainable recycling business model.

A hybrid model of loans for the recycling sector could also have a component of funding for technical and training assistance to overcome challenges, including financial management; operations and supply chains; technological procurement; strategic planning; and environmental and social considerations.

**(ii) Technical assistance for innovation and new technology**

Recycling technology is not advanced in PRC, and some kinds of high quality recyclables are converted into low quality raw materials which results in a waste of resources. It's necessary to promote better and advanced recycling technologies in PRC.

ADB could provide assistance in setting up such a scheme to promote domestic innovation and technology development. The projects could focus especially on low-value waste and waste that is currently difficult to recycle in an environmentally sound and economically viable manner in the PRC context such as lamps and dry batteries. Priority should be given to projects that involve both academic institutions and practitioners.

**(iii) Technical assistance for pilot projects to improve the recovery rate of recyclables that currently having low recycling rates such as lamps and dry batteries**

Disposal of low market value recyclables such as fluorescent lamps and dry batteries is wide-spread in PRC. Disposal of this waste into municipal solid waste disposal sites can cause serious environmental and health impacts. These problems can be minimized if a recycling market for these wastes existed.

A pilot project could be carried out in the following manner. Select 8-10 residential communities at different levels of affluence and 4-5 other large sources of waste (such as shopping centres, real estate companies) in 3-4 cities to test collection systems for recyclables such as waste fluorescent lamps and dry batteries. Distribute public awareness raising materials regarding environmental and health impacts of disposal and improper recycling of waste; set-up special collection facilities; select pilot companies; conduct pilots and assess potential for improvement in terms of further improving economic performance and other factors; propose improved transportation and treatment technology and methods based on the results.

**iv) Microfinance loan programmes for small to medium scales waste buyers and recyclers to upgrade their environmental standards**

Many small to medium scales waste buyers in PRC carry out dismantling and recycling of materials without proper environmental controls. This practice has

resulted in a polluted environment and health risks. Microfinance programmes for these actors would be useful to enable them to upgrade their business practices but it should be linked with a training programme on proper recycling, including good business practices, labour laws, and protective measures for worker health and environment. The costs for the training may be borne partly by the local governments, the national government, and other organisations or supported by ADB.

**v) Technical assistance for capacity building across the sector**

A capacity building programme targeting both small-scale and large-scale recyclers would be useful for enhancing skills and reducing the reliance on foreign workers, as well as improving performance and efficiency. Such capacity building should cover the technical aspects of solid waste management and recycling as well as impacts on health, safety issues and environment.

## **ANNEX III**

### **Recycling business in India**

## Annex III Recycling Business in India

### 3.1 Overview of municipal solid waste recycling

#### 3.1.1 Recyclable waste generation and recycling rate

India covers an area of 3,287,240 square kilometres. Total population in 2011 was approximately 1,210.2 million. Amongst this, urban population is 31%, slightly increase from 30% in 2008<sup>32</sup>.

It is estimated that about 160,000 tons of municipal solid waste is generated daily in the country (2009). Per capita waste generation in cities varies from 0.2-0.6 kg per day depending upon the size of population. An assessment has been made asserting that per capita waste generation is increasing by about 1.3% per year. With growth of urban population ranging between 3 to 3.5% per annum, the annual increase in overall quantity of solid waste is estimated at about 5%.<sup>33</sup> It was estimated that the total waste generation in India in 2011 was approximately 68.8 million tons/year or 188,500 tons/day<sup>34</sup>.

As of 2005, municipal solid waste composed of approximately 19% of recyclable materials: 9% plastic, 8% paper, 1% glass, 0.5% metals (including aluminium)<sup>35</sup> (Zhu, et al. 2008). There is no national data regarding the quantity of recyclables that is being traded through the recycling business chain. However, it is estimated that 27% of total waste generated in Delhi (municipal solid waste is a part of this waste) is recycled. The largest amounts of materials recycled by type are paper, metal and plastic. These high recycling rates are achieved largely through the collection, sorting, and recycling efforts of informal waste pickers which contributes to recycling of approximately 70% of plastic waste and up to 56% of all recyclable waste generated in India. It is estimated that the informal sector recycles about 10 million tons of recyclable waste per year.

#### 3.1.2 Separation and collection of recyclables

Waste recovery is usually practised by the informal sector, though it is practised to some extent by private companies or NGOs. However, some municipalities have begun to formally segregate recyclables at source. One example is Ahmadabad that provides incentives to residents by establishing door-to-door collections run by the Resident Welfare Associations (RWAs), associations of sanitation workers and women's organizations.

---

<sup>32</sup> Worldbank, 2013 <http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>

<sup>33</sup> Department of Economic Affairs, Ministry of Finance, Government of India. (2009, November). Position Paper on " The Solid Waste Management Sector in India". India.

<sup>34</sup> Annepu, R. K. (2012). *Sustainable Solid Waste Management in India*. New York, USA: Earth Engineering Centre, Columbia University & Waste-to-Energy Research and Technology Council (WTERT).

<sup>35</sup> Zhu, D., Asnani, P., Zurbrugg, C., Anapolsky, S., & Mani, S. (2008). *Improving Municipal Solid Waste Management in India: A Sourcebook for Policy Makers and Practitioners*. Washington D.C.: The International Bank for Reconstruction and Development / The World Bank.

### 3.1.3 Waste recovery and recycling practices

Waste recovery and recycling practices in India are largely run by the informal sector, with the formal recycling set-up in India being a minor fraction, being only in its initial stages and experimenting with different models. Informal recycling in developing nations like India is a consequence of the increased gap in waste service provision<sup>36</sup> and the resultant ease of access to secondary raw materials which have immediate economic value.

Every tonne of recyclables informally collected per day can save the expenses of urban local bodies (ULB) USD 500 (INR 24,500) per year and can avoid the emission of 721 kg of carbon dioxide per year. In Delhi, the informal sector collects and transports about 1,088 tonnes per day of recyclables which would otherwise be the responsibility of the ULB. This leads to savings of USD 17.8 million (INR 795 million) per year in collection and transportation costs to the Municipal Corporation of Delhi (MCD). Similarly, a study named “Recycling Livelihoods”, made by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ, earlier GTZ), SNDT Women’s University and Chintan Environmental Research and Action Group (Chintan) has found that in Pune city the informal sector effectively subsidizes the formal waste sector to the extent of USD 4.08 million (INR 200.6 million) per year in waste handling costs. Another study by Chintan in 2009, “Cooling Agents” estimates that the informal sector avoids 1 million tonnes of CO<sub>2</sub> equivalent of GHG emissions in Delhi alone, by collecting 476 tonnes per day of mixed paper, 510 tonnes per day of mixed plastics, 17 tonnes per day of metals and 85 tonnes per day of glass (a total 1,088 tonnes per day of municipal solid waste).

In Pune city alone, the informal system operates at a net profit of USD 12.7 million (INR 621 million) per year. Even though these revenues are not distributed evenly amongst the population involved in this sector, the average earnings of the least well-off exceed the statutory minimum wage. This sector achieves high profits substantiated by the fact that “From the time the material is picked up and before it is recycled, an average unit of plastic increases in value by 750%, through segregation, washing and trading alone.”<sup>37</sup>

These recycling activities are undertaken in the formal as well as the informal sector and hence may not always be regulated, resulting in environmental pollution. Recycling of e-waste and plastics has now come onto the radar of Indian entrepreneurs. E-waste recycling in particular is picking up because of high generation rates, high value and enforcement of e-waste rules by the Ministry of Environment & Forests (MoEF) effective from June, 2012.

There are 1,777 known plastic recycling units in India. Most of the known units are located in Tamil Nadu (588), Gujarat (365), Karnataka (302), Kerala (193) and Madhya Pradesh (179).

---

<sup>36</sup>*Sustainable Recycling Model: A Comparative Analysis Between India and Tanzania*. Bob Jan Schoot Uiterkamp, Hossein Azadi, Peter Ho. 3, s.l. : Resources, Conservation and Recycling, 2011, Vol. 55.

<sup>37</sup> *Failing the Grade*. Chintan Environmental Research and Action Group, 2011

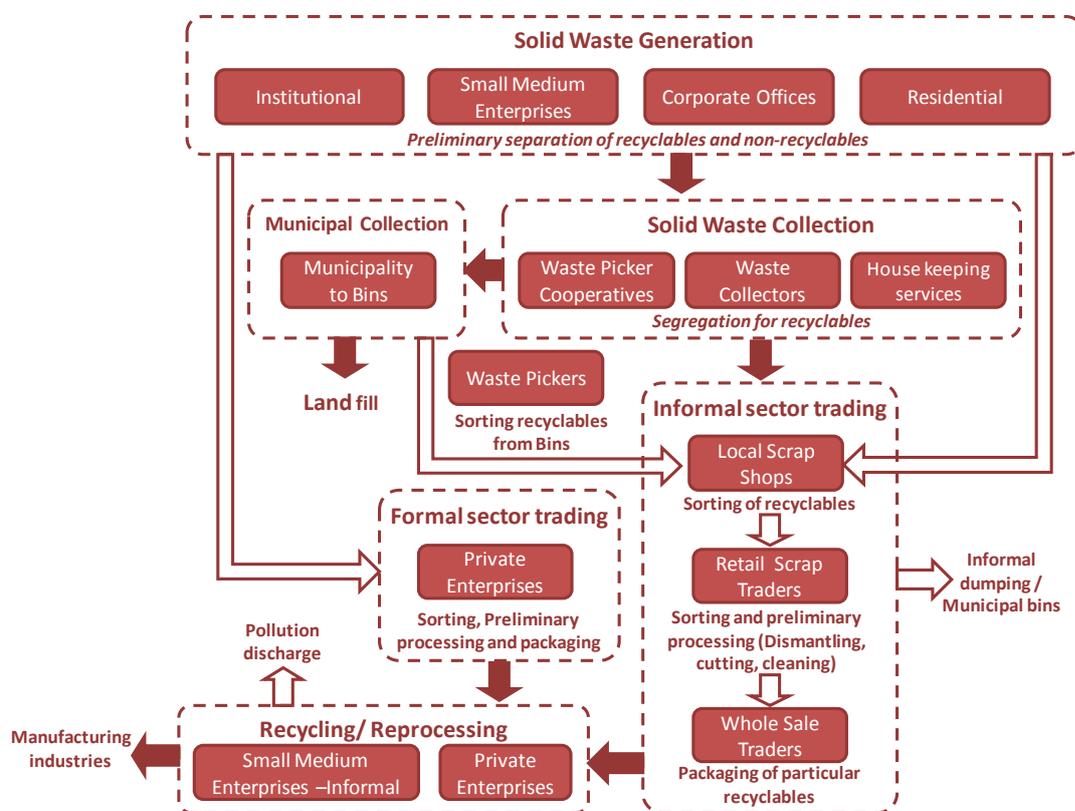
The actual total number of plastic recycling units is believed to be much higher and the capacity of each of these units is unknown.<sup>38</sup>

It is observed that businesses are specialised in particular waste streams and do not generally work with multiple waste streams at a location. E-waste business organisations for instance do not work on plastic waste or MSW. Companies that handle multiple waste streams like Wongpanit are not seen in India.

### 3.1.4 Recyclable material flows

The waste flow along with the stakeholders and processes involved in waste processing is illustrated in **Figure 3.1** below. The role of waste pickers is central in the decentralized segregation of waste. Along with the waste pickers, the informal sector is operational at a local level through local scrap shops which sort recyclables from households, small or medium sized enterprises and institutions and buy recyclables from waste pickers. These get further directed to the retail traders of scrap and wholesale scrap dealers, who are also a part of the informal sector. There are emerging examples of private companies targeting large generators such as offices, schools, institutions that mainly generate recyclables such as paper and plastic. All of these stakeholders assist in scrap collection, trading and directing it for recycling.

**Figure 3.1: Generic flow chart of recyclable material flow**



<sup>38</sup> Annepu, R. K. (2012). *Sustainable Solid Waste Management in India*. New York, USA: Earth Engineering Centre, Columbia University & Waste-to-Energy Research and Technology Council (WTERC).

### **3.1.5 Recycling stakeholders**

In most cases, materials that have some value are not lost in India. Recycling is practiced by several stakeholders at different points in the SWM chain (Zhu, Asnani, Zurbrügg, Anapolsky, & Mani, 2008). However, at present there is a lack of coordination among the stakeholders and therefore still large scope for improvement.

The two major stakeholders include the formal and the informal sector players.

#### **1) Informal sector**

Informal sector is the largest group of stakeholders on recycling in India. The informal sector comprises of waste pickers, itinerant waste buyers, dealers and recycling units. Waste pickers constitute the largest population in the informal sector. For example, the informal sector in Delhi employs about 150,000 people (0.9% of the total population of 16.75 million). Equally large populations of waste-pickers are estimated in Mumbai, Kolkata and Chennai. Other cities, such as Bengaluru, Hyderabad and Ahmadabad have slightly lower estimated populations of waste-pickers. The total number of people involved in informal recycling in India is estimated to be 2.86 million, i.e. 0.75% of the urban population (377 million) or 0.23% of the total population of India (1,210 million)<sup>39</sup>.

#### **2) Formal sector**

##### **a) Urban Local Bodies**

Urban Local Bodies (ULBs) are responsible under the 74<sup>th</sup> amendment of the Indian Constitution, respective state laws, and the Municipal Solid Waste (Management and Handling) Rules 2000 for managing municipal solid waste in an appropriate manner. In most Urban Local Bodies there are engineers, health officers, sanitary inspectors, and supervisors in charge of Solid Waste Management departments.

Currently, the ULBs are tasked with the following;

- (i) to organise door to door waste collection, infrastructure development for collection storage, segregation, transportation, processing and disposal of municipal solid wastes
- (ii) to formally allow and encourage other agencies to undertake this work.
- (iii) to provide incentives to undertake the work through provision of capital costs or equipment and encouraging the informal sector.

Some ULBs, especially those in Pune, have taken a lead and formalized the waste-pickers in the city by encouraging formation of associations and signing a Memorandum of Understanding (MoU). This trend is increasing and spreading to other ULBs. Given the key role played by the informal sector in waste recycling, focus should be on institutionalizing the informal sector. Once formalized, the minimum wage requirements, labour laws and

---

<sup>39</sup> Annepu, R. K. (2012). *Sustainable Solid Waste Management in India*. New York, USA: Earth Engineering Centre, Columbia University & Waste-to-Energy Research and Technology Council (WTERT).

operational health and safety regulations will ensure their welfare. Providing sorting centres and micro-finance for production or valorisation are the expected next steps.

#### **b) State Pollution Control Board (SPCB)**

State Pollution Control Boards (SPCBs) are primarily responsible for monitoring the implementation of the Municipal Solid Waste (Management and Handling) Rules 2000 and for taking actions against defaulters. The SPCBs are also responsible for authorizing the municipal authorities or operators of the facilities to set up treatment and disposal facilities as well as also checking compliance.

#### **c) Non-Governmental Organizations**

There are various kinds of interventions made by civil society groups, with a number of objectives and approaches.

There is enormous potential to involve RWAs, NGOs and CBOs in decentralized solid waste management ensuring cost efficiency. There are examples of the Urban Local Bodies supporting their involvement in the form of grants, subsidies or Memorandums of Understanding. NGO involvement is critical in integrating the informal sector into a formal waste management system. Their involvement has also been important for advocacy of human rights on behalf of the waste pickers. NGOs such as KKPKP/Swach in Pune, Stree Mukti Sangathana in Mumbai, Chintan in New Delhi have done extensive work towards advocating for the waste pickers, creating a union and giving them a sense of identity and mainstreaming them into society. They have also had an important role in formulating and executing the cooperative model with waste pickers for door-to-door collection, segregation and decentralized waste management.

The Cooperative Model assists in building partnerships with the city administration and/or with corporates – the latter to assist in Extended Producer Responsibility (EPR).

#### **d) Private Sector**

The Urban Local Bodies are involved in the private sector through the door-to door collection of solid waste, street sweeping in a limited way, secondary storage and transportation, treatment, processing and disposal of waste. Cities which are pioneers in Public Private Partnerships (PPP) in SWM include Bangalore, Chennai, Rajkot, Delhi, Hyderabad, Ahmadabad, Surat, Guwahati, Mumbai and Jaipur. In most of the cases, the ULBs have benefited by reducing 30 to 50% of their operating costs.

The resource recovery from waste is partly taken care of through PPP models. The PPP models for development of waste management/processing facilities are: Build, Own, Operate and Transfer (BOOT); Build, Own and Operate (BOT) and Design, Build and Operate (DBO). These facilities include recovery services by undertaking segregation, partial compacting and directing the recyclables into the recycling industry. In most of these cases, the municipal authority provides land on a token lease rent and collects and delivers waste to the plant site.

The private firm invests money to build, own and operate the facility for a term of normally 20 to 30 years sufficient for a reasonable return on investment.

The private sector involvement in waste recycling activities is small and mainly in the recycling of paper, plastic and metal. Private investments in the recycling sector is seen to have potential, but is not sufficiently supported by financial institutions with softer loans, grants from governments or multi-lateral development banks, and financial incentives by the government.

### 3.1.6 Recyclable price

The price of recyclables varies temporally and spatially across the country. It also increases at each stage of the waste processing cycle from the local scrap shop to the wholesale trader to the recycler. The price variation ranges from 10 to 20% at each stage inclusive of profit margins. **Table 3.1** gives an approximate price of the main recyclables in metropolitan cities.

**Table 3.1: Rates of recyclables in the retail market in India**

No	Material	Rate of sale at retail level per kg (Rs.)	Rate of sale at retail level per 10 kg (USD)
1.	Cement sacks	2 to 3	0.4 to 0.6
2.	Soiled plastic bags PP	2 to 5	0.4 to 0.9
3.	Newspaper	5 to 10	0.9 to 1.9
4.	Tin	5 to 10	0.9 to 1.9
5.	Iron	16 to 22	3.0 to 4.2
6.	White paper	5 to 10	0.9 to 1.9
7.	Low grade soiled paper	1 to 3	0.2 to 0.6
8.	Corrugated cartons	5 to 10	0.9 to 1.9
9.	Glass	1	0.2
10.	Alcohol bottles	1 to 2	0.2 to 0.4
11.	PET Bottles	10 to 20	1.9 to 3.8
12.	Cloth	2	0.4
13.	Blow moulded plastic	6 to 8	1.1 to 1.5
14.	Soft plastic	5 to 8	0.9 to 1.5
15.	Milk bags- LD	4 to 8	0.8 to 1.5
16.	Milk bags- HD	15 to 25	2.8 to 4.7
17.	Tetrapak	5 to 8	0.9 to 1.5
18.	Aluminium cans	80 to 90	15.1 to 17.0
19.	Aluminium (from caps)	80 to 90	15.1 to 17.0
20.	Chappals/Boots	1 to 3	0.2 to 0.6
21.	Metals (Bronze, Brass, Copper)	180 to 400	34 to 75.5
22.	Batteries	35 to 40	6.6 to 7.5

There is an observed increase in the price of recyclables between the years 2008 to 2012. Although, there was a drop in prices ranging from 20 to 40% for all types of recyclables between the years 2008 to 2009, the prices of rubber and glass were not affected. Between the years 2009 to 2012, there was an average annual price rise of around 5 to 60% in recyclables, the lowest attributed to glass and paper and the highest to plastic and Tetrapak.

### 3.1.7 Recycling promotion law and policies

The important laws and regulations related to recycling are summarized in **Table 3.2**. All of them address specific wastes separately and their implementation is with the State Pollution Control Boards (SPCB).

**Table 3.2: Solid Waste Management Rules in India**

<b>Rule</b>	<b>Brief description</b>
Batteries (Management and Handling) Rules, 2001	These rules shall apply to every manufacturer, importer, re-conditioner, assembler, dealer, recycler, auctioneer, consumer and bulk consumer involved in manufacture, processing, sale, purchase and use of batteries or components thereof.
Recycled Plastics Manufacture and Usage Rules, 1999 as amended in 2003	In 1999, the Ministry of Environment and Forestry (MoEF), the Government of India (GoI) issued the Recycled Plastics Manufacture and Usage Rules, 1999 which were amended in 2003. These rules prohibited the usage of carry bags or containers made of recycled plastics for storing, carrying, dispensing, or packaging of foodstuffs. The recycling of plastics would have to be undertaken strictly in accordance with the Bureau of Indian Standards specification: IS 14534: 1998 titled "The Guidelines for the Recycling of Plastics".
Maharashtra Non-Biodegradable Garbage (Control) Act, 2006	This Act provides for prevention of the garbage into open drains, roads, wetlands, waste lands, water bodies and open places to public view, and regulating the use of non-biodegradable material. It states that the State Government holds the powers to impose restrictions or prohibitions on the use of certain non-biodegradable material or any other material which is harmful to the environment.
The Maharashtra Plastic Carry Bags (Manufacture and Usage) Rules 2006	The Maharashtra Plastic Carry Bags Rules is the most recent rule. This rule restricts thickness of the plastic bag and mandates the manufacturer to seek registration with the MPCB. It also states the conditions of manufacturing carry bags and containers made up of plastic and the markings to be made on them.
E-Waste (Management and Handling) Rules, 2011	The E-Waste (Management and Handling) Rules, 2011 provides for measures to enable the recovery and/or reuse of useful material from e-waste and ensures environmentally sound management of all types of waste from electronic and electrical equipment so as to reduce resulting environmental and health hazards.

## 3.2 Recycling business model

This report provides examples of four recycling business models in India: i) conventional small to medium enterprise model, ii) NGO oriented model, iii) waste picker cooperative model, and iv) private company model.

### 3.2.1 Conventional small-to-medium enterprise

In general, this model is linked to the various other models described in this section. This is a subset and mainly involves the informal sector players consisting of local scrap shops, retail scrap traders, whole sale scrap dealers, re-processors and recyclers. They deal with all kinds of recyclable materials; paper, plastic, metals, e-waste, rubber, etc. The waste pickers play an important role in the operation of these business enterprises. They ultimately link up as suppliers to the manufacturers of various products. **Figure 3.1** explains the involvement of the conventional small to medium enterprise in the waste recycling chain.

#### (a) Background

Scrap collection is the first stage in the recycling sector. The conventional waste buyer shop/ local scrap shop in India is a major player at the local level, directly linking with the waste pickers and delivering recyclables to larger scale waste dealers. These recyclable wastes get further directed to the retail traders of scrap and wholesale scrap dealers, who are also a part of the informal sector (**Figure 3.2**). All of these players are mainly located in slum areas. They may be registered under the respective Municipal Corporation as a Shop & Establishment, and are not necessarily authorized by the State Pollution Control Boards. The working conditions often do not comply with the occupational, health and safety standards in the country.

#### (b) Scale of business

The local scrap shops generally operate in a space varying from 4.65 – 27.87 m<sup>2</sup>. Their income is around 200- 600 USD per month, depending on the scale of the operation. Typically, their area of influence is within a 3 km radius of the shop and they handle around 150 kg of recyclables at any given time, again depending on the scale of the operation.

The retail scrap traders usually operate from an average space of 280 m<sup>2</sup>, including 186 m<sup>2</sup> of open space. The material stored is approximately 1300 kg, dependent on the materials handled by the retailer.

The wholesale scrap traders operate typically from a space of 4,645 – 5,574 m<sup>2</sup>. The material stored is around 5 – 6 tonnes depending on type of the materials.

#### (c) Business and marketing strategies

The local scrap shops have a well-established local presence and network at the neighbourhood level to source materials from the waste pickers and buy waste from households and small and medium establishments. The retail scrap traders network with the local scrap shops and sell it on to the wholesale traders.



A scrap dealer in Dharavi dealing in from cardboard which is sold to paper recyclers recycling



A scrap dealer in Dharavi dealing in plastic car scrap, further shredded for plastic recycling



Drying shredded and washed plastic scrap



Discarded large cardboard being refurbished into smaller boxes



Sorting of plastic waste



Recycling plastic into pellets

**Figure 3.2: Recycling activities by SME**

A pickup service is often arranged by the buyer to procure the waste from the seller. The wholesale traders are networked and connected directly to recyclers to sell the segregated and sorted waste. The connections can either be wholesaler to wholesaler or wholesaler to recycler.

Their networking and direct communication is the only marketing strategy used.

#### **(d) Source of recyclables, processing and value added**

There is value added at each step; segregation, sorting, dismantling, shredding, refurbishment, compacting, packaging, etc. Following these processes the recyclables are finally dispatched to the recycler who transforms the material into products such as pellets, ingots, cullets, etc. that are sold to manufacturing industries.

The local scrap shops and retail scrap traders are involved with sourcing, segregation and sorting different types of wastes into their sub-categories. They may be sorted by texture, density, thickness, and colour.

The waste is further sorted and compacted by the wholesale trader and stored until a large amount is reached. This may be sold to re-processors where the waste undergoes processing and may be reprocessed to make different products (large cardboard boxes to smaller ones). The sorted, compacted and packed products (e.g. metals, plastic, cardboard, paper) are further sold to the recyclers. Some recyclables such as plastic are recycled by different medium enterprises within the slums into pellets and sold in the market.

In case of e-waste there are small and medium scale enterprises operating in the slums as dismantlers and recyclers. They operate in an effective network with small scale waste retail traders (collection points). Electrical and Electronic Equipment (EEE) is technically checked, further refurbished or manually dismantled for metal extraction. This is done in an environmentally unsound manner, with wires being burnt to extract the metal and manual dismantling. Plastic, metals and special metals are extracted in this manner and sold in the market.

#### **(e) Technology and innovation**

There is no particular technology and equipment used by the local scrap shops and traders for sorting and segregating recyclables. The dismantlers, re-processors and recyclers use locally fabricated and manufactured machinery such as shredders and extruders.

#### **(f) Social and environmental promotion activities**

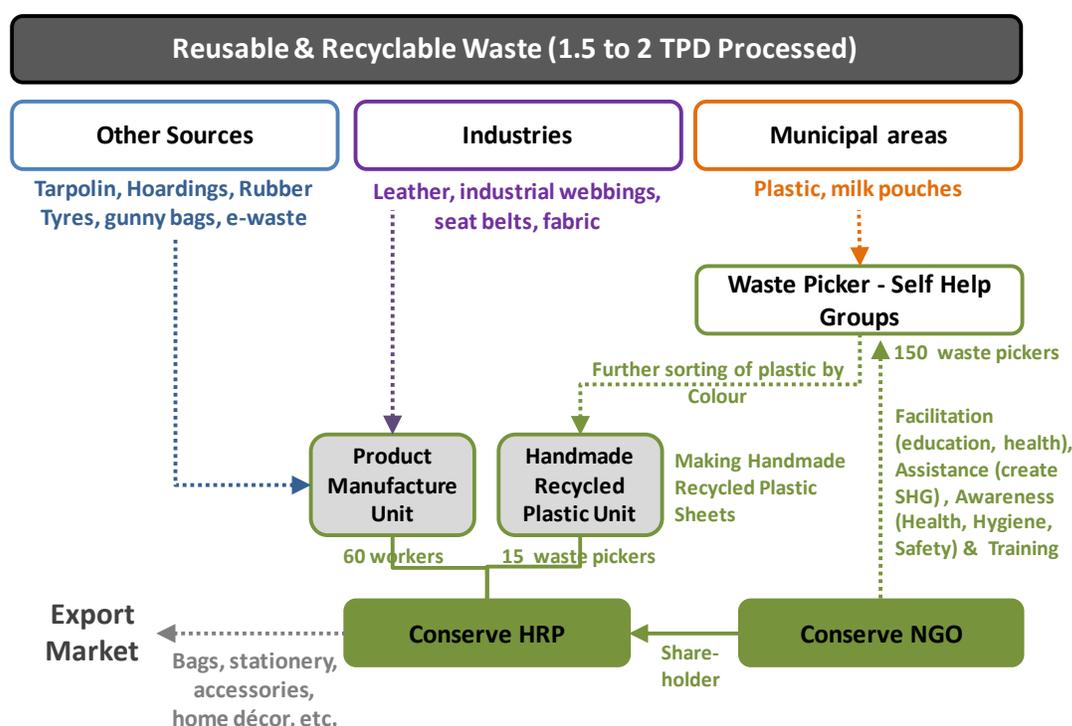
- None

#### **(g) Business extension and scaling-up strategies**

- None

### 3.2.2 NGO oriented business model

In general, this model is initiated by NGOs and implemented in partnership with waste pickers. It also combines an innovative strategy of integrating fashion, design and manufacture of useful products from recyclable waste with the participation of the waste pickers. **Figure 3.3** presents an example of this business model initiated by Conserve India.



**Figure 3.3: NGO oriented model-Conserve India**

#### 3.2.2.1 Conserve India<sup>40</sup>

##### (a) Background

Conserve India, an NGO was founded in 1998 to recycle the waste in their neighbourhood that was not being managed by local authorities, improve energy efficiency, and help some of Delhi's poorest out of the city's slums. They soon realized that plastic bags were a major concern that needed attention. The team at Conserve India started experimenting with using discarded plastic and came up with a solution to recycle bags into sheets of plastic called

<sup>40</sup>The information noted is based on the discussion with Mrs.Anita Ahuja and Mr.Shalabh Ahuja, Founders of Conserve India Mr.Guarav Dhingra, Designer at Conserve on 6<sup>th</sup> August, 2012 at their manufacturing facility at Bahadurgarh, Haryana, India (near Delhi)

Handmade Recycled Plastic (HRP) that could be used to manufacture fashion accessories. This also led to the formation of a company called Conserve HRP in 2003, as an export house which produced bags for export to international markets. The Conserve HRP is a self-proprietorship with Conserve NGO being a board member and having a guardian share in the company.

In the last 2-3 years there has been interest expressed by social investors to invest in the company due to its principles of social improvement and environmental concern.

### **(b) Scale of business**

It is a small-scale waste recycling initiative that received initial financial support from ADB, USAID, WHO and personal funds (60% grants and 40% personal). In case of Conserve HRP, initial financial support was 90% personal funds through loans with a grant making up the remainder.

There are around 150 unskilled waste pickers employed by Conserve India NGO through organizing them into self-help groups. These waste pickers have a formal contract with Conserve HRP for waste procurement on a quantity basis. By being involved with Conserve HRP, a regular source of income is assured and it is about twice as high as likely alternative work (Rs.150-200/day; 3-4.USD). Additionally, working conditions are better than when they were working as individual waste pickers. The waste pickers have been trained in health and safety issues. Furthermore, they have opportunities for skill development and further growth opportunities.

The manufacturing facility (on a plot of 0.08 hectares) employs 60 skilled persons for the manufacture of bags and other fashion accessories and home interior design products (**Figure 3.4**). There are 12-15 persons working on the handmade recycling plastic facility. Conserve also works with other material fabricators such as cloth rag makers.

### **(c) Business and marketing strategies**

Conserve HRP buys material/products from Conserve NGO. Some part of the profits of Conserve HRP is shared with Conserve NGO. They have collaborations with different design and management schools and have a continuous involvement of interns from management and design schools. They have collaborated with organizations like George Town University, Washington (USA), Footwear Design Institute and others. These organizations help them with business development, design development and marketing strategies.



Washing of plastic bags



Drying of cleaned plastic bags



Sourced rubber tyre waste for manufacturing of fashion accessories



Industrial webbings and seat belts for manufacture of fashion accessories



Manufactured handmade recycled plastic



Quality check and correction of bags



Manufactured bags from rubber plastic



Manufactured bags from handmade recycled plastic

**Figure 3.4: Recycling activities at Conserve**

(Source: <http://www.greenmuze.com/green-your/fashion/1317-conserve-photo-story-.html>)

The products manufactured are sold and exported to the international market. They focus on fair trade buyers. They participate in export trade shows and depend on word of mouth marketing. They export to various countries such as France, Netherlands, USA, and Germany. The international market is more favourable due to their sensitivity and awareness about fair trade; environmental consciousness; their fashion is more aligned to absorbing new ideas and trends; there is low entry costs for business and less competition. The Indian market and fashion trends are mature enough for green products and fair trade practices.

#### **(d) Source of recyclables, processing and value added**

The Conserve HRP facility buys plastic waste including plastic bags, rubber tyres, tubes, seat belts, industrial webbings, fabric waste, gunny bags, tarpaulin, etc. from waste pickers. Each waste picker can collect around 15-25 kg of waste per day. The commercial waste materials such as belts, rubber, etc. are procured from the waste disposed by large manufacturing companies. Altogether, the facility receives around 1.5 to 2 tonnes/day.

The waste pickers involved with Conserve India collect plastic bags, sort them manually into different colours into bamboo made bins at a central collection space within waste pickers residential clusters. These clusters are spread in different pockets of Delhi. The sorted plastic is sent to their recycling facility to make sheets of handmade recycled plastic. The sorted fabric waste is stitched together to form large patches of cloth for manufacturing of bags and other accessories. Various other recyclable waste materials such as seat belts, tarpaulin, industrial webbings, etc. are collected at their central manufacturing facility at Bahadurgarh, Haryana (close to Delhi).

#### **(e) Technology and innovation**

They have developed their own technology for manufacture of handmade plastic recycling sheets. They have other equipment such as sewing machines for manufacturing bags and other accessories. Their central facility has the following: washing area, storage room, prototype room, production room, quality assessment room and the show room. The training is either undertaken in the central facility or at the school.

They have a R&D facility and laboratory and have collaborated with other laboratories for material testing. They examine new materials for their characteristics and possible use in manufacture of various usable products and accessories.

#### **(f) Social and environmental promotion activities**

The Conserve NGO tries to improve status of the waste pickers including their low conditions of hygiene and safety at work and health risks, which influenced the founders of Conserve to

establish the organization. Additionally, they wanted to do something for the betterment and improvement of the neighbourhood environment.

**Awareness & training:** Conserve India adopts a training and skill development strategy for the improvement of waste pickers and to create entrepreneurs. The waste pickers are trained to sort material and plastic into various types and colours through use of creative strategy and use of popular media such as Bollywood movies as a common visual platform for communication. For example the trainers use Bollywood movies and songs to explain to the waste pickers how to identify and segregate waste into the correct bin. They are further trained in finer skills for cutting, pasting, weaving, stitching different materials. They have vocational training camps. Some of the waste pickers are trained to manufacture HRP of the required types, designs and colours. The school is intended for the waste pickers' children to groom them and train them in basic lifestyle, health and hygiene and go onto basic communication so as to get access to formal school education. They have also organized campaigns for the recognition of the waste pickers. Conserve also organizes environmental clubs in schools.

**Social benefits:** Conserve states that waste pickers collecting bags for Conserve earn on average three times more than they would earn elsewhere. Conserve provides training opportunities for all staff at their facility so that they can get more skilled jobs either within the organization or elsewhere. They have also started a school in the slum where many of the waste pickers live. Conserve workers also get access to a loan facility to develop their own start-up businesses, and most recently a health clinic for the entire workforce. They also assist the waste pickers in further medical healthcare and refer them to hospitals in critical cases.

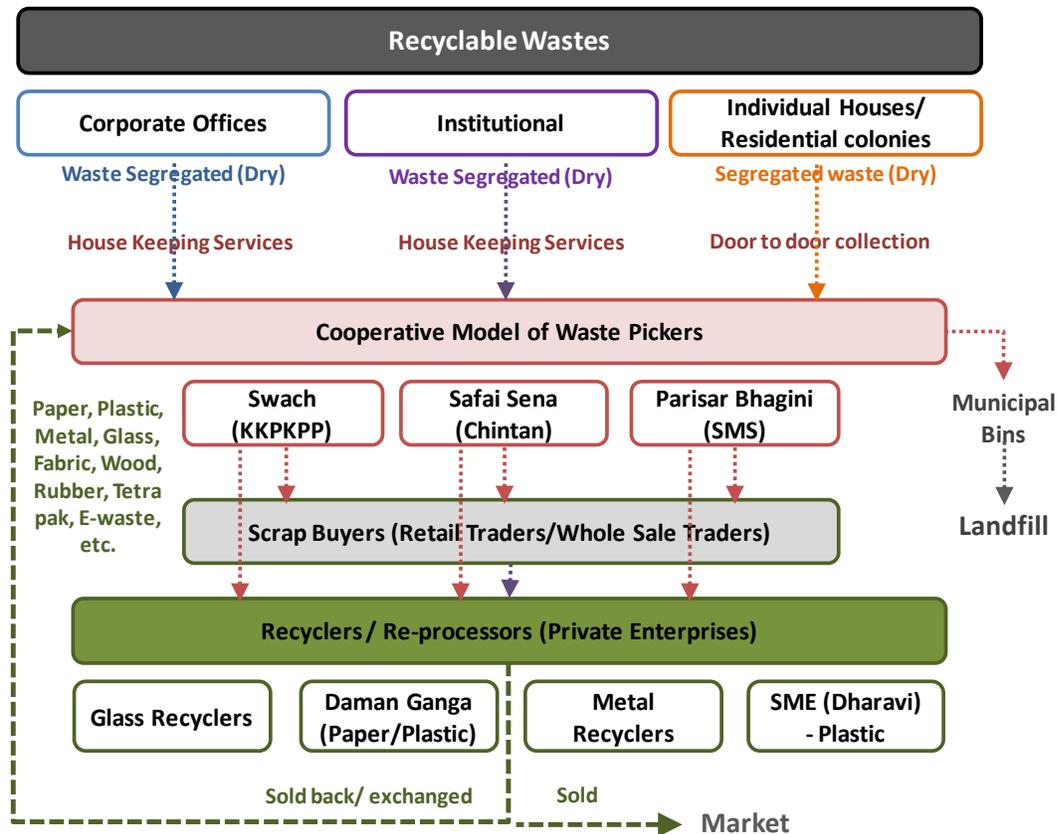
**Fair trade:** The company tries to ensure that the market value of the goods is directly shared with the producer and ensures minimal involvement of middlemen. Thus the waste pickers get a better price for the waste and do not have to share it with the scrap shops or scrap traders. The product is directly sold to the customer. Therefore, Conserve is recognized as a fair trade company.

#### **(h) Business extension and scaling-up strategies**

Conserve does not have particular strategy in place. However, it is currently being assisted by the George Town University in the development of a business plan. They are looking at the franchise model to expand their efforts. Furthermore, some NGOs offer to support replication of their models. Some multinational companies who want to act as social investors propose to support the scaling-up of this model. However, the company has not yet taken any decision.

### 3.2.2.2 Waste picker cooperative model

The waste picker cooperative model recognizes the role of the waste pickers in the decentralized segregation of waste as well as the informal sector role in scrap collection, trading and directing it for recycling. The model integrates all together through the active facilitation of the government/municipal corporation. The relationship and business model is explained in **Figure 3.5** below.



**Figure 3.5: Cooperative Supported Recycling Model**

## 1) Waste picker association: Safai Sena of Chintan<sup>41</sup>

### (a) Background

Safai Sena is an association of waste pickers initiated by Chintan, a social driven institution. Chintan works with waste pickers to give them a sense of identity. Safai Sena is run by the waste pickers themselves and has about 12,000 members. Safai Sena receives education and training from Chintan on handling and managing waste properly to ensure that health and safety measures are maintained while working.

### (b) Scale of business

With support from Chintan, in partnership with the New Delhi Municipal Council (NDMC), Ghaziabad Nagar Nigam, as well as a range of RWAs across the Delhi region and other agencies, Safai Sena has signed a contract with over 6,000 households as well as other establishments in the NDMC area.

### (c) Business and marketing strategies

In the traditional system of waste management in Delhi, the waste collection was undertaken and contracted to the Valmiki Samaj (the low caste community dealing with waste) and street sweeping was undertaken by the Bhangis (a lower caste community employed by the Valmiki Samaj). The Valmiki Samaj employed the waste pickers called the 'Kabbadiwalas' (waste pickers) in Delhi for a small fee and the recyclables were sold by the waste pickers who are the first tier (bottom tier) in the waste management pyramid. The second tier is the 'cycle kabbadiwala' who buys waste from the households. The third tier is the 'junk dealer' who is the scrap dealer who buys from the waste picker, households/establishments and the cycle kabbadiwalas.

With the facilitation of Chintan, Safai Sena secured work and legal contracts from the municipality or other residential colonies or institutions. Chintan connects Safai Sena to the recycling market and the municipal corporations in and around Delhi with the assurance of access to recyclable waste and safe work. The waste pickers have ID cards and formal contracts to allow door to door collection. It ensures that the waste pickers are not harassed and reduces uncertainty. Their incomes range from Rs.4,000-6,000/month (75-115 USD) which is higher than previous working conditions where they usually get paid around 50-60 USD per month with no assurance of regular work and income. These waste pickers are not required to share their income with Chintan. Additionally, they are given uniforms and education is provided for their children to mainstream them in society.

---

<sup>41</sup> The information noted is based on the discussion with the Chintan Team (Mr. Protip Bose-Head of Programmes, Mr. Rajneesh Tyagi, Moses Bane, Pujarini Sen) on 8th August, 2012. Further details were also available on their website <http://www.chintan-india.org/>

The Safai Sena undertakes door to door collection services to over 20,000 households in Ghaziabad (a municipal corporation area in the New Delhi Metropolitan Area). They are also contracted by around 22 institutions, townships and corporate houses such as; ONGC, DLF, Vodafone, public agencies, etc. for in house solid waste management. Residents pay for the waste collection service directly to Safai Sena and the particular waste pickers. They segregate and sell the recyclables to the scrap dealers.

#### **(d) Source of recyclable, processing and value added**

Safai Sena deals with all kinds of municipal solid waste and e-waste. Safai Sena handles over 10 tonnes of recyclable waste per day through its solid waste programme.

The waste is manually segregated, sorted, dismantled, compacted, packaged, temporarily and sold to scrap dealers.

#### **(e) Technology and innovation**

Safai Sena has a Material Recovery Facilities (MRF) at Tughlakabad, Bhopura, and 4 Railway Stations; New Delhi, Old Delhi, Nizamuddin, Anand Vihar. The MRF is a dedicated facility for segregation and temporary storage until it is sold to scrap traders or recyclers. They have a plastic shredder/compactor at one of the stations. The MRF is operated by Safai Sena and the profits are shared with the waste collectors and facility managers.

#### **(f) Business extension and scaling-up strategies**

Safai Sena with the help of Chintan would like to expand their reach by involving many more waste pickers and plans to set up MRFs in other areas of Delhi.

### **2) Kagad Kach Patra Kashtakari Panchayat (KKPKP) & SWaCH Seva Sahakari Sanstha Maryadit<sup>42</sup>**

#### **(a) Background**

Kagad Kaach Patra Kashtakari Panchayat (KKPKP) is a membership-based trade union striving hard for the benefit of waste pickers. It has a membership of over 8,000 waste pickers and itinerant waste buyers in the cities of Pune and Pimpri Chinchwad. It was formed in 1993 to organize waste pickers; establish and assert their contribution to the environment; improve their status as workers and have their crucial role in the solid waste management of the city acknowledged.

---

<sup>42</sup>The information noted is based on the discussion with KKPKP, General Secretary, Ms. Lakshmi Naryanan, site visits on 26<sup>th</sup> July, 2012. Further details were also available on their website <http://www.wastepickerscollective.org> and <http://swachcoop.com/>.

The Solid Waste Collection and Handling Cooperative or officially the SWaCH Seva Sahakari Sanstha Maryadit, Pune is a cooperative of waste pickers and other urban poor which came into existence in 2008. It is the institutional outcome of the door-to-door waste collection initiative of the KKKPKP to integrate waste pickers into door-to-door collection of source segregated waste thereby improving their conditions of work and upgrading their livelihoods. SWaCH is authorized by the Pune Municipal Corporation to provide door-to-door waste collection and other allied waste management services. The scope of SWaCH includes collection of waste, resource recovery, trade and waste processing.

### **(b) Scale of business**

The KKKPKP's initiatives are supported by external donor agencies, individual and institutional donors. The Pune Municipal Corporation (PMC) provides the infrastructure and transportation logistics. They have provided 34 sorting sheds/spaces. Pune Municipal Corporation institutionalized the Scheme for Medical Insurance for all Registered Waste-Pickers in its jurisdiction.

The Pune Municipal Corporation (PMC) and Pimpri Chinchwad Municipal Corporation (PCMC) have contracted SWaCH for the waste management of 40% of the area of Pune and 50% of the area of Pimpri Chinchwad. SWaCH waste pickers undertake door-to-door collection from 350,000 households within Pune Municipal Corporation and 250,000 households in Pimpri Chinchwad Municipal Corporation. There are around 200 households serviced per waste picker. They are paid Rs.4 per month per household (0.08 USD) towards logistics, planning and management of the entire solid waste management system in those areas. The average income of waste pickers involved with SWaCH is around Rs.4500/month (85 USD) whereas previously they obtained only around 50-60 USD.

At present around 3,000 waste pickers are members of SWaCH. SWaCH has extended its service to another city, and today there are SWaCH PMC (Pune Municipal Corporation), SWaCH PCMC (Pimpri Chinchwad Municipal Corporation), and SWaCH Plus which includes all the livelihood improvements and income enhancement activities that go beyond door-to-door collection.

### **(c) Business and marketing strategies**

The access to recyclable waste is ensured through a contract with the municipality. The selling of recyclables is done through networking with scrap dealers and the establishment of fair trade scrap shops through creating awareness amongst the scrap dealers. They have also created a network base and forward linkages to wholesale scrap buyers and recyclers. SWaCH has also established 3 scrap shops using a cooperative model to ensure a fair price and profits are directly shared with the waste pickers.

The area of the scrap shop is provided by the municipality. The shops are run through a cooperative model. The scrap shops have electronic scales, systematic storage and segregation of various types of recyclables sold. The profits, receipts for which are provided by the SWaCH waste pickers, are distributed based on the proportion of waste contributed. One such scrap shop in the PCMC area achieved sales of around Rs.2 lakhs (3,750 USD) from recyclables purchased for Rs.1.5 lakhs per month (2830 USD). They had hired a manager and 1-2 helpers for operating and managing each scrap shop.

They have also started providing waste collection services to institutions and corporate houses at a certain cost for collection depending on the quantity of recyclables.

The payments are made to waste pickers as per work done and payments are made by clients through the cooperative model. SWaCH deducts a 5% user fee from the payments to the waste pickers. This fee is for supervision in each area and for coordinating activities.

#### **(d) Source of recyclables, processing and value added**

The scope of SWaCH includes collection, segregate recyclable waste, trade and waste processing. The waste pickers are involved with gate collection and door to door collection after which the waste is segregated into various recyclables through manual segregation. Citizens have been taught to separate their waste into dry and wet through awareness raising activities. The waste is collected and further sorted in a sorting area provided by the municipality/local resident groups or a space close to a municipal bin. The segregated recyclable waste includes glasses, cardboards, papers, plastics, cables, metals, footwear, clothes, etc.

The segregated waste is temporarily stored in covered areas until a certain amount is reached for sale. The recyclables are sold at dedicated fair trade scrap shops identified by KKPKP or SWaCH owned scrap shop and if not available in the locality of operation, they are sold directly to the nearest scrap shop. Depending upon the scale of operations in various localities and availability of sorting sheds provided by the municipality, the collected and segregated waste is sold directly to wholesale scrap buyers or recyclers.

Each pair of waste pickers recovers and sells around 80 kg per day of recyclable waste. Thus, around 120 -180 tonnes/day is estimated to be recovered by the SWaCH waste pickers out of approximately 850 tonnes/day through door to door collection in Pune and Pimpri Chinchwad by SWaCH. Each waste picker makes around Rs.50-70 per day (1-1.3USD) i.e. Rs.1,800 (35 USD) through sale of recyclables and Rs.2400 (45 USD) through gate collection charges. They typically work 5-6 hours a day starting at 7:30 am.

After segregation of the recyclables and organic waste, the rest of the waste is disposed into the municipal bins which will be collected later on by the municipality.

### **(e) Technology and innovation**

There is no technology used for segregation of waste, it is undertaken manually.

### **(f) Social and environmental promotion**

KKPKP functions on the principles of “Collective Ownership”, “Participation” and “Empowerment”. It aims at addressing the grievances of the waste pickers, creating platforms for social and cultural renewal, market interventions in scrap trade, lobbying for legislative protection, developing institutional mechanisms for social security, fighting for seeking state assistance in claiming medical insurances, promoting education and safe-guarding human health, and the prevention of child labour.

**Awareness:** SWaCH/KKPKP is an implementing agency as part of the e-waste programme organized by the Deutsche Gesellschaft Internationale Zusammenarbeit (GIZ). The programme involves creating awareness about e-waste and its hazards through workshops and various activities in schools and among various stakeholders, particularly itinerant waste buyers. They have installed e-waste collection boxes in various colleges and institutes.

They conduct training and awareness amongst the waste pickers about occupational health and safety related to waste management. They also conduct awareness drives towards sensitization of students and citizens towards segregation of waste and zero waste.

**Social Benefits:** SWaCH provides waste pickers with uniforms, gloves, masks, raincoats and soap as part of the payments made by the Municipality.

KKPKP undertakes advocacy towards creating recognition for the waste pickers work and fighting for their human rights. The payment of the annual premium to the New India Assurance Company has become part of the annual municipal budget. Hospitalization costs of up to Rs. 5,000 (95 USD) are reimbursed by the insurance company. Claims are processed through the KKPKP. There is also a pension scheme the waste pickers have been registered for under the Swavalamban National Pension System. A life insurance cover for the waste pickers is taken with an annual amount of Rs.50 (1 USD) is paid by the waste picker towards life insurance cover. KKPKP also provides a credit facility at 2% interest, 0% interest education loans as well as books and materials for the waste pickers’ children.

KKPKP also assists in medical aid requirements by connecting the waste pickers to Trust Hospitals. KKPKP also assists in providing access to education facilities/schools for the waste picker children. They help in accessing government schemes and private philanthropists. They campaign against child labour.

**Research & Developmental activities:** KKPKP undertakes research on the working conditions of the waste pickers, policy research towards advocacy of waste picker rights, economic value created through waste management by the waste pickers, assessment of waste generation and

treatment, as well as waste management business models that are socially inclusive and financially viable.

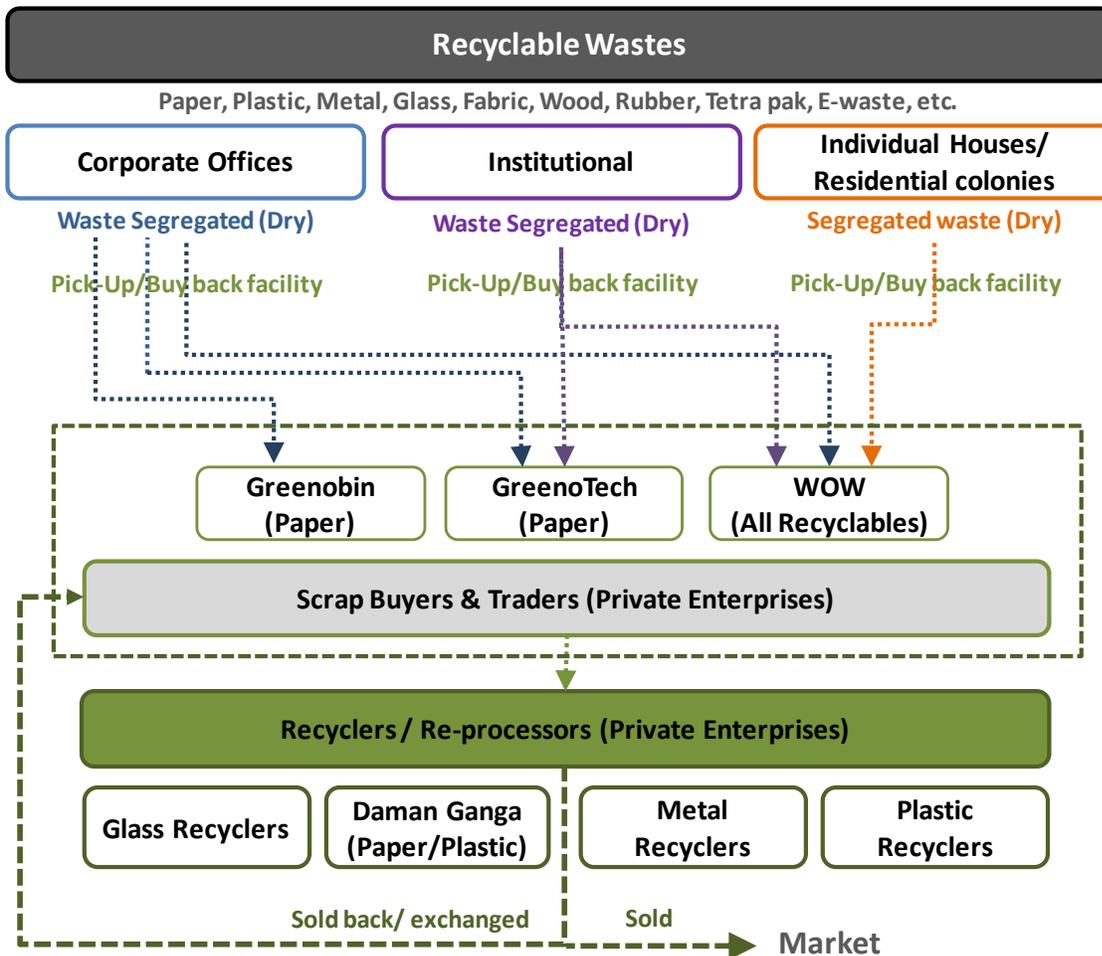
**(g) Business extension and scaling-up strategies**

KKPKP's efforts in creating awareness and capacity building activities amongst waste pickers has resulted in new members joining the Waste Picker Union as well as SWaCH, thus, leading to an expansion in the network of SWaCH in Pune as well as Pimpri Chinchwad Areas. They have also partnered with scrap shops for ensuring fair trade practices and are also establishing scrap shops on a cooperative model.

### ***3.2.3 Private Company***

#### *3.2.3.1 Private company for sourcing recyclables for recycling*

Current changes in consumer patterns, increasing waste generation and the economic potential of material recovery in recycling has led to formal private sector players entering the scrap collection and trading sector. The role of traditional scrap shops for sourcing household/small establishment waste is being replaced by private companies targeting large generators such as offices, schools and institutions that mainly generate recyclables such as paper and plastic. There are examples emerging of companies who are consolidating and building a logistical network and clientele for sourcing all types of waste from all types of clients. The examples of such private companies include Greenotech, Greenobin and Wealth of Waste amongst others. The relationship and business model is explained in **Figure 3.6** below.



**Figure 3.6: Private company model for sourcing recyclables for Recycling**

Greenobin provides a collection and redemption service to corporate sector and institutional clients for all kinds of recyclable paper in National Capital Region (Delhi). It collects waste paper from organizations and rewards them with recycled paper products in a barter system. Along with waste paper, they also collect PET bottles & Tetrapaks. Collection and sorting are performed by Greenobin post where recovered material is channelled to the recycling industry. They have in-house collection vehicles and storage areas. They use CNG vehicles for collections.

Green-no-tech collects waste paper from clients in Delhi and Gurgaon and offers the following recycled products; office files, writing pads, spiral pads, note books, paper bags, pen stands, letter head, slip boxes, visiting card sheets, office envelopes, eco ball pens, slip pads and tea coasters.

WOW - Wealth Out of Waste, provides door-step collection services to households and offices in Ahmedabad for around 30 types of recyclable wastes such as paper, metal scrap (copper, aluminium, brass), glass, plastic, wood, cartons, cardboard, utensils, wires, all types of e-waste, old vehicles, etc. They further directly connect to the recyclers ensuring the customers get a better price for their waste.

### 3.2.3.2 Private company for waste recycling

#### **Plastic recycling**

Plastic recycling activities have been undertaken by the formal and informal sector players. As per CPCB Report, there were 2,079 Plastic Recycling Units in India as of December 2006. As per the Central Institute of Plastics Engineering & Technology, there are 3,500 organized recycling units and 4,000 unorganized recycling units. There are around 1.6 million workers working directly and indirectly in the plastic recycling industry. The major types of plastics recycled are: PE, PP, PVC, PET, PS, ABS, and PMMA. An estimated 3.6 million tonnes of plastics is recycled per annum<sup>43</sup>.

The future growth trends in plastic recycling include: PET bottle recycling, automotive parts recycling, e-waste recycling, energy recovery and PE & PP road construction.

#### **Daman Ganga<sup>44</sup>**

##### **(a) Background**

Daman Ganga is a company engaged in recycling products with a focus on environmental friendly technologies. They produce a range of recycled products including paper, core-board, cores & tubes, fibre-drums, roof sheets, partition boards, insulation boards, acoustic boards, plastics composites, bio-fuels, recycled lube oils, etc.

Daman Ganga's Tetra Pak recycling facility was established by Tushar Shah in partnership with Tetra Pak which is currently not in operation.

Daman Ganga is interested in the plastic recycling business because there is lot of post-consumer plastic particularly soiled plastics bags do not get into the recycling chain and end up in the landfill site. Therefore, this company is trying to find a way to recycle this type of waste as they see a large business opportunity.

---

<sup>43</sup> Central Institute of Plastics Engineering & Technology. (2012). National Seminar on 'Recycling and Plastic Waste Management'. Delhi

<sup>44</sup>The information noted is based on the discussion with Mr. Tushar Shah, Director, Daman Ganga, information received from him and site visit of the plant at Vapi on 20<sup>th</sup> June, 2012

### **(b) Scale of business**

The entire recycling facility has been established in Vapi, Gujarat with an investment of approximately over Rs.600 lakhs (1.1 million USD). The total area of the facility is built over approximately 35 hectares with construction of approximately 2.7 hectare of buildings. There are 150 workers employed in the facility.

### **(c) Business and marketing strategies**

It is a private family owned company. They do not have any franchises and operate as any other product manufacturing industry with employed skilled and unskilled labourers and administrative staff.

The waste is either imported or procured from wholesale scrap dealers in Gujarat and places around Mumbai. They also source the waste from number of corporate houses, other private clients from Vapi and other some parts of the country through NGOs working in the area of waste picking and waste management.

This company produces a range of recycled plastic products such as roofing materials and plane boards which can be used instead of plywood to make household furniture (**Figure 4.8**). Therefore, a market for their products can be found in many sectors: industries, residential complexes, private individual houses resorts, rural areas, institutions, etc. as they have a huge range of products including panels to standardized furniture.

The recycled plastics are into direct selling of processed products; pricing is decided by various factors including fixed costs, and variable costs which include manpower, power consumption, maintenance, excise and other taxes which are chargeable on the products and so on. Nevertheless, the company sometimes sells the recycled products at a higher price than the conventional materials as a psychological technique to convince consumers that this is a high quality material.

The company tries to presents benefits of the recycled products both in term of environmental quality, long-term monetary benefits and its advantage over conventional materials. The company claims that their recycled products have a huge economic and environmental benefit compared to other similar products (panels) in the same category (for instance, asbestos cement sheet, tin sheets, acrylic for roofing material) as it has a better life span than usual products. Thus consumers have a long term economic benefit in this regard.

### **(d) Source of recyclables, processing and value added**

Daman Ganga deals with all types of post-consumer mixed plastic waste. These are particularly “difficult to recycle” type of wastes due to contamination and co-extruded and laminated plastics which pose challenges for efficient recycling. Daman Ganga receives this waste from a number of corporate houses, other private clients and from Vapi and other parts of the country

through wholesale scrap dealers and NGOs working in the area of waste pickers and waste management.

The plastics go through a number of processes including cleaning, drying, sorting and shredding before compression at high temperature, moulding, etc (**Figure 3.7**). They process and recycle mixed plastic waste to manufacture composite sheets as panels and roofing material with multiple applications such as wall claddings, interiors & exterior applications, construction applications, partitions and doors, cement casting, furniture, industrial machinery packaging, crates and shipping pallets, etc.

#### **(e) Technology and innovation**

Daman Ganga developed its own technology for plastic recycling. They have tailor made special purpose machines designed or modified in-house.

Daman Ganga technology can make high strength roofing sheets from postconsumer plastic waste. The important thing to note is that the plastic used is not separated into different grades. Any type of plastic can be used to make the sheets. The process involved is as follows:

- Washing and drying of mixed plastic waste.
- Gravity separation: This is used to separate the plastic from sand and biodegradable waste.
- Magnetic Separation: A conveyor belt was used to separate plastic from metals using a magnetic conveyor belt.
- After magnetic separation, the plastic pieces are further broken down into very small plastic pieces.
- Compression and Thermal Fusion: Compression of the plastic was done at high pressures. No catalyst is used for this step.

On an average, 20 sheets can be made in one hour. One roofing sheet uses 24kg of plastic and its thickness is 5-6 cm. They sell it at Rs. 500 per sheet (9.5 USD).

#### **(f) Social and environmental strategies**

The company conducts workshops for scrap dealers at regular intervals so as to make them aware of their new production activities and for sourcing of types of waste.

#### **(g) Business extension and scaling-up strategies**

The company is partnering with local NGOs to create awareness about waste and waste segregation and also to source waste from waste picker cooperatives. They have also been marketing the recycled products. Once the market is established, they plan to invest for further expansion.



Washing and drying of plastic



Gravity separation of mixed plastic



Magnetic separation through conveyor belt



Preparation of plastic sheets



High temperature machine for manufacture of sheets/panels



Quality check of manufactured sheets



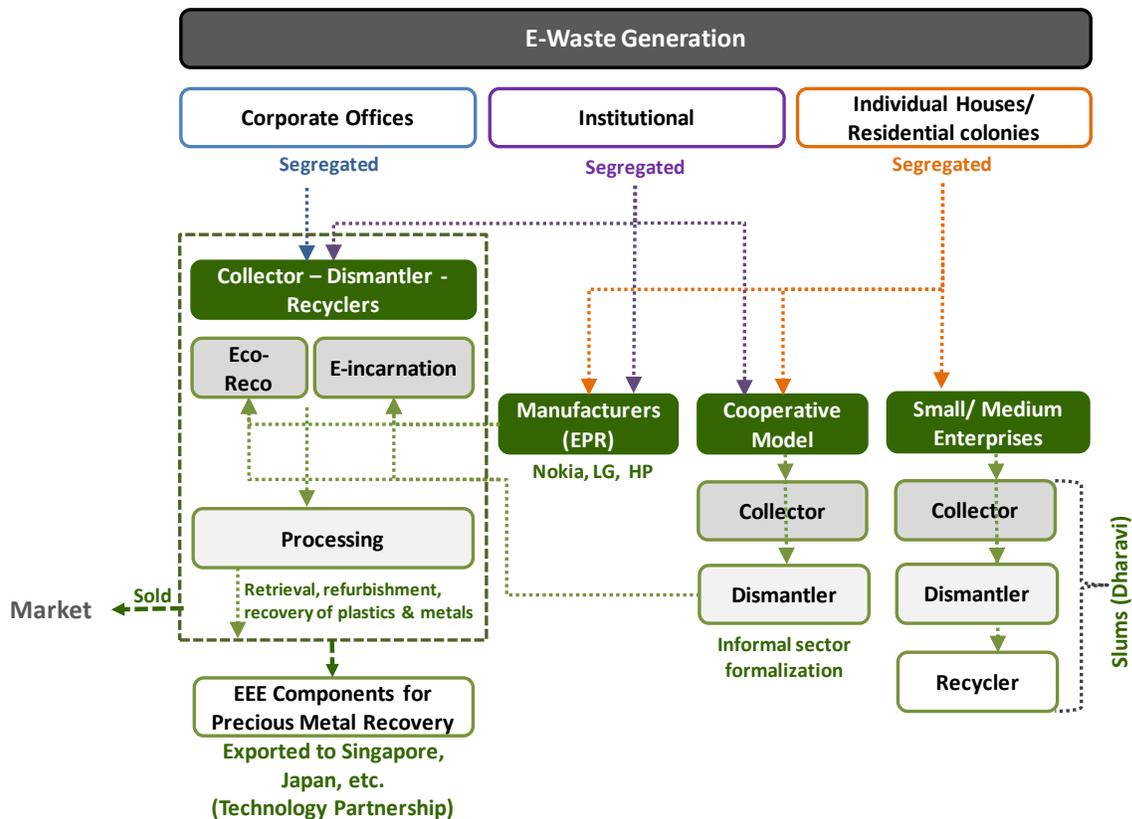
Further products manufactured from postconsumer plastic recycling panels

**Figure 3.7: Recycling activities at Daman Ganga**

### 3.2.3.3 E-Waste Recycling

E-waste is the new emerging high importance waste stream, in spite of its hazardous risk mainly due to its high value material recovery potential. Currently, there are small and medium scale enterprises and informal sector players involved in e-waste management and recycling which have environmental, health and safety risks.

Currently, with the E-Waste (Management & Handling) Rules, 2012, there have been large investments by private players into e-waste recycling. Considering the current dynamics and developments in e-waste management, a combination model is seen to be emerging which seeks formalization of the informal sector, integration of small and medium enterprises involved with e-waste collection and dismantling along with private sector investments to encourage environmental sound practices in recycling. The relationship and business model is explained in **Figure 3.8** below.



**Figure 3.8: E-Waste Recycling model in India**

## **Eco-Recycling Limited (Eco-Reco)<sup>45</sup>**

Eco-Recycling Limited (Eco-Reco), is promoted by Mr. B.K. Soni, who is a chartered accountant and was in the hardware and software business in the 1990s. He was involved with various companies in selling and buying computer hardware and related products. Whilst he was involved with this business many of his clients expressed concern about discarding old computers. He initiated buy back options/discounts and realized the need for computers in other developing countries. Initially they worked on repair and refurbishment and exporting to some of the South Asian Association for Regional Cooperation (SAARC) countries. They also imported discarded computers for refurbishment and export. All of these involved a number of transactions, taxes and time delays (30-45 days cycle for each import/export). He also realized the material recovery potential of e-waste and researched on the same before setting up the recycling company and facility.

Mr. Soni has been a member of the expert group on e-waste management constituted by Maharashtra Pollution Control Board (MPCB) and has been a regular invitee of government agencies and organizations for strategizing e-waste management plan.

During 2004-2005, Mr. Soni attended a number of conferences (some organized by North American Association of Recyclers) and made visits to e-waste recycling facilities and export oriented units in various countries such as USA, UK, Germany, Canada, etc. where he met with machine manufacturers and recyclers. Thereafter, he sought for permissions from regulatory authorities for setting up his facility which had no precedent and thus was challenging to establish. A senior officer in the Pollution Control Board encouraged and understood the need for e-waste recycling. Therefore, Mr. Soni was able to establish Eco-Recycling Limited (Eco-Reco) in September 2007.

Currently, the E-waste Management Rules, May, 2012 acts as a major influence in e-waste management businesses and helps formalise the current informal sector work in environmentally detrimental e-waste.

Eco-Reco is a completely business driven private limited company. It is aimed at managing end of life electrical and electronic waste in an organized manner employing necessary technology and methodology to achieve commercial objectives and also to protect ecology and the environment. Eco-Reco was initially promoted by Infotrek Syscom Limited, a company listed on the Bombay Stock Exchange since 1995, Mr. Soni being a first generation entrepreneur and main promoter of Infotrek Syscom Ltd. Also, Eco-Reco is a member of the International Association of Electronic Recyclers (IAER), USA, now merged with Institute of Scrap

---

<sup>45</sup>The information noted is based on the discussion with Mr.B.K.Soni, chairman of Eco-Reco on 23<sup>rd</sup> July, 2012, site visit of the Vasai Plant on 20<sup>th</sup> June, 2012. Further details were available in an article "Dandamental approach should change E-waste recycling in India [Article] / auth. Ayyappan Vazhayil // Recycle Now. - Mumbai: Profit Media, April 2012. - 4 : Vol. 2" and their website <http://www.ecoreco.com/>.

Recycling Industries, Inc (ISRI), USA. It is also associated with industry bodies such as the Manufacturers' Association of Information Technology (MAIT) and Electronic Industries Association (ELCINA).

#### **(a) Scale of business**

The initial investments were self-financed with additional loans. Although multilateral banks initially studied their loan proposal and were inclined to fund, they backed out due to the recession in 2007-2008. A 0.94 million USD investment was made by a Japanese entity after the company was registered on the Bombay Stock Exchange (BSE).

Times of India Group invested 1.03 million USD in private equity only for creating awareness raising campaigns, print media and radio. 0.23 million USD per year is being spent on awareness raising activities. Department of Scientific and Industrial Research (DSIR), the Government of India (GoI) has provided a soft loan for e-waste recycling and precious metal recovery. The recycling facility located in Vasai has an annual capacity to process 7,200 tons on an area of approximately 2,323 m<sup>2</sup>, (0.25 hectare). Currently 40 people are employed with Eco-Reco.

Eco-Reco has achieved a turnover of 3.3 million USD and a net profit of 0.1 million USD during the year 2011-12. The total capital investment is 6.82 million USD out of which 4 million USD is on fixed assets.

#### **(b) Business and marketing strategies**

At the initiation of the facility, Eco-Reco invited 100 corporates to visit their e-waste management to encourage organized environmentally sound recycling and continue to do so regularly. Castrol, TCS and other such 350 corporate entities are amongst their clients. In most cases a quotation is sent to the company based on an inventory of items. Advance payments are made by Eco-Reco to the client company.

Eco-Reco has entered into sourcing agreements with various companies. It has also joined up with a logistics player with nationwide presence to enable both operational and financial efficiency in collection. This has enabled e-waste collection from over 600 locations in India. Safe disposal certificates are provided to the e-waste providers.

They have a provision for franchising but did not mention any entity associated through the franchisee model. They employ and train staff for skilled work.

#### **(c) Source of recyclables, processing and value added**

Eco-Reco has handled and recycled 3,000 tonnes of e-waste in the last financial year. Currently, an estimated 12 tonnes per day is handled at the facility.

Eco-Reco buys waste from various corporate and institutional sources, who are their main clients. The facility receives discarded electronic equipment from large corporate clients and institutions. This equipment is systematically segregated and checked by qualified technicians to ascertain their working condition. Once verified, the ones in operation are repaired and others are broken down to retrieve components. The residual components are dismantled, shredded through machines (**Figure 3.9**). Plastics, metals such as aluminium, steel and copper are recovered and sold to smelters.

Certain components of the computer such as printed circuit boards (PCBs) contain precious metals such as gold, silver, etc. are accumulated for precious metal extraction. Eco-Reco has tied up with a Japanese company and sends PCBs for precious metal extraction. Batteries and hazardous waste components are sent to authorized treatment and disposal facilities.

#### **(d) Technology and innovation**

Many of the machines such as shredders, dismantlers, and hard disk destroyers have been imported from other countries such as UK, Europe, etc. There are 4 collection vehicles/vans and collection mainly through third party logistics.

#### **(e) Social and environmental strategies**

**Awareness:** The company has started organizing an e-waste disposal week annually in December to create awareness through print media, radio and deploying mobile shredding vans to strategic locations in Mumbai. They also partner with NGOs such as Toxic Links and Clean Sweep for various workshops and seminars towards creating awareness about the subject.

**Social Benefits:** In case of waste donated by companies, the refurbished items are directed to underprivileged children.

**EHS compliance:** The processes employed are environmentally sound. Care is taken towards employee safety. Eco-Reco has a fully compliant facility in Vasai. It is an ISO 9001, 14001 and 18001 compliant facility.

#### **(f) Business extension and scaling-up strategies**

Eco-Reco is looking into precious metal extraction from PCBs and have collaborated with National Metallurgical Laboratory, Jamshedpur, India for the same.



Mobile van for lamp recycling



Logistics for e-waste collection



Stocking of CPU for dismantling



Hard disk data destroyer



Technical check and refurbishment



Scrap plastic from dismantled e-waste

**Figure 3.9: Recycling activities at Eco-Recycling Limited**

### **3.3 Driving factors, barriers and way forward for recycling business development in India**

#### **3.3.1 Driving factors**

Recycling in India is on the rise and the associated business opportunities are expanding. The sector is also gradually becoming more diverse with many different kinds of recycling undertaken side-by-side and sometimes in competition. Informal waste collection and backyard recycling, which have existed for a long time, are still common. At the same time, professionally managed recycling enterprises using more advanced technology have entered the scene. A sector that used to be driven mainly by poverty and the economic value of recyclables is becoming more complex due to new drivers and concerns. In the current situation, there is a multitude of recycling activities along a wide spectrum from informal and low-tech to formal and technologically advanced. Each of these activities has its own set of drivers and its own challenges. As illustrated in the main text of the report, this diverse and complex reality makes it difficult to formulate effective policy responses.

The recycling sector is growing at quite a considerable rate but there is potential for further expansion. There are indeed good reasons to try to increase the recycling rates of many materials further since this can dampen the demand for virgin natural resources, reduce waste to be disposed in landfills, and also create employment. At the same time, there is a need to improve the performance of the sector – to reduce negative repercussions on health and environment, to get rid of child labour and human exploitation, to enhance efficiency and financial viability, and to stimulate innovation and investments. Further expansion of the sector needs to go hand in hand with a widespread upgrading of its environmental and social performance – these two tasks should be addressed simultaneously.

Our analysis identifies three main drivers of the expansion of the recycling sector in India:

1) **Economic value of recyclables**

Economic value of recyclables is the primary driver of recycling business similar to other developing countries. Many people especially those living in poverty in India are engaged in the collection of recyclables from the street and dumpsites and sell it to local scrap dealers. Nowadays, many stakeholders are engaged in the recycling business in India as they see economic benefits from this business.

2) **Social benefits of recycling initiatives,**

Working conditions of many of waste pickers and local scrap dealers are unhealthy and they additionally suffer from discrimination. Local governments, with support from NGOs, are working to improve this condition by formalizing waste pickers' association or cooperation and offer them a contract for door-to-door recyclable and

non-recyclable waste collection. This driver helps improve the social and economic status of the waste pickers.

### 3) Public policies

The national government has enacted the law on operationalization of the Municipal Solid Waste (Management and Handling) Rules in 2000 to increase the recycling rate as well as enacting e-waste management and handling rules in 2011 to minimise environmental impacts from the e-waste recycling.

These drivers correspond largely with the three main groups of actors: the private sector (including the informal sector), civil society (NGOs and community based organisations, and the government (at central, state and local levels). Efforts to address the sector's challenges and improve its performance need to be based on a thorough understanding of how these drivers influence the sector, including how the different drivers interact – sometimes supporting, sometimes conflicting – with each other.

The recommendations presented in the following sections suggest ways to address the complex and diverse situation in the recycling sector and identify opportunities to capitalise on the key drivers to further expand and improve the recycling sector in India.

### **3.3.2 Barriers and recommended actions**

#### **1) Weak coordination among stakeholders**

Many different stakeholders are engaged in the recycling business. The two major stakeholders are the formal and the informal sector. Initially waste management was mostly taken care of by the informal sector through waste pickers and local scrap shops and wholesalers in slums. These activities often compromise environmental, health and safety conditions and their low costs give them an unfair advantage over the formal sector that has to comply with basic environmental, safety and health regulations. Currently, the informal sector is generally ignored by the formal sector; there are few attempts to bridge the gap between these two actor groups and to build partnerships. The recycling business and overall urban waste management would be significantly improved if the formal sector coordinated its activities with the informal sector and collaborated with these actors.

Many private companies and NGOs are prepared to make investments to expand and improve the recycling business. However, investments will only be sustained if the local governments can offer some degree of stability and predictability in the business environment. This requires that local governments establishes a trustful relationship with these organizations, work towards increased collaboration between informal and formal recyclers, and facilitate a shift to environmentally and socially acceptable recycling practices.

### Lesson learnt from Wongpanit

Wongpanit has overcome this barrier by partnering with local governments in promoting waste separation at source. The activity improves the relationship between the waste buyers, local governments and residents. As a result, the local government can significantly reduce waste collection landfill disposal, waste buyers receive larger amount of recyclables, and residents earn extra income which can be used for private expenses or donations to community funds.

Furthermore, some franchises have established partnerships with large generators of recyclable waste such as banks, schools, universities, offices and institutes and provide an onsite collection service. The franchises can secure certain amount of recyclables and thus easier for the Wongpanit headquarters to analyzing its potential supply volume and negotiate with the manufacturers or importers.

### Lesson learnt in India

See examples of NGOs oriented business model with example of the Conserve India and the waste picker cooperative model with example of Kagad Kaach Patra Kashtakari Panchayat (KKPKP) in Pune.

### Recommendations:

Learning from the experiences of the Wongpanit business model, national and local governments and big scale recyclable waste dealers should take the following actions to improve coordination among stakeholders.

- The governments should encourage the establishment of a union or an association for informal recycling actors, if possible in collaboration with NGOs. Once constituted, these entities can partner with city administration and/or with corporate clients to assist in Extended Producer Responsibility (EPR). It is important however that capacity building of informal businesses is part of this process. Partnerships between associations of formal sector and the government with the informal sector would assist in expanding the waste recycling activities.
- Local authorities and businesses need to partner with waste picker organizations so as to make waste management socially acceptable and economically viable. Memorandum of Understanding (MoU) between Pune Municipal Corporation and Kagad Kaach Patra Kashtakari Panchayat (a waste picker cooperative) is one good example to consider as a template for partnership with the city administration. Additionally, local authorities

should strengthen activities of the waste picker's organizations through the following actions:

- Urban Planning:

Local authorities should provide and plan for space for waste sorting and storage i.e. waste recycling infrastructure. Apart from space for sorting and storage, space will need to be provided for operating markets for selling waste and waste based products as often done under the caption of "Sunday markets".

- Financial Support:

Apart from the space for sorting and storage, waste pickers need transport infrastructure such as bicycles, hand carts and rickshaws. If these vehicles could be provided for waste transport through legitimizing the use of existing vehicles by the informal sector or directly financed, then waste collection efficiency will further improve. Here, support from business in the form of Corporate Social Responsibility (CSR) should be sought.

- Capacity Building

Training and capacity building of the informal sector on safe recyclable waste segregation, environmentally sound recycling practices, health and occupation safety are needed and could be carried out with the assistance from NGOs. Local governments may need to provide protective gear such as gloves, boots, etc.

- Large scale recyclable waste dealers can follow the Wongpanit approach on social corporate strategy by offering training on waste segregation and value added strategy for waste pickers and residents.

## **2) Lack of awareness and business skill**

People's awareness on recyclable waste separation for recycling is generally low and more efforts are needed to raise awareness. The informal sector is unorganized, lacks training and a systematic approach to business leading to lower productivity. Multiple scrap dealers deal with the same housing complex, each dealing with different households on a requirement basis, replicating logistics efforts and not optimizing transportation requirements. The case is similar with large scrap dealers who send in vehicles for the pickup of recyclables from local scrap dealers on a requirement basis not optimizing resources. Also, possibilities of accessing larger waste generators directly along with streamlining collection systems as per categories of waste would increase efficiencies. A lot of effort and resources are required in training and capacity building. Language is a barrier to effective training of waste pickers since they come from different parts of the country and speak different languages with different dialects.

### Lesson learnt from Wongpanit

Wongpanit has overcome this barrier by provide training to residents, waste pickers, governmental organization as a social service. Also, Wongpanit provides business training to those who would like to engage in the recycling business as well as develop a franchise system to support the investment of new entrants and scale up its business.

Residents are free to sell recyclables to whichever waste-buyers they prefer. Nevertheless, Wongpanit provides training on waste segregation to all stakeholders including local governments, itinerant waste buyers, waste pickers and residents. In collaboration with the local government, trained itinerant waste buyers and waste pickers are registered and upgraded to volunteers for environment.

***Recommendations:*** Regarding awareness, residents need to understand the importance of waste segregation for recycling. Capacity building of recycling business is also required to either new entrants or existing enterprises. Contents of capacity buildings can be further identified to serve the needs of those stakeholders. They need to understand the political, social, cultural, economic, technological and legal aspects of waste management and the recycling business. This is especially true for the entrepreneurs and investors. Local stakeholders can play significant role as follows:

- The national government may set a national policy or regulation on waste separation for recycling and increase the target of recycling rate.
- Local governments and local NGOs may develop an awareness raising campaign on waste separation targeting residents. Furthermore, the campaign should try to improve social status of waste pickers and other stakeholders engaged in recycling business.
- Local governments, NGOs and large scale waste buyers may help train waste pickers and small scale waste buyers on waste separation, pre-processing and other value-added techniques. In this case, the large scale waste buyers may enjoy a better quality of recyclables to their business as well as receive more recyclables from trained waste pickers and small scale waste buyers.
- Experienced companies may formulate a training course for their clients and new business entrants. It may utilize the Wongpanit franchise system tailored to suit the local conditions.
- Local governments may regulate a local rule for waste separation at source such as the policy in Mumbai. However, the local government should also prepare a logistic system to serve the collection of the separated waste.

### **3) Lack of accessibility to financial sources and no tax incentives**

There are huge investments required in waste recycling which are currently mostly being made by the private sector. The necessary investments will only be made if they make sense from a business perspective. Access to finance is an obstacle for expansion of waste recycling industries, especially those working on decentralized basis and dealing with small volumes such as 1 to 10 tonnes per day. Although the recycling sector has positive externalities in the form of waste reduction, the support available from the government is mainly in the form of land provided on nominal lease. Financial institutions and banks do not give any particular support or special consideration for waste recycling projects and consider them as any other project funding.

Many decentralized, waste picker based programmes are NGO initiated and developed towards social improvement. They are supported by external funding which enables the initial start-up of activities and are expected to scale-up using other sources of funding for investment. Many NGO programmes that cannot secure budget for continued operations and scaling-up gradually terminate after the initial project funding runs out. Improving access to preferential finance to strengthen these NGO programmes, and to make them viable over the long term, should be a priority.

Waste recycling companies and other waste innovation enterprises do not get any subsidies or incentives although they are instrumental in dealing with waste to create useful products and reduce dependency on virgin materials.

There are examples of funds created by banks and financial institutions supporting renewable energy, clean technology and socially sustainable sectors. These funds are not easily available for recycling activities, due to differential priorities. Simple recycling, which is associated with environmental and social problems, can be profitable but improved recycling, which has higher costs due to the needs to meet environmental and social standards, required support in the form of access to preferential funding for investments and may also need subsidies in order to be financially viable.

Currently, there is no particular tax incentive for recycling businesses and/or environmentally sound recycling business in India.

### Lesson learnt from China

The Chinese Government provides a subsidy for the development of recycling industrial parks. Companies clustered in each recycling industrial park can share basic infrastructure, get support with technology innovation, management and other services, which decrease investment needs and operation costs of each company. Each park must establish a block for small scale waste buyers to relocate the curb-side recycling business into a proper environmental control area. Several incentives are provided to those small scale waste buyers, including awareness raising, study tours, loans, etc.

### Lesson learnt from Wongpanit

Similar to India, Thailand does not have a good channel to access finance for recycling businesses. Wongpanit has overcome financial problems by making cost-benefits analysis and deciding not to move forward to the complicate recycling process but work as scrap dealers and supply the recyclables to manufacturers or exporters depending on the price incentives. Pre-processing is invested in only if there is significant value-added to the products. Simple and cheap technologies were invented upon budget availability. This system is an alternative where the government does not provide support to recycling businesses.

Secondly, Wongpanit tries to scaling up its business by develop a franchise system where investment is mainly done by the franchise members. Through these franchises, Wongpanit can increase negotiation power with manufacturers and obtain premium prices. Overall, Wongpanit's profit is increased with minimum investment. This lesson learnt may be applicable for India once the public system does not sufficiently facilitate the development of recycling businesses.

### Recommendations:

- For the national government
  - The government may learn from the recycling industrial park policy in PRC and formulate a similar system in India. There are many recycling slums in India that should be developed into an environmentally sound recycling community or recycling business zone.
  - Considering that environmentally sound recycling facilities need a lot of investments especially for e-waste, such initiatives should be supported by the government by concessional loans, tax exemptions and subsidies.
    - The government should provide tax exemptions for environmental sound waste recycling and recycled products. This would help waste recycling businesses compete with products manufactured from virgin materials.

- Microfinance schemes should be established for small scale recycling businesses including waste pickers, small waste buyers, etc, especially for the recycling of plastic, paper, glass and metal. A special recycling loan scheme should be set for large scale recycling businesses to enable them to scale up their business in an environmentally sound practice.
  - Alternatively, loans may be structured to lend on a cooperative basis rather than to individuals. Waste Pickers Associations may be formed as companies with membership or shareholding, and loans could be advanced to the cooperatives/associations or companies. These loans could be long term and padded with longer moratoriums or through reserve funds as these may help to address volatility of the waste recycling market. It has been found that especially during the economic meltdowns, price falls in the waste markets are rather sharp and lead to a paralysis of the waste recycling business.
- Providing funding assistance and grants for supporting research and technology innovation. Alternatively, a special interest rate should be given to the loan for technology innovation.
- Setting financial assistance to support capacity building of the informal sector.
- For the local government
  - The local government may provide land to facilitate the recycling activities as already practiced in some cities such as Mumbai or Delhi.
  - The local government may financially support the informal sector by offering contract for waste collection and the handling of recyclable waste like in Pune.
- For the entrepreneurs and private sector
  - The entrepreneurs and private sector may develop an alliance system to support each other and reduce logistic costs. The alliance system may increase the negotiation power of recyclers and increase accessibility to the financial institutes or government assistance.

#### **4) Low priority on innovation in waste recycling technology**

Local innovation in waste recycling is being undertaken on a small scale within slums by the informal sector. These local technology developments are rudimentary and crude with minimal attention to environmental, health and safety considerations. Private sector involvement is limited and technologies are being imported from other countries like US, UK, Japan, etc. There is a need to encourage and develop local models and technologies for waste recovery and recycling.

### Lesson learnt in India

Daman Ganga invests in technology innovation to find new business opportunities especially in recycling low-value waste. In an area that requires high technical input, the company seeks support from universities and research institutes to receive knowledge related to recycling and to test the quality of products and its environmental impact. Sometimes, universities and research institutes have difficulty accessing private companies who can actually produce recycled products to markets and often those products are not tested for health and environmental hazards. Therefore, collaboration between Daman Ganga and research institutes can provide benefits to both of them. This form of cooperation should be strengthened.

### Recommendations:

- Grants for technology innovation should be established (see also the recommendation under access to finance). Academic and R&D centres can play significant role in recycling technology innovation. State governments and city authorities can bring actors together and provide seed-funding for innovation systems for recycling technologies suitable to the local context.
- Alternatively, cross-functional innovation centres should be established linking waste recycling activities with city based academics and R&D. The innovation centres may lead to incubation, development and dissemination of waste recycling technologies and propel more conversion of waste to resources. Manufacturing companies can also participate in such centres to develop products that are easy to disassemble and recycle. Corporates can also operate such centres or partner in developing product designs for sustainability (D4S). Corporate partnerships can be developed with research institutions and NPOs involved with the informal sector along with other international funding agencies. These partnerships could then engage with and mobilize small medium enterprises and waste recyclers towards formalization, business and technology development inclusive of environmental and social safeguards.
- Tax incentives for companies that invest in technology innovation and research should be established.

### **5) Vulnerability of the market**

The recycling business is subject to considerable price volatility. This is critical since the waste recycling industry in India is at a stage where its consolidation has just begun. Margins in the industry are currently generally low. Cost of wages and fuel are rising. Systems and software are becoming obsolete. Regulations are getting stricter and investments in improved technology

are needed. Price fluctuations for recycled materials add to these challenges and hamper further investments.

#### Lesson learnt from Wongpanit

Wongpanit tries to overcome this barrier by buying a wide range of recyclable materials to lower the risk of price deduction on particular waste item. Additionally, Wongpanit has developed an SMS system to provide on-time price information to all franchise members and enabling the members to quickly change the price and making a decision whether to sell or to stock the recyclables. Additionally, Wongpanit creates channels to both domestic and international markets which enables the company taking the decision whether to sell domestically or export.

#### Lesson learnt from China

The Chinese Government provides subsidies to certified companies on recycling electronic waste. The subsidy will be based on quantity of recycled materials. This subsidy helps companies to overcome the recyclable costs and maintain stable profits.

#### Recommendations:

- The national government should set up a subsidy scheme for certified facilities, similar to PRC. However, modifications to suit Indian's condition are required.
- Similar to the Wongpanit strategy, a system for on-time price notification should be set up which will help minimize the risk of waste buyers and recyclers. This could be done through the setting up of a national alliance of recycling business with government support.
- Business models that integrate the informal and formal sectors should develop financial instruments (e.g. insurance) that will address price related uncertainties and fluctuations.
- Small waste buyers that do not have enough area for the storage of waste will be more vulnerable to price fluctuations, so a local government intervention to buy and/or provide storage for those recyclable items that have serious price drops would be helpful. This budget could be derived from the savings from waste collections and landfill operations derived from not disposing these recyclables.
- At a macro-scale, a mechanism to promote use of recycled products such as the green procurement would make a significant contribution to minimising the fluctuation of recyclable waste prices.

## 6) Lack of database and ease of accessibility to scrap dealers and recyclers

The recycling chain needs transparency on information about the market, recyclables, the volumes of recyclables, transactions and the operational businesses. Locations and involvement of scrap traders, retailers and recyclers is not known to all. It is difficult for potential new entrants to estimate costs and revenues. It is also difficult to establish the right connections and to find sellers and buyers. Due to these high entry barriers and information asymmetry the competition is low and the established players can capitalize on their exclusive knowledge base.

### Lesson learnt from Wongpanit

Wongpanit tries to overcome this barrier by announcing the buying price to the public (e.g. price board, webpage), collaborate with local governments, and use public events and media to advertise the company. Therefore, the company is well known and many stakeholders contact Wongpanit to do business.

Additionally, Wongpanit has developed a franchise database, sending information of waste dealers and price offered from each dealer to all franchises which helps the franchise know that which dealers offer the best price for which item.

### Recommendations:

- A database of scrap dealers and recyclers should be established to support the networking of relevant stakeholders for the direct sourcing of waste and reducing the long supply chain. In the current situation, there are middle-men who benefit from having an information advantage while adding little actual value to the handling of the recyclables. Making the sector, and its network structure and prices, more transparent would ensure better returns to the poor and also help in expanding waste recycling activities. Negotiations on waste quality, quantity, pricing, and logistics development would be easier once a database is established. Furthermore, a database would assist new investors in understanding and investing in the waste recycling business.
- Additionally, an effective market also requires that all players have access to up-to-date price information. In order to reach as many as possible information should be accessible by mobile devices, including regular mobile phones.

## 7) Labour requirements

Segregating recyclables in mixed waste is labour intensive. Although the availability of labour is currently not a problem, labour availability in urban areas could become an issue. Also, working conditions in this sector is poor with health and hazard risks. This is coupled with a lack of social support, lack of recognition and disrespect in the community for workers in the waste sector.

### Lesson learnt from Wongpanit

Wongpanit has overcome this barrier by coordinating with local governments on promoting waste separation at source for sale. The company trains residents, community and waste pickers on waste separation for value added and thus the company can reduce labour requirements for waste separation at the company. Furthermore, the company uses the franchise system to scale up its business so jobs are not all concentrated in one area but distributed across the country.

The company has also improved the image of the recycling business, leading to a greater interest from labour. The company also offers reasonable salary, skill training, safety and health insurance as similar to other business. These strategies can reduce risk of labour shortages and enable the company to continue scaling up its business.

### Recommendations:

- The government should provide health and life insurance for waste pickers. There should be regular health checks for those working in waste handling.
- Environmental, health and safety conditions in waste facilities need to be paid attention to with regular monitoring and the establishment of a management system. Guidelines or standards may be needed to enhance this practice.

## 8) Policy Issues

Environmental regulations tend to focus on end of pipe solutions, are often reactive in nature and do not recognise the importance to resource recovery by acknowledging the role of stakeholders engaged in recycling. Industrial policies continue to rely on manufacturing from virgin resources. There is no incentive or market based instruments to encourage waste minimization and support greater use of recycled materials.

### Lesson learnt from China

The Chinese Government promotes a ‘Circular Economy’ approach and has enacted the ‘Circular Economy Promotion Law’ to promote a more sustainable use of materials. To comply with this law, the State Council and provincial governments set up a special fund for circular economy development. The local government can apply for special funds to improve recycling practices in the province.

### Lesson learnt from Malaysia

The Government of Malaysia has enacted a new Act 672 (Solid Waste and Public Cleansing Management Act 2007) which regulates all stakeholders related to solid waste management. In the long run, this will create a better system for recycling sectors in Malaysia, including proper data management, as well as overall improvement in the operation of the stakeholders. Some small players who are not able to fulfil the requirements of the act or regulations will gradually disappear from the market.

Some small incentives are given by the government such as tax exemptions for importing recycling equipment; and also a special “Green Technology Financing Scheme” for certified green technology projects, including the recycling sectors. However, not many recycling projects are eligible for such applications due to low operational standards.

*Recommendations:* New policy measures and enforcement of existing regulations are required to promote the scaling-up of recycling businesses in a sustainable manner.

- The government should initiate policy reforms in the waste management sector including efforts such as in Gujarat and zero waste cities such as in Ahmedabad, so as to build investor confidence in waste recycling. The policies should look into extended producers responsibility (EPR) and the use of waste recycled products/materials as an alternative to virgin resources in manufacturing. In addition, financial incentives and market based instruments need to be developed to promote waste recycling. Alternative tax structures should be developed along with market based instruments as financial incentives for waste recycling businesses.
- National guidelines on environmental safeguards should be established for waste recycling and processing facilities operated by private and government agencies to ensure environmental as well as health and safety standards are maintained.
- Formal and informal sector integration should be undertaken to take advantage of current developed networks and maintain existing waste management cycles. This can

be done by engaging the rag pickers and the scrap dealers in the public private partnership waste management models developed by Urban Local Bodies in metropolitan cities like Navi Mumbai, Pune, Delhi, etc. through agreement and Memorandums of Understanding (MoU). Also, the government should try to promote the engagement of the private sector in waste recycling businesses, by giving tax rebates/exemptions on investments in recycling businesses, redemptions of excise on recycled products and involving recycling businesses while developing city solid waste master plans .

- Implementation of decentralized waste management should be encouraged to increase resource efficiency and develop local replicable models with lower investment requirements.

### **3.4 Support from ADB: Five proposals for Follow-Up**

ADB could play an important role in improving recycling businesses in India in an environmentally and socially sound manner. This study has identified five key interventions through which ADB could offer significant assistance.

#### **(i) Microfinance loan programmes for the informal sector, community based organizations, and NGOs**

The majority of recycling businesses in India are part of the informal sector (which here refers to waste pickers and small scale waste buyers). These small scale businesses often have limited managerial skills and ability to attract ‘risk capital’ for investments. A microfinance programme for the informal sector should be linked with a training programme on proper recycling, including good business practices, labour laws, and protective measures for worker health and environment. The costs for the training may be borne partly by the local governments, the national government, other organisations or supported by ADB.

In addition, many community based organizations and NGOs are engaged in recycling and could be a key beneficiary. However, the upper limit, eligibility criteria and conditions may be different for these groups. Further study is required in order to design a microfinance scheme tailored to the needs of different groups of beneficiaries.

#### **(ii) Loans for recycling companies to improve the recycling business practice toward an environmentally and socially acceptable model**

Upgrading of recycling businesses towards an environmentally and socially acceptable practice requires a high level of investment that interrupts the development of small-to-medium scale recycling companies. The criteria for ‘environmentally and socially acceptable practice’ should be identified and agreed through a consultation with relevant stakeholders. This consultation could also be part of the process of criteria development

for the soft loan programme. A long term loan will enable companies investing in the improvement or scaling up of its business model. This loan should be also available for large scale companies but priority should be given to the small scale to motivate these groups to move toward the sustainable recycling business scheme.

A hybrid model towards loans for recycling industries could also have a component of funding technical and training assistance to overcome challenges, including financial management; operations and supply chain; technological procurement; strategic planning; and environmental and social considerations.

**(iii) Technical assistance for innovation and new technology**

An R&D grant scheme could be established to strengthen India's innovation system related to recycling. ADB could provide assistance in setting up such a scheme to promote domestic innovation and technology development. The projects granted could focus especially on non-valuable waste as well as waste that is currently difficult to recycle in an environmentally sound and economically viable manner in the Indian context. Priority should be given to projects that involve both academic institutions and practitioners.

**(iv) Technical assistance for pilot projects for upgrading recycling business practices**

Dharavi is the largest slum in Mumbai which contains hundreds of small scale recyclable waste dealers and recyclers. A pilot project on Dharavi Recycling & Networking Project for creating a waste recycling hub within the city of Mumbai is proposed and should be implemented as a showcase project for other recycling slums in India. The pilot project would aim to transform the existing recycling industry in the slums of Dharavi through development of a business plan, creating a brand, improving the environmental, health and safety conditions, a node for innovation and improvisation of local waste recycling technologies, consolidation and networking of the waste market and formalization of the informal sector through training and capacity building. Experiences gained in PRC on establishment of recycling clusters should be carefully studied. Micro-finance loan initiatives should also be undertaken on trial under this pilot project so as to enable stakeholders in these recycling slums to improve their recycling business practices.

**(v) Technical assistance for capacity building across the sector**

It would be beneficial to implement a capacity building programme for both informal and formal players, to enhance skills to scale-up the recycling business in an environmentally sound manner as well as to improve performance and efficiency. Such capacity building should not only emphasise the technical aspects of solid waste

management and recycling but should also focus on health, safety issues and environment. Capacity building could be based on the Wongpanit model where training for the workers has not only increased efficiency but also lead to a shift in mindset and to some extent changed the perception that waste is dirty. In this way the Wongpanit approach has increased interest in recycling in industry, facilitated recruitment and given the sector a more positive image among residents. Capacity building could increase staff pride in working in the sector, helping to reduce staff turnover.



## **ANNEX IV**

### **Recycling Business in Malaysia**

## IV. Recycling Business in Malaysia

### 4.1 Overview of municipal waste recycling activities in Malaysia

#### 4.1.1 Recyclable waste generation and recycling rate

Malaysia covers an area of 329,800 square kilometers with a total reported population in 2010 of approximately 28.25 million. Amongst this the urban population is 73%, a slight increase from 70% in 2008<sup>46</sup>.

There is no regular update of waste generation data in Malaysia, but various data can be found from reports and research findings. Most of the findings are based on estimated figures following primary data collection as there is no existing data requirement for various stakeholders to submit waste management data. Furthermore, some facilities such as old disposal sites in Malaysia are not equipped with weighbridges for proper recording of data, and much of the waste collected is diverted from disposal sites for various purposes such as recycling without proper recording of data. However, following a report done by the Japan International Cooperation Agency (JICA) in 2005, the total annual waste generation was reported to be approximately 8 million tonnes/year or 22,000 tonnes/day nationally. This includes both household and business waste generation.

By using the latest population data of 28,250,000 as published by the Department of Statistics (2010), and per capita waste generation rate of 0.628 kg/cap/day as reported by JICA, the Ministry of Housing and Local Government (MHLG) estimated that total waste generation from households in 2010 was estimated 17,741 tonnes/day or 6.5 million tonnes/year and that from business entities was estimated to be about 0.27 kg/cap/day giving a result of 7,600 tonnes/day or 2.8 million tonnes/year. Therefore, it is estimated that the total waste generated in Malaysia is about 25,340 tonnes/day or equivalent to 9,249,100 tonnes/year, based on population in 2010. This is significantly higher than the previous figures published by the MHLG in 1994 of 5 million tonnes/year. Additionally, another later study completed in 2010 by the Danish International Development Agency (DANIDA) shows that the generation figures estimated by JICA in 2005 may not include some other waste categories, most notably solid waste from industrial and construction activities, meaning the actual total amount of waste generated in Malaysia could be much higher. To date, a new study has been initiated by JPSPN to evaluate the actual waste generation rate in the country. The study has been completed however the findings are yet to be published by the JPSPN.

Similar to waste generation, waste composition data is available from various sources. The 9<sup>th</sup> Malaysia Plan officially reported that approximately 33% of municipal solid waste is made up of recyclable materials: 9% plastic, 18% paper, 4% glass, and 2% metals (including aluminium)

---

<sup>46</sup> Worldbank, 2013 <http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS>

(JICA, 2005<sup>47</sup>). In addition to waste composition studies at the household level, other studies were also conducted to identify the waste composition at disposal sites. As reported in the National Strategic Plan (NSP), a study carried out at the Taman Beringin landfill site gives comprehensive waste composition data in Malaysia based on different generation sources, with an average waste composition at the disposal site being 13% plastic, 8% paper, 2% glass, and 2% metals<sup>48</sup>. It is therefore expected that some portions of the waste, especially recyclable materials (such as metals, papers and plastics), could be omitted from the study because in most cases these materials are segregated for recycling purposes before entering the waste stream. Nevertheless, the waste composition figures reported in the 9<sup>th</sup> Malaysia Plan have been officially used by the Government, including a recent World Bank Report published in November 2011.

There is no obligation so far to report or register recycling activities carried out under private business initiatives to any government authorities. Therefore, information on the recycling activities by these private businesses is very limited. Information available is mostly those related to the recycling activities carried out under public sector initiatives and as such is reported by the waste concessionaire companies, NGOs and the Local Authorities. Due to the above reason, the official announcements made by the Government represent only about 5% of the recycling rate in Malaysia. In actual fact, the rate should be much higher especially among the private initiatives, which are also in many cases carried out by the informal sector.

In order to rectify this issue, a detailed investigation was conducted under the initiatives of a JICA project in 2006. As a result, the boundaries of recycling activities carried out under private business and public sector initiatives were clearly differentiated as shown in **Figure 4.1** below. This flow diagram of waste and recyclable materials was prepared based on statistics of 2005 and it is so far the latest available.

Based on the estimated figures shown in Figure 5.1, JICA categorized the recycling rate in Malaysia into two different types. These two types of recycling rate contribute to the total recycling rate of the country. The recycling rate under public sector initiatives in Malaysia was very low at only 4.5%. On the other hand, the rate from private business initiatives was estimated to be around 14.1%. Therefore, the overall recycling rate in Malaysia estimated for year 2005 could be as high as 18.6%. These figures show that about 76% of the recycling activities in Malaysia were due to private initiatives, while government initiatives only captured about 24%.

---

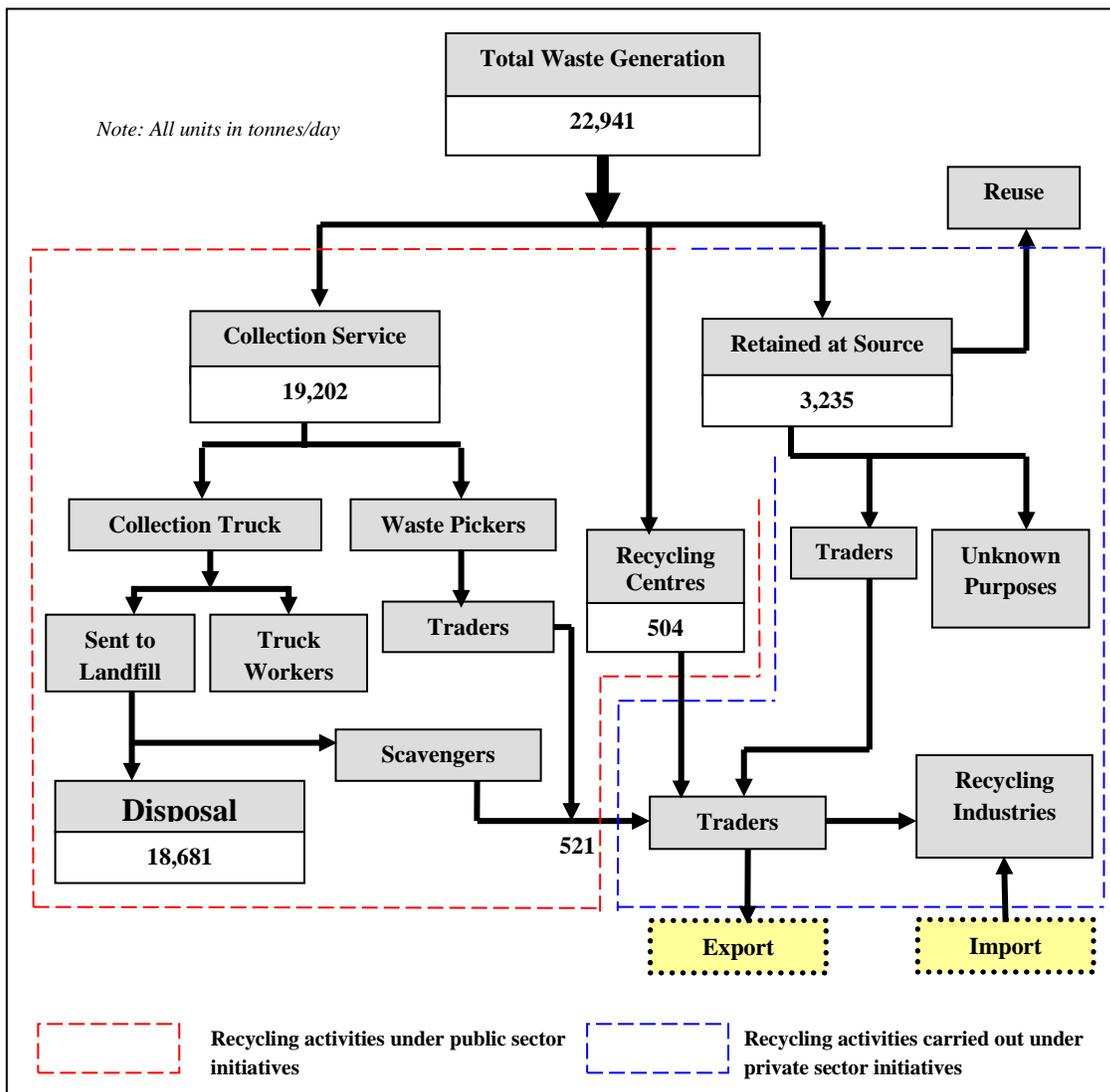
<sup>47</sup> JICA Study report, 2005

<sup>48</sup> National Strategic Plan for Solid Waste Management, 2005

However the actual recycling rate under the private sector initiatives is believed to be even higher as many other recycling activities, especially those by commercial entities and industries, are not known. General observations and surveys show that some business entities such as restaurants, food courts and café etc. are selling almost 100% of used aluminium cans and old newspapers for recycling. These recyclable materials are not being discarded into the waste stream, therefore no data is being captured.

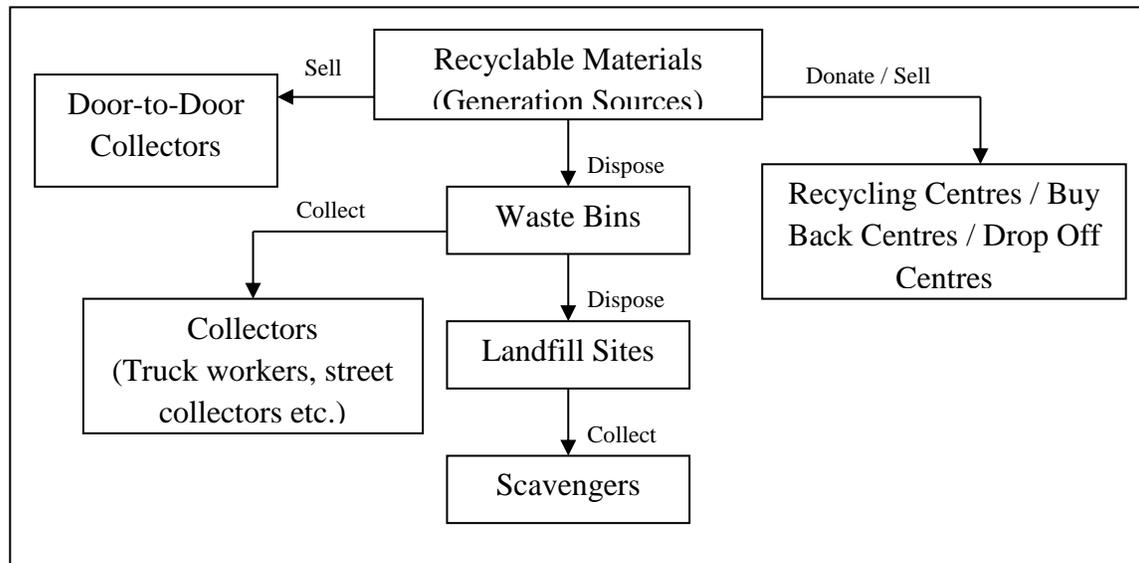
The Government of Malaysia aims to increase the material recycling rate to 40% of total waste by 2020. More attention will be given to enforcing proper data management of waste generation and recycling, in addition to promoting more recycling activities for food waste and building materials (Director General of JPSPN, 2012).

**Figure 4.1: Quantity of Waste and Recyclables Flow in Malaysia**



#### 4.1.2 Collection and separation of recyclables

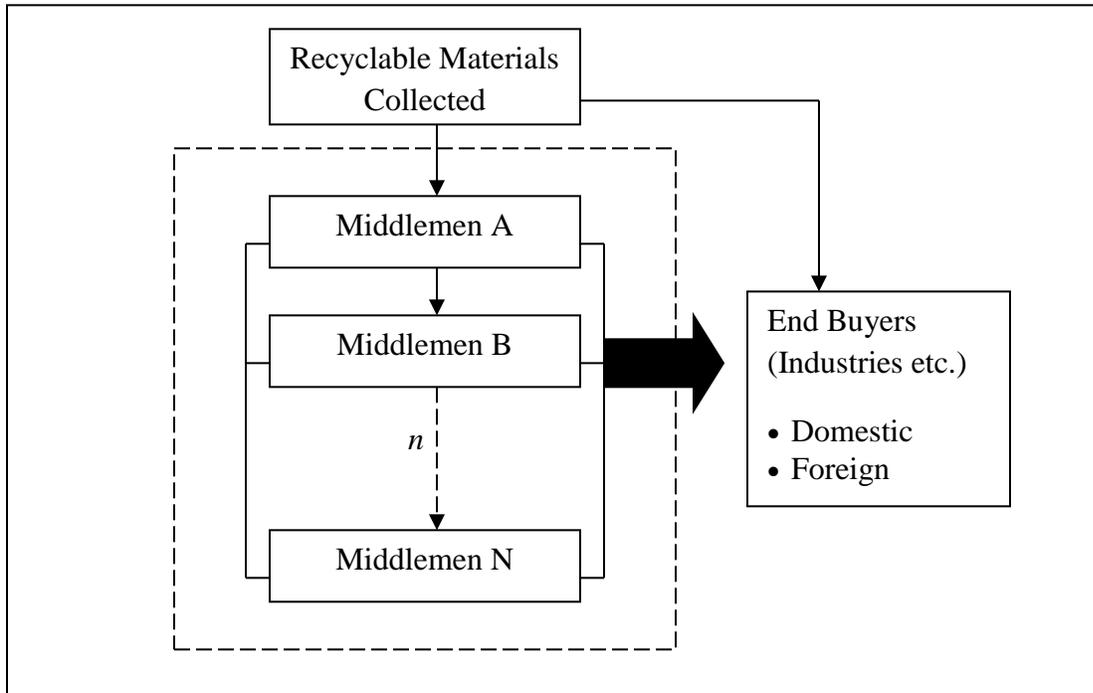
Generally, the recyclable materials generated from sources (households or business entities) are collected by the waste collectors (truck workers, street collectors, etc.) or sold to middlemen who collect recyclable materials door to door. Some of the waste generators also retain the recyclable materials at source and bring them to recycling centres, buy back centres or local drop off centres. The general collection system of recyclable materials has been summarised in **Figure 4.2**.



**Figure 4.2: The Collection System of Recyclable Materials**

The trade in recyclable materials in the markets is quite established and has a long history. Some traders were found to have been involved in the business for more than 30 years and many types of common recyclable materials are being traded such as glass, papers, scrap iron and other non-ferrous metals. However, it was also found that there are new categories of recyclable materials that are being collected for recycling, this mainly includes electrical and electronic wastes, plastics, scrap computers etc.

The recyclable materials trade starts right from the collection of recyclable materials by the waste pickers, scavengers, street collectors etc. and extends to the end users of the materials or industries. The trading process sometimes involves several levels of middlemen and the industries or end users of the recyclable materials can be both domestic and foreign. Nevertheless, there are also cases where the recyclable materials are sold to the end users directly without going through any middlemen, especially if the end users (such as industries) are willing to accept the recyclable materials directly from the waste generators or general public. The trading process of the recyclable materials in the markets can be summarised in **Figure 5.3** below:



**Figure 4.3: The Trading System of Recyclable Materials**

However, the Government of Malaysia is attempting to establish a formal recycling collection system by introducing the “2+1” scheduled collection system, which was supposed to kick off by September 2012, but has been delayed until end of 2013. The collections are currently done with varying frequency (either once in two days or three times a week depending on the areas). Once the “2+1” scheduled collection system is in place, collection will be done twice a week for non-recyclable waste and once a week for recyclables including bulky wastes. It is a mandatory system in long run where anyone who against the system will be punished. However, the government announced that the implementation of the “2+1” system will be started on a voluntary basis at initial stage, to provide some time for the people to familiarize themselves with the system.

For all households that are subject to the “2+1” collection system, a standard waste bin of 120 litres capacity will be provided (the first bin is free, but the household needs to purchase their own replacement if the bin is lost or damaged). Following this plan, the non-recyclable wastes shall be placed inside the 120 litre bins, whereas the recyclable materials, bulky wastes and household hazardous wastes shall be placed in plastic bags or at the front door of the household for collection. Non-recyclable e-wastes will be collected by standard bin-lift vehicles, while the others are to be collected by open trucks. Both collections will be performed by concessionaire companies.

### ***4.1.3 Waste recovery and recycling practices***

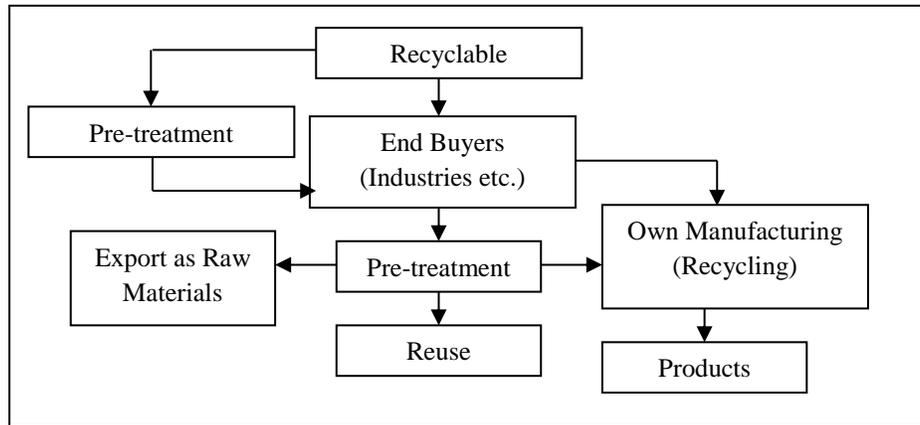
The existing recycling activities in Malaysia are generally divided into two main categories:

- Recycling activities under public sector initiatives (such as recycling centres provided by the Local Authorities, Ministries, NGOs and recycling activities initiated in collaboration with the concessionaire companies etc.)
- Recycling activities under private business initiatives (including all private recyclable traders, middlemen, agents and junkshops which are active in the markets due to market forces)

In general, the reuse and recycling activities at business entities in particular is one of the major driving forces for recycling in the current market. The recyclable materials are normally sold to the recycling industries by the middlemen in a raw form without any pre-treatment. Pre-treatment of the recyclable materials collected such as crushing or sterilising processes in the industries is normally considered as part of the manufacturing activities. However, there are also cases where the pre-treatment process is handled by the middlemen such as crushing or compacting the plastic bottles before selling the recyclable materials to the recycling industries.

The recyclable materials that are sold to the industries are either used as raw materials in their own manufacturing processes or some of them are exported to other recycling industries both domestic and foreign. Instead of recycling the materials, some of the industries are reusing them after the pre-treatment process such as cleansing and sterilising the glass bottles for reuse. In general, the reuse and recycling activities of the recyclable materials can be summarised in **Figure 4.4** as follows:

Detailed elaborations on the recyclable flows in the markets of Malaysia are shown in the following sections. Generally, all the major recyclable materials are subject to the same flow regardless of the type.



**Figure 4.4: Reuse and Recycling of Recyclable Materials**

At the moment, there is no data available about the total number of recycling facilities in the country. Some information about recycling facilities is available at the local authority level due to business licensing, however, this information is not integrated and therefore not known by the Federal Government.

In terms of the types of recycling facilities, the following are some of the common activities currently active in the markets but subject to market forces from time to time:

- ✓ Paper and carton box recycler – turning waste paper into pulp
- ✓ Plastics recycler – turning waste plastics into resins, pallets, crushed or compacted plastics (almost all types of plastics except PVC, Styrofoam and laminated plastics with other materials such as aluminium)
- ✓ Glass – turning waste glass into glass cullets
- ✓ Ferrous and non-ferrous metals – turning metals into ingots
- ✓ Food wastes – turning waste food into animal feed, compost or fertilizers
- ✓ E-wastes – recovery of precious materials
- ✓ Used tyres – turning waste tyres into rubber granulates, rubber powders, bunker oil and carbon black
- ✓ Used car batteries – recovery of the metals

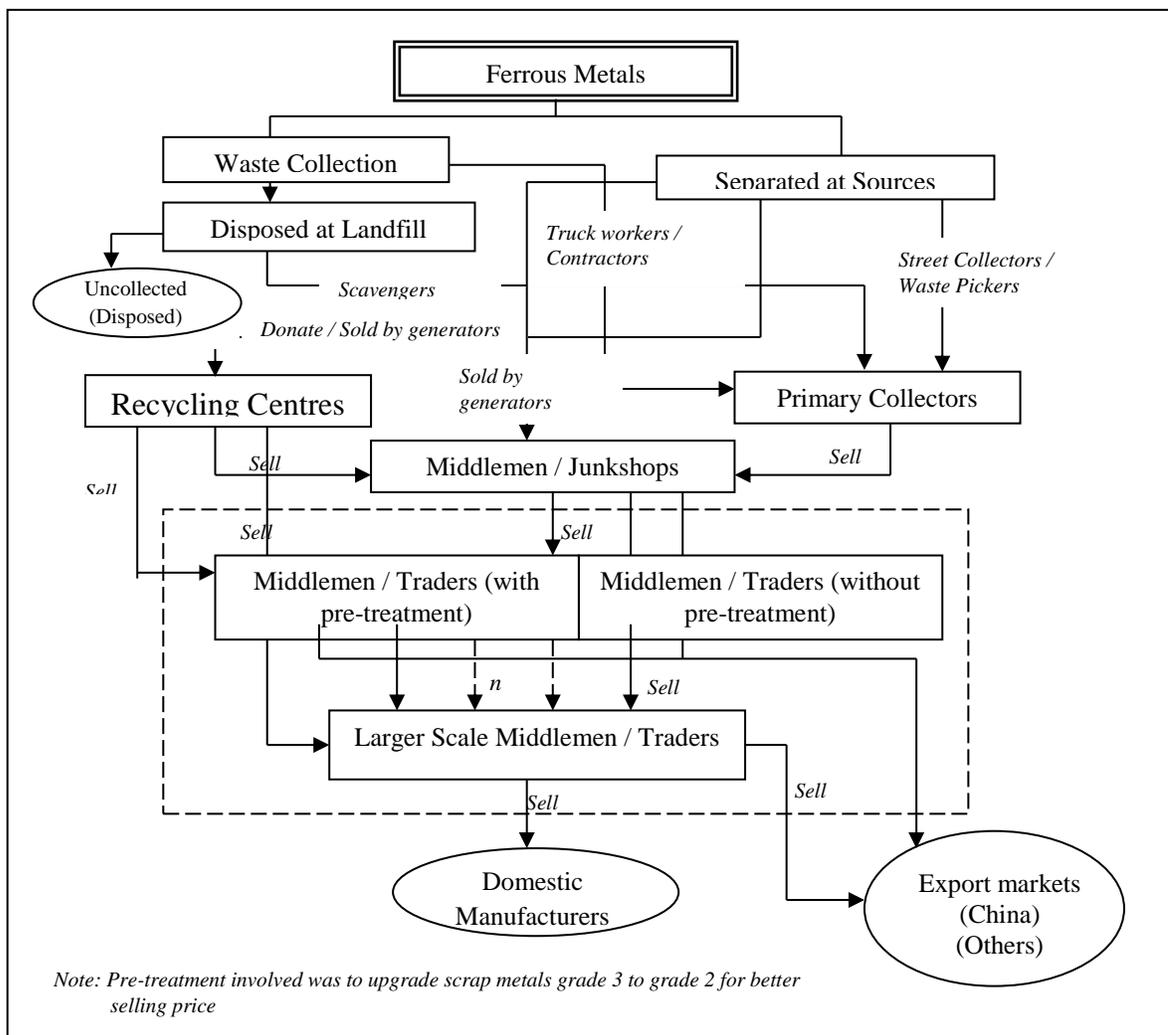
In addition to these recycling facilities, some other special recycling activities are carried out, which are not common such as turning used cooking oil into bio-diesels, and turning used candles to make new candles.

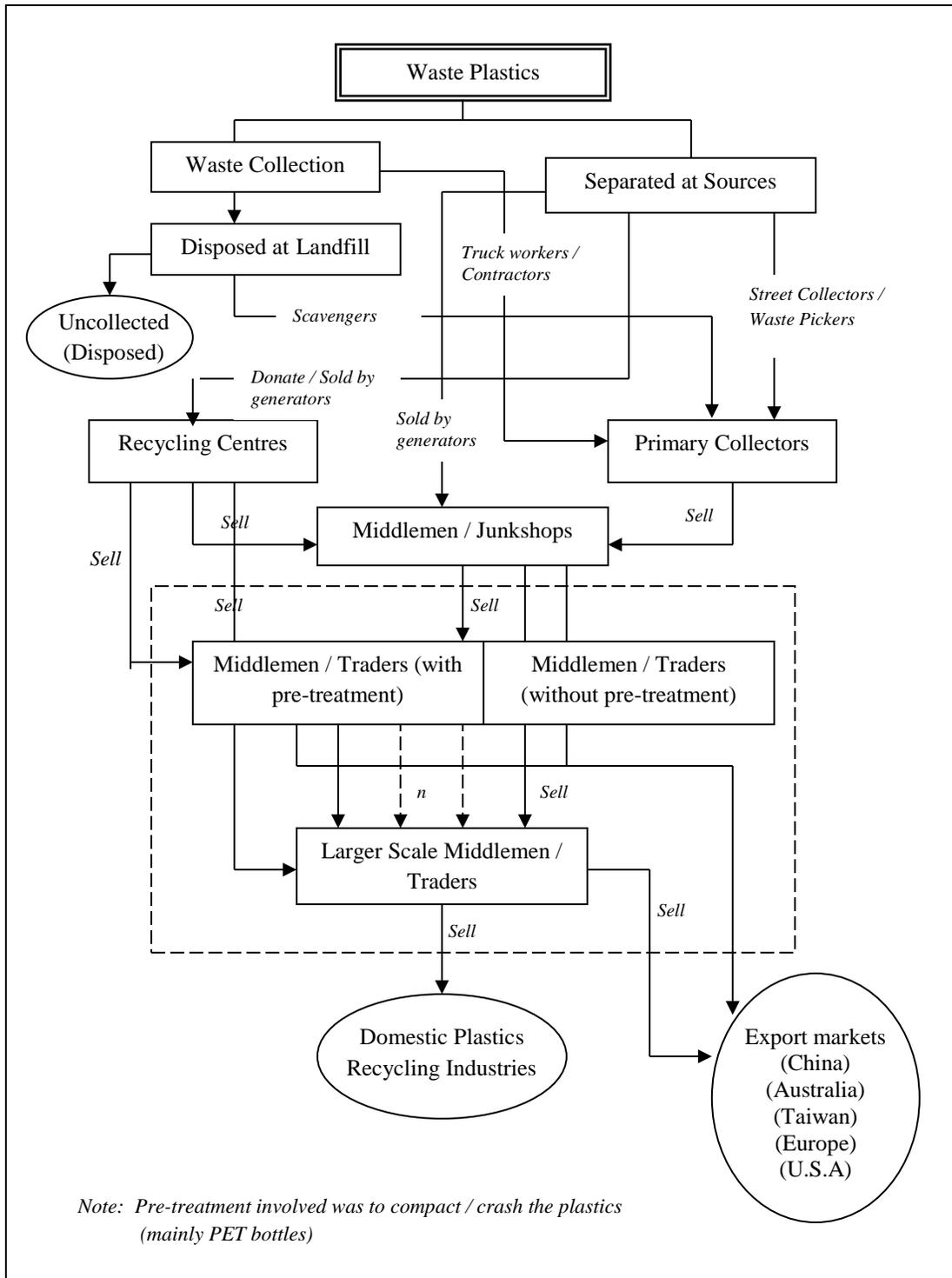
#### 4.1.4 Recyclable material flows

The material flows of the main types of recyclables identified were analysed. It was found that the material flow for each different type of recyclable in each different study area can differ, due to differences in terms of recycling practices, business establishments as well as other local conditions. Examples of waste flows for waste plastics and scrap metals in Malaysia are shown in **Figures 4.5** and **4.6**.

As shown in the figures below, the flows for the other recyclable materials are similar since the collection and trading systems for such recyclable materials are not much different in the markets, where most of the collectors or recycling centres, middlemen etc. collect all these materials at the same time. However, some obvious differences were observed such as the pre-treatment of recyclable materials as well as the end buyers' markets depending whether there are ready buyers locally or in foreign markets.

**Figure 4.5: Material Flow for Ferrous Metals (Irons)**





**Figure 4.6: Material Flow for Plastics**

#### **4.1.5 Recycling stakeholders**

As discussed earlier in the section on existing recycling practices, many recycling players are playing important roles in the overall recycling activities of the markets, right from the generation of recyclable materials at source to the final point of the recycling industries at different levels of involvement. In general, the actors are categorized in the following manner:

- a) Waste Generators: This entails separation of solid waste materials at the point of generation. However, recycling at source is limited and generally involves separation of recyclables by households, offices and industries which is performed on a voluntary basis. The recyclables are collected either by private door-to-door collectors, contractors in the case of industries or brought by the source generators to recycling centres or schools.
- b) Tailgate Recyclers, waste pickers and the scavengers: This involves recycling activities by street pickers, door-to-door recyclable pickers, truck workers as well as landfill scavengers. The recyclables collected, including those collected from recycling centres or by scavengers at disposal sites, are sold to middlemen buyers.
- c) Recyclable Traders/Middlemen/Junkshops/Centres: This involves the trading of recyclables collected by any party. The traders are sometimes involved in collection activities by themselves, but some are only trading the recyclables sold by collectors or generators. The traders/middlemen/junkshops are selling recyclable materials to the end users who are normally recycling industries in domestic or overseas markets.
- d) Recycling facilities/factories: These are factories that purchase recyclable materials for reuse or reprocessing. The recyclables are typically obtained from tailgate recyclers or middlemen. Very few recycling industries are involved in collection activities.

#### **Street Collectors, Scavengers and Waste Pickers**

The waste pickers, street collectors and scavengers are first level primary collectors playing an important role in the collection of recyclable materials. The activities done by the collectors at this level can generally be further divided into the following categories:

- a) Wastes pickers/Street collectors - Collection of recyclable materials door-to-door and from curb sides. Some street collectors are using simple trolleys for collection whereas some are equipped with vehicles such as motorcycles, vans or lorries. Some collectors are paying a small amount of money for the recyclable materials collected (a buy back system) especially old newspapers, aluminium cans, car batteries etc. Coverage areas are dependent on the vehicles used. Collectors with simple trolleys are normally working within very limited coverage areas where middlemen or traders are located

nearby to buy the recyclable materials collected.

- b) Scavengers - Collection of recyclable materials only within a landfill site area. The scavengers normally use simple hand tools to sort the recyclable materials from the mixed wastes dumped at the tipping areas. The collected materials are sold to agents or middlemen at the landfill sites or nearby. In some cases, the middlemen come to the landfill site several times or once a day.
- c) Truck workers - Collection of recyclable materials from sources during the waste collection process. The collection workers collect recyclable materials while they are collecting waste and the materials are sold to agents or middlemen before non-recyclable wastes are sent to the landfill sites.
- d) Waste contractors - Collection of recyclable materials upon request from the waste generators. The collections provided are normally a paid service and the coverage areas are normally commercial areas as well as industry premises. In addition, special waste items such as bulky waste (furniture etc.) are also collected by the waste contractors upon request. The recyclable materials in the collected wastes are sorted out and sold to middlemen while some useable items such as old furniture are sold to second hand item dealers. The remaining non-recyclable materials are sent for final disposal.

Some photos of the wastes pickers, street collectors and scavengers (**Figure 5.7**) are shown as follows:



**Landfill Scavengers**



**Door-to-door Waste Collector**



**Truck Workers**



**Recyclable Contractor**

**Figure 4.7: Street Collectors, Scavengers and Waste Pickers**

#### ***4.1.6 Recyclable prices***

However, it should be emphasised that the recycling industry in Malaysia, especially private initiative activities, are highly dependent on market demand and prices. It was reported that the prices of recyclables very much fluctuate depending on the price of virgin materials such as plastic resin and pig iron. The market demand, for example the Chinese market, has a big impact on the recycling activities carried out in the country.

A list of recyclable prices indicated by the concessionaire company (Alam Flora Sdn Bhd) is shown in **Table 4.1** below (as of December 2012). These are however, only indicative prices because this is a competitive market and thus the prices are also expected to be competitive subject to market supplies and demands.

**Table 4.1: List of Prices for Recyclable Materials indicated by Alam Flora Sdn Bhd**

No	Recyalables	Unit	Price (RM)	Price (USD)
1	Old newspapers	Kg	0.24	0.08
2	Papers (Black and white)	Kg	0.36	0.12
3	Carton boxes	Kg	0.22	0.07
4	Paper (magazines)	Kg	0.22	0.07
5	Paper (mixed)	Kg	0.18	0.06
6	Tetrapak	Kg	0.50	0.17
7	Tin / iron	Kg	0.40	0.13
8	Aluminium cans / stainless steels	Kg	3.00	1.00
9	Car batteries	Kg	1.00	0.33
10	Plastics	Kg	0.40	0.13
11	Glass	Kg	-	-
12	Computer	unit	4.00	1.33

Note: Prices shown as of December 2012; conversion used: USD1.00 = RM3.00

#### ***4.1.7 Recycling promotion law and policies***

The National Solid Waste Management Department (JPSPN) under the Ministry of Housing and Local Government (MHLG) is the core Department that announces the National Solid Waste Management Policy and enforces the Solid Waste and Public Cleansing Management Act (Act 672) upon its enforcement in September 2011. This Act is aligned with the 3Rs (Reduce, Reuse, Recycle) approach.

With the enforcement of this Act, the power of managing solid waste was transferred from the Local Government to the Federal Government. To date, Act 672 enforces all states and federal territories in Malaysia except the states of Pulau Pinang, Selangor, Perak, Sabah and Sarawak, which are still managing solid waste under the relevant local authorities.

Some important points extracted from Act 672 are summarized as follows:

- All the stakeholders involved in any solid waste management activities will be subject to licensing conditions including recycling activities. For prescribed solid waste management facilities in particular, approval from the JPSPN will also be required prior to operations commencing.
- A clause to enforce mandatory source separation by the waste generators is stipulated in Act 672. However, it was announced by the JPSPN that source separation will only be done on a voluntary basis until 2014, when the mandatory or “stick approach” will be taken. The segregation of recyclables is therefore expected to be improved in stages.

- To supplement source separation efforts, the JPSPN will implement a “2+1” collection system, in which there will be 2 collections of non-recyclable wastes for each collection of recyclable materials including bulky wastes. Each household will be given a 120 litre bin in which to place the residue waste, while recyclable materials such as plastics, papers and metals should be placed in normal plastic bags for collection. The collected mixed recyclables will be delivered to a dedicated facility (most probably a MRF) for further sorting. For some business entities, 240 litre bins will be given instead of a 120 litre bin.
- The Act 672 also stipulates the power to enforce a buy-back system and deposit refund system for certain products. However, it was also announced by the JPSPN that the implementation of these systems is not a priority at the moment.
- In terms of institutional setup, the National Solid Waste Management Department (JPSPN) and Solid Waste and Public Cleansing Management Corporation (PPSPPA) were established in 2007 under Act 672 and Corporation Act 673. JPSPN is playing a main role in policy and planning matters at the Federal Government level, while working closely with the PPSPPA to ensure effective implementation of the daily tasks on all aspects of solid waste management and public cleansing. On the other hand, 3 concessionaire companies were awarded long term contracts to collect solid waste from households. The concessionaire companies and other waste contractors or operators will be implementing the services as the working arms under supervision by the PPSPPA.
- For waste recycling facilities in particular, any recycling facilities approved before the enforcement of Act 672 is deemed to be already approved under the Act. However, establishment of any new facilities will be subjected to approval conditions of Act 672. In addition, any operation of recycling facilities will require a license from the JPSPN in the long run. This includes in principle, all industries that are using recyclable materials as part of their productions such as plastic manufacturers or metal smelters. However, the JPSPN announced that for actual enforcement in the future, industries that receive less than 50% waste materials in their production line as raw materials might be exempted from licensing.
- To date, a total of 8 regulations were enacted under Act 672, more regulations are undergoing drafting and are expected to be released in stages. The concessionaire companies are in the progress of distributing the waste bins to the households and some commercial entities. No standardized trucks are used at the moment. Furthermore, licensing also has not taken place yet, but the PPSPPA is calling for voluntary registration by stakeholders in solid waste management, including registration of existing solid waste management facilities.

In addition, it should be emphasized that Act 672 stipulates one clause for direct billing of solid waste management services in the long run which means waste generators such as households will receive a separate bill for solid waste management services, in addition to the current electricity, water and sewerage bills. Nevertheless, the JPSPN has made several announcements that direct billing will not take place in the near future. The government will be subsidizing the additional budget required for proper solid waste management, on top of the assessment tax money paid by the waste generators. When direct billing is in place in the future, it is expected that some portions of the assessment tax that people are paying now will need to be deducted.

At the moment, there are no specific incentives provided by the government on solid waste management, except some tax exemption for importation of recycling machines, and also special feed-in-tariff for projects which are related to renewable energy, including waste sectors.

## **4.2 Recycling business model**

This report reviews 3 types of recycling business models in Malaysia: (i) private company (conventional model) (ii) charity organization and (iii) government initiatives. Details of each example are described as follows:

### ***4.2.1 Recycling Business Model of Private Company***

#### ***4.2.1.1 Waste buyer shop in Kuala Lumpur – Company X***

The business model of a recycling company located in Kuala Lumpur area was studied. The owner of the company requested that the company name not be used in the report (referred hereafter as Company X). The company was not willing to release much information especially the financial information of their business due to confidentiality concerns. Only some other information released by the company is reported in this section.

In a nutshell, the business model of Company X is a common business model for recycling in Malaysia, which is very much market driven, profit oriented and heavily subject to market prices. No direct intervention by the government on this business model of recycling in terms of any supports or incentives, although some tax exemption is available for importation of recycling machinery. Companies running on similar business models are common in the markets and very competitive.

#### **(a) Background**

Company X started its business about 20 years ago, as a small scale recyclable buyer, mainly buying recyclable materials directly from only 3 nearby manufacturers (metals and plastic manufacturers). After about 3 years of operation, the business expanded to serve more manufacturers at wider areas, and small-scale recyclable collectors started to also sell the recyclables to Company X. The owner of the Company informed that he was a supervisor in an

engineering factory before starting this business. There was no specific reason for him to start in this business, just opportunities as well as market availability.

Company X is operating with 3 different licenses provided by different authorities: (a) normal business licenses provided by the local authority (b) license from DOE to collect and transport E-wastes (c) permits issued by the police to collect scrap materials. The company stated that they have already registered with the Solid Waste and Public Cleansing Management Corporation as waste contractor and recycler. They are expecting to get a license under the new Act 672 when licensing conditions are established in the future.

However, the legislation or licensing system by the government is mainly aimed at controlling the activities of all recycling players including proper data management, no direct benefits will be enjoyed by the players under this system such as subsidies or financial assistance. However, the licensing conditions are expected to get rid of some small recyclers, therefore this system will be beneficial to genuine recyclers indirectly when these small scale recyclers are disqualified.

#### **(b) Scale of business**

Company X is considered a large-scale waste buyer in Kuala Lumpur. No financial information was released by the owner about the initial investment and monthly cash flows. The initial investment could be small (estimated at around USD 30,000) since the business started on only a small scale and then slowly expanded over the last 20 years. From observations, it was estimated that the monthly cash flow could be more than USD 400,000 per month. The company has more than 5 branches in Kuala Lumpur and nearby areas, the total area is unknown. There are about 30 workers in total, of which half are responsible for manual waste separation.

#### **(c) Business and marketing strategies**

Company X plays the role of the middleman or trader for the waste generators or other small recycling players such as the scavengers, street pickers as well as recycling centres. The collection of recyclable materials is done in two ways:

- a) Brought in recyclables – recyclable materials are brought to Company X directly normally by individual waste generators such as households or some commercial entities, and also some small scale waste buyers or collectors
- b) Collection service – recyclable materials are collected from industries or commercial complexes; recycling centres of NGOs; institutions such as schools; large scale waste collectors; as well as landfill sites scavengers.

With both methods of collection, Company X offers buying prices for different materials by weight following the fluctuations of market prices.

Company X stated that the market is very competitive as there are too many buyers around, therefore the buying price is market driven and very competitive, especially for the first category of business (walk in sellers).

On the other hand for some clients such as industries, commercial complexes, NGO recycling centres and institutions such as schools, contracts or agreements are sometimes signed in which Company X will serve these clients normally throughout an agreed duration (normally on yearly basis). By signing a contract with the Company X, the clients will enjoy the following benefits:

- a) Provision of free waste bins (normally 1,500 litres or larger communal bin) to be placed on the client's premises place free of charge (**Figure 4.8**).
- b) Pre-determined collection frequency as agreed by both parties, or collection upon request by the clients.
- c) Pre-agreed buying prices as agreed by both parties.
- d) Additional collection service for non-recyclable wastes (such as food wastes) to be disposed of at a low price.

Company X further stated that some industry clients are offering recyclable materials for free, but with condition that non- recyclable waste must also be picked up and disposed of for free. In this case, most of the waste is all mixed together without any segregation.



**Figure 4.8: Example of Communal Bin Provided by Company X to the Industry Client**

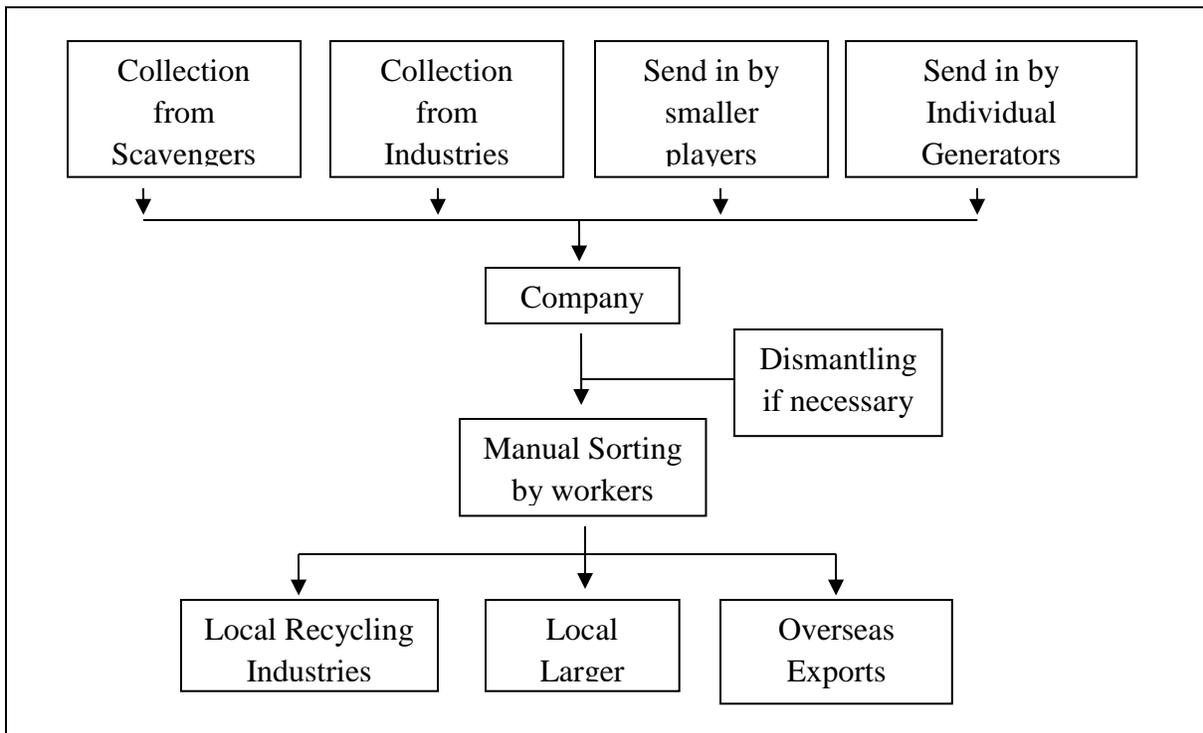
**(d) Sources of recyclables, processing and value added**

The materials purchased by the company include all categories of plastics, metals, papers, car batteries and e-wastes. Glass is not collected by Company X because it is not profitable with low selling price and high handling costs.

The average quantity of recyclable materials collected by Company X was recorded as about 50 tonnes per day, which is equivalent to 1,500 tonnes per month. The recyclable materials collected by Company X are further sorted manually on company premises.

Depending on the types of recyclable materials sorted, some will be sold directly to the end users or recycling industries, while some will be sold to other larger scale agents or traders. Some materials are also exported overseas but little information was released by the company possibly due to legal liability, especially regarding the export of E-wastes.

The material flows of the main types of recyclables identified were analysed based on information provided by Company X. Generally, the recyclable flow can be illustrated as in **Figure 4.9** below.



**Figure 4.9: General Flow of Recyclable Materials in Company X**

**(e) Technology and innovation**

No sophisticated process is in place at the moment except manual sorting by workers, and when necessary, some simple dismantling and compacting using baling machines. There were 3 baling machines found in the factory, and dismantling work was observed only on collected E-waste.

**(f) Social and environmental promotion strategies**

The company imports many foreign workers from Bangladesh and Indonesia. In terms of environmental promotion strategies, there is no specific requirement for the company to take any precautions, except general conditions that no pollution should be caused by the operation of the company. Although the company has a license issued by the DOE, the license is meant for only e-waste collection. Only in cases when pollution occurs and complaints are received by the DOE, will investigations be taken by DOE against the company. The company stated that this has never happened to the company during the past 20 years. In addition, the owner of Company X stated that they have participated actively in some CSR programmes organized by the ministry and local authorities, such as recycling campaign and awareness creation talks in schools etc.

From site observations, the company has no specific environmental promotion strategies in place, however the surrounding environment was not too bad except for some recyclables scattered around nearby the plant. It is generally a business oriented company with minimal emphasis on social and environmental aspects except those as required under regulatory requirements.

**(g) Business extension and scaling-up strategies**

In order to maximize profits, Company X is now expanding their business to carry out plastic recycling on their premises, mainly to produce value added plastic resin at a higher selling price for the plastic industries. In addition, the company is also interested in expanding their business in organic food waste recycling in the near future.

*4.2.1.2 Waste buyer shop in Rawang, Selangor – Company Y*

Another business model of a private initiative was investigated in Rawang, Selangor, another state about 60km to the north of Kuala Lumpur. The Managing Director also preferred that their company name not be released in the report (referred hereafter as Company Y).

### **(a) Background**

Company Y started its business only 12 years ago, but the owner has been involved in the scrap business since 22 years ago as a small scale recyclable buyer. Company Y was set up by the owner with some investments received to expand the business to the current scale. Investment was received from both local and Indian sources, but the amount of investment was not disclosed. The owner of the company stated that the reason for him to start this business was the reasonable profit margin, and because he does not have a high education level. Other important factors are also the opportunities as well as market availability.

Company Y is also operating with 2 different licenses required by different authorities: (a) normal business license provided by the local authority; (b) permit issued by the police to collect scrap materials. No license from DOE is required because the company is not dealing with E-waste or any other hazardous wastes.

### **(b) Scale of business**

The company uses an industrial lot with an area of about 1.5 hectares with a completely roofed 10m steel structure. The maximum capacity of the plant is 1,000 tonnes per month, but they are now running under capacity because of manpower issues. Company Y is now employing 25 workers to do sorting, all are foreign workers from India and Myanmar.

This is considered a medium scale recycler focusing their business only on waste plastics (**Figure 4.10**). At the moment, the company is running 3 machines to wash the waste plastics and the 4 other machines to melt and make plastic resins. The initial investment was not released by the owner, but the monthly cash flow was stated to be approximately RM 300,000 (USD 100,000).

### **(c) Business and marketing strategies**

Company Y is buying waste plastics from various sources but not collecting on their own. The main clients of the company are the small scale waste buyers or collectors as well as individual waste pickers. The company has no special marketing strategies except offering slightly higher buying prices because of the economics of scale. In addition, the company's experiences of more than 10 years in this business has enabled it to develop a strong network among the industries to trust and sell their plastic waste to at reasonable prices.



General Outlook of the Plant of Company Y



Mixed Waste Plastics Received by Company Y



Workers Doing Sorting at the Conveyor Belt Areas



Sorted Waste Plastics by the Workers

**Figure 4.10: Recycling activities at company Y**

#### **(d) Sources of recyclables, processing and value added**

At the moment, Company Y is collecting about 300-400 tonnes of mixed waste plastics per month from the surrounding local markets (from small scale waste buyers, collectors, middlemen of scavengers and truck workers), but they have previously collected as much as 600-700 tonnes in the past. Some industries also send their plastic wastes directly to Company Y, but not on a regular basis.

The waste flow for Company Y is similar with Company X, although Company Y is not offering services to place collection bins on client premises. In general, they are undertaking the following processes:

- HDPE, LDPE and PE – shredded, washed and melted to make plastic pellets
- ABS Plastics – only shredded and sold
- PET bottles – only baled and sold

The company has baling machines, washing facilities, melting facilities and simple conveyor belts for manual sorting by the workers.

#### **(e) Technology and innovation**

There is no complicated machinery in the plant, except an old conveyor belt, several compacting/baling machines, melting and washing facilities. Most of the plant areas are used for waste sorting and storage purposes.

#### **(f) Social and environmental promotion strategies**

Similarly to Company X, the business of Company Y very much relies on foreign workers, and therefore they are subject to the Labour Law of Malaysia in terms of social welfare for the workers. The workers are all working without any personal protection device except simple hand gloves. Other than that, the company has never been involved in any other CSR or social promotion activities.

In terms of environmental precaution strategies, it was observed that the surrounding environment of the company is dirty and not very well maintained, mainly due the waste plastics received by the company are all dirty plastics from small scale waste buyers, which could also be waste plastics scavenged from the landfill.

### **(g) Business extension and scaling-up strategies**

The company revealed that the biggest problem preventing the business from running at full capacity is difficulties in finding and hiring good quality workers.

As mentioned above, Company Y is currently only receiving about 300-400 tonnes of waste plastics per month, whereas the maximum capacity is as high as 1,000 tonnes per month. This serious under capacity condition (only 30-40% used) has been happening only recently, and the company raised the following points including their future plans:

- i. Difficulty in recruiting workers; quality of the foreign workers is too low and they are hard to manage (discipline problems). Local workers require a higher salary, and in many cases, are not willing to work in this industry even if a higher salary is offered.
- ii. Waste plastics are available in terms of quantity in the surrounding areas. Networking and buying prices are important factors in obtaining the materials.
- iii. The company is looking into possibility of using an optical sorting system (automatic system using conveyor belts and optical sensors) to solve their manpower problem. A certain level of investment is required; however the capacity can be increased to 1,000 tonnes per month, which could make the investment viable.
- iv. The company has very high concerns about the requirements to obtain an operation license under the new Act 672. In general, there is no special action done at the plant currently for environmental protection measures. The company however claimed that they have never received any penalty from DOE for any pollution caused, and they are taking good welfare of all the foreign workers.

### **(h) Financial analysis**

The company didn't reveal much information on the financial aspect of the plant, except some general figures:

- The buying price of waste plastics is about USD 0.35 to USD 0.45 per kg
- The selling price is about USD 0.80 per kg
- The salary of each worker is about USD 330 per month

Assuming the plant is collecting 400 tonnes of plastic per month, it can therefore be estimated that:

- The cost of buying waste plastics is approximately USD 160,000 per month
- The sales amount is approximately USD 320,000 per month

- The salary of 25 workers is approximately USD 8,250 per month

Other expenditures such as the utility costs (electricity and water consumption), maintenance costs etc were not revealed by the company; therefore the entire financial model of the company couldn't be determined. However, by looking at the scale of the plant, it was estimated that the other costs involved could be around USD 50,000 per month, which means the company could be highly profitable at more than USD 100,000 per month. Of course this excludes the capital investment (CAPEX) of setting up the plant.

#### ***4.2.2 Charity organization***

A recycling business model involving no monetary incentive is described in this case study. There are probably more than 100 similar charity organisations which are running on small to large scale around the whole country, including some which are attached to religious organisations such as Christian churches and Buddhist temples. Some of these small organisations are much more localised such as an old folk's home or even a small church which collects recyclables from the community.

Some private companies are also active in recycling in collaborations with these charity organisations, which provide free awareness talks and training to the employees of the companies. Some larger scale NGO/Charity organisations that are active in collecting recyclables are:

- Pertubuhan Amal Seri Sinar Kuala Lumpur and Selangor (P.A.S.S.)  
([recyclecharity.org/](http://recyclecharity.org/))
- Buddhist Tzu Chi Foundation  
([eng.tzuchi.my/](http://eng.tzuchi.my/))
- Xim Phou Moon Welfare Society  
([www.xpmcaringworld.com/](http://www.xpmcaringworld.com/))
- Beautiful Gate Foundation for the Disabled  
([www.beautifulgate.org.my](http://www.beautifulgate.org.my))
- Amitabha Centre Malaysia  
([www.amitabhacentre.org/](http://www.amitabhacentre.org/))
- Community Recycle Charity (CRC)  
([www.crcbox.com.my/](http://www.crcbox.com.my/))

**Figures 4.11 and 4.12** shows some activities of NGOs/Charity organisations active in recycling in Malaysia.



**Figure 4.11: Segregation Works at Recycling Centre by Buddhist Tzu Chi Foundation**



**Recycling centre of Fo En in Penang**



**Recycling for Charity Carried out at a Shopping Mall by CRC**



**Another Charity Recycling Centre in Penang**



**Recycling Bin of Beautiful Gate Foundation for the Disabled**

**Figure 4.12: Charity activities for recycling in Malaysia**

#### 4.2.2.1 Pertubuhan Amal Seri Sinar Kuala Lumpur and Selangor (P.A.S.S.)

##### (a) Background

P.A.S.S. is a Non-Governmental Organization (NGO) in Semenyih, Selangor. It was formed in year 2003 by Dato' (Dr.) Eadon Ching with the aim of educating the public in recycling for charity. The organization's activities are fully endorsed and supported by the Ministry of Housing and Local Government and also WANGO (World Association of NGOs). No other incentives or subsidies are obtained, and the NGO operates completely independently.

Since its inception in 2003, P.A.S.S. has given humble charities including environmental conservation a total of more than RM 1,300,000 (about USD 430,000). This charity was initially started with small amount of investment in 2003 and grew tremendously to about USD 70,000 per year of charity money donation by 2011 (See later section on Financial Analysis). The target groups included orphans, broken families, underprivileged children, the sick, the disabled, needy single mothers, community projects, schools and the deaf.

##### (b) Scale of business

Due to the fact that it is an NGO running on a charity basis, the CAPEX involved in the setup of this business is not known, because it was mainly donated including the premises (about 1 acre land size), which is used as the management office, central collection point, as well as the depot for parking of all vehicles. In addition to the premises, some other CAPEX included the pickup vehicles and drop off bins (**Figure 4.13**). It was however estimated that the overall investment could be at least USD 2.5 million to USD 3 million, if the price of the land or premises is included.



Recycling Drop off Points Provided by P.A.S.S.



Free Pick up Service provided by P.A.S.S.

**Figure 4.13: Services provided by P.A.S.S**

P.A.S.S. has 80 staff and manages to service more than 300 permanent recycling centres (drop off points) in the Klang Valley daily, as well as 25 free pick up vehicles providing services for bulky waste.

#### **(c) Business and marketing strategies**

P.A.S.S. is focusing only in Kuala Lumpur and nearby areas, because logistically it is not viable to collect recyclable materials from too far a distance from their premises in Semenyih.

Instead of selling to any middlemen, the P.A.S.S sells most of the recyclable materials collected directly to the end users, such as paper mills, scrap metal smelters and plastic recycling industries.

The operational data of P.A.S.S is opened to the public and is transparent due to their NGO status. Most of the figures are even displayed in their premises for public viewing. P.A.S.S also organizes a charity dinner on a yearly basis to declare its financial status, at the same time raising funds for charity purposes.

#### **(d) Source of recyclables, processing and value added**

P.A.S.S. collects all reusable and recyclable items including usable furniture, household junk items, used electrical appliances, books, PET bottles, etc. (**Figure 4.14**). Based on the figures of 2011, total recyclable materials collected by P.A.S.S was reported as 47,890 tonnes/year.

The P.A.S.S does not carry out any treatment process on the recyclable materials collected, except some repairs of furniture and electronic appliances. Most of the recyclable materials are sold to traders or middlemen after segregation in their raw form. It was informed that there is no plan for P.A.S.S to carry out any further processing on the recyclable materials such as crushing or processing into resins, because they are a charity organisation.

#### **(e) Technology and innovation**

The P.A.S.S does not process any of the recyclable materials received, but sells directly to buyers. Therefore there is no specific technology used by the organisation, except simple compacting machines to bale the recyclables, especially plastics. However, the P.A.S.S does repair electronic appliances, old furniture and used bicycles in the plant before selling to second-hand goods buyers.



**Old clothes**



**Recyclable Materials**



**Collection Activity**



**Donations to School**

**Figure 4.14: Recycling activities at P.A.S.S**

**(f) Social and environmental promotion activities**

P.A.S.S has donated more than RM 1,300,000 (about USD 430,000) in total since its inception in 2003 for various social welfare and environmental conservation activities. Recent records from 2011 shows that the yearly donation has increased to more than RM 200,000 per year (about USD 70,000).

In addition to this, the P.A.S.S also uses their networking to raise education funds of about USD 166,667 (RM 500,000) every year to distribute to needy pupils in schools (USD 66.67 or RM 200 each pupil). This budget is excluded from the revenue because the funds raised are totally used for educational purposes. With both the donations from recyclables and funds raised for educational purposes, the P.A.S.S donated about RM 700,000 (more than USD 230,000) in 2011 for both social welfare and environmental conservation activities.

### **(g) Business extension and scaling-up strategies**

It is not the plan for P.A.S.S to expand their business to other areas at the moment, because of manpower issues (most of the workers are foreign workers), although it was stated there is an increasing trend for people to be willing to donate their recyclables for charity purposes. In addition, many other charity organisations are active in many parts of the country, which is more localised, such as charity houses in Ipoh, Penang or Johor.

P.A.S.S. revealed that although the recyclable materials are collected for free, the organisation is paying a substantial amount of overheads to sustain the operations of the NGO. These include the salary of workers, upkeep of the collection vehicles, production of the drop off bins, maintenance of the storage areas etc.

### **(h) Financial analysis**

Detailed descriptions of the financial model for P.A.S.S in the year 2011 are shown as follows:

#### **REVENUE:**

- a) Mixed paper, books, carton box, old newspapers = 2,520 tonnes  
~ sold to paper mills at USD 100.00 per tonne (USD 0.10/kg)  
~ revenue generated = USD 252,000
  
- b) Scraps, aluminium, steel & others. = 1,110 tonnes  
~ sold to scraps factories at USD 333 per tonne (USD 0.33/kg)  
~ revenue generated = USD 370,333
  
- c) Plastics all types = 320 tonnes  
~ sold to plastic recycling factory at USD 267.00 per tonne (USD 0.27/kg)  
~ revenue generated = USD 85,333
  
- d) Furniture of all types, kitchen appliances = 28,200 tonnes  
~ either donated to remote areas or sold at charity sales  
~ revenue generated = USD 94,000
  
- e) Textiles = 5,200 tonnes  
~ either donated to 3rd world countries or sold at charity sales  
~ revenue generated = USD 54,167
  
- f) Others like porcelains, plants, pots, toys, home belongings = 10,540 tonnes

- ~ either donated to needy OR sold at charity sales
- ~ revenue generated = USD 70,267

Therefore, **total revenue generated for Year 2011 = USD 926,100/year**

### **EXPENDITURES:**

Expenditures of the organisation for the whole year are:

- i) Wages for 80 staffs (administration, drivers, general workers) = USD 512,000
- ii) Office expenses, factory & hostel rental, utilities insurance = USD 77,200
- iii) Lorry finance, maintenance, fuel, repairs, toll, tyres = USD 128,542
- iv) Medical expenses = USD 9,600
- v) Advertising, flyers, website, banners = USD 7,667
- vi) Recycling bins & bins maintenance = USD 73,333
- vii) Miscellaneous = USD 20,000

Therefore, **total expenditures for Year 2011 = USD 828,342/year**

### **PROFITS:**

Therefore, **total profit generated for Year 2011 = USD 97,758/year**

### **(E) CHARITY:**

- ~ USD 26,667 for study aid to needy students
- ~ USD 12,000.00 for tree planting sponsorship to schools
- ~ USD 20,000.00 for welfare homes, hard core poor & health programs
- ~ USD 10,000.00 for setting up community recycling centres

Therefore, total donations = USD 68,667/year

Percentage of donated money = **70%**

### **4.2.3 Government Initiative Recycling Model**

#### **(a) Background**

The Government of Malaysia is also active promoting recycling throughout the whole country. A National Recycling Programme (NRP) was launched back in the year 2000, with the aim of achieving a recycling rate of 22% by the year 2020. At that time, the government was actively promoting recycling by introducing 3-colour recycling bins; setting up recycling centres; promoting recycling using special 3R trucks; distributing posters and flyers; advertisements through various mass media; organised awareness creation events/campaigns etc. The initiative is still on-going 12 years after inception, but is getting very slow and now has an emphasis on awareness raising.

#### **(b) Scale of the Initiative**

The NRP is a national-wide programme following a directive from the central government (Ministry of Housing and Local Government) to all the 141 local authorities in Malaysia. The main focuses of the initiative were local communities, which were targeted through the following channels:

- Government offices
- Schools/colleges/universities
- Shopping malls/hypermarkets
- Public places (such as stadiums / bus stations / public halls / petrol stations etc.)
- Other places upon request (such as factories, companies etc.)

#### **(c) Promotional / Marketing Strategies**

Under this initiative, three main allocations were given by the central government to all the local governments throughout the country:

- a) 3-colour bins for drop off of recyclables at various strategic locations (**Figure 4.15**)
- b) Awareness raising posters
- c) Recycling centres at some local authorities upon request
- d) 3R truck for collection of recyclables from the communities

The most commonly seen activities under the NRP is the 3-colour recycling bin which was introduced and distributed to various places such as schools, malls, petrol stations and public places. The 3 bins are designed to collect “plastic and can bottles”, “papers” and “glass bottles”. Together with the recycling bins, various posters were also printed and distributed for awareness creation purposes.

The NRP has continued since it was launched, and now the government is the progress of preparing new posters and bins for distribution. Under the NRP, November 11<sup>th</sup> of each year was announced to be the National Recycling Day, and road-shows were conducted by the National Solid Waste Management Department and Cooperation every year.

Under the NRP, recycling centres were constructed in many local authorities to serve the communities at a local level (**Figure 4.16**). Examples of recycling centres operated by the local authorities are shown as follows.

Some of the recycling centres operated by the local authorities use the buy-back system, while some are on the drop-off system. It was also found that some of the recycling centres launched under the NRP are no more in operation now, while some have been handed over to NGOs or charity organisations for operation.



**The 3-colour recycling bin launched under the National Recycling Programme**



**The Posters Distributed under the National Recycling Programme**

**Figure 4.15: Promotion of waste separation**



**Figure 4.16: Recycling Centres Operated by the Local Authorities**

An example of buy-back system is at the office of the Ministry of Housing and Local Government itself (**Figure 4.17**). There is no specific “centre” for collection of recyclable materials, but the staff of the whole ministry are required to collect their recyclables on certain days, and sell it in the ministry lobby during lunch or after working hours. Recyclable buyers are in the lobby to measure and buy the recyclable materials at prices pre-determined and agreed by the ministry. Cash money will be paid directly by the buyers to buy the recyclable materials, and the money is usually kept by each department of the ministry as a small office fund.

This recycling system can be easily implemented in office buildings, and the system can be easily duplicated to other government office buildings. Photos below show the buy-back system currently practised by the ministry.

In addition to the 3-colour bins, posters and recycling centres, the central government has also allocated special 3R trucks for some selected local authorities (**Figure 4.18**). These trucks are designed with compartments for the collection of recyclable materials, especially for moving around residential areas.



**Figure 4.17: Buy Back System Practised by the Ministry**



**Figure 4.18: 3-R Truck for Collection of Recyclables from Communities**

#### **(d) Source of recyclables, processing and value added**

The main target of the NRP is the general public and communities. The activities involved are only the collection of recyclable materials, without any further processing. The collected materials are sold directly to the recyclable buyers.

Private sectors are indirectly supporting the NRP by providing a space to place the 3-colour bins, such as at the shopping malls, petrol stations and supermarkets etc. The bins are given for free by the local government, and no other incentives are given to the private sector that supports this initiative. Similarly, no incentives are given to the person who put recyclable materials into the bins since it is a drop off system instead of buy back.

The 3-colour bins initiative under the NRP is not a scheduled collection system, therefore there is no separate collection of recyclables provided for the 3-colour bins. In most cases, the recyclables in the bins are collected by the normal waste collectors or concessionaire companies. Thus, there is no additional cost to be covered by any party, except the bin costs, which are sponsored by the central government. From the perspectives of waste contractors/concessionaire companies, the collection service from the 3-colour bins is done as a service to the local government and also as CSR for the community.

#### **(e) Technology and innovation**

The NRP initiative only focuses on awareness creation and recyclables collection, no processing is required and therefore no sophisticated technologies are used.

#### **(f) Social and environmental promotion strategies**

The ultimate objective of the NRP is to create awareness among the public on recycling. It is part of CSR for the private sector as well to support this initiative. This initiative is a nationwide social and environmental movement, and it does not affect the livelihoods of the existing recycling players in the markets, because the collected recyclable materials are also finally sold to the recyclers. The central government uses the local governments to implement promotion strategies to raise awareness of the initiative at the local level, with particular focus on strategic locations such as schools and public places. There is no specific environmental countermeasure taken in this initiative. The biggest disadvantage of this initiative is the sustainability of the 3-colour bins used, because once the bins are placed at a specific location, there is lack of maintenance and responsibility for the bins. It was found in many cases that after some time, many bins are found to be broken or no longer in use due to the bad condition.

On the other hand, in comparison with the recycling activities of the private sector as well as the charity organisations or NGOs, it was found that the public has a tendency to give away their recyclable materials to the private sector, the charity organisations or NGOs rather than to the local government. Willingness to give away the recyclable materials to government initiated recycling centres or bins are lower because peoples tend to have a better feeling when giving away the recyclables for charity purposes. In addition, there is no clear indication by the government to the public about the final destination of the collected recyclables and how the revenues generated from recyclable materials collected will be used.

#### **(g) Extension and scaling-up strategies**

At the initial stage of launching in 2000, it was announced that a total of 2,360 sets of 3-colour recycling bins were distributed and road shows were organised at 9 major cities countrywide. In addition, hundreds of recycling centres from small to large scale were set up throughout the country at the local level. However, no further update information was reported after that about the total numbers of bins and recycling centres in operation until today.

The NRP has not been successful since its inception, although the awareness level of the public may have been increased, as a result of the promotional activities and 3-colour bins placed around. Many of the recycling centres established were reported to be abandoned, and some were handed over to some NGOs for operation.

The biggest challenge of the NRP is to have a proper separate collection system for the recyclable materials collected. In most cases, no separate collection was found in place, and the recyclable materials were found collected and mixed by the same contractor.

In 2010, the Minister of Housing and Local Government announced the re-launch of the NRP with distribution of more 3-colour bins to the public, however, no re-launch activity was done as of June 2013. It is obviously not a priority of the government to extend or scale up this NRP, but to conduct it mainly as awareness raising activity as part of the regular activities of the ministry.

#### **(h) Financial analysis**

Information on the financial aspects of the NRP is not available, as it is not a profit driven model but a government led effort towards recycling.

## **4.3 Driving factors, barriers and way forward for recycling business development in Malaysia**

### **4.3.1 Driving factors**

A lack of relevant data concerning recycling within Malaysia makes it difficult to clearly ascertain the current status of recycling within the country. The sector is extremely diverse with the presence of both the government at the national and local level as well as private sector and third sector actors such as NGO and charity organization. The level of responsibility for the local governments differs depending on the area of the country. Regarding the private sector, small-scale recycling players are coexisting with large scale recycling companies in Malaysia, each targeting their respective markets although a certain level of competition is taking place. Small-scale recycling players are focusing more on short-term benefits with a higher company turnover rate, and are very much subject to the fluctuation of recyclable prices in the markets. The activities of the third sector actors appear to be smaller scale but well supported in their communities. Their actual impact is easier to assess due to their transparency.

Without regulation to enforce reporting of the amounts, types and proportions therein of waste it will remain difficult to accurately assess the true status of recycling within Malaysia and create strong recommendations. Nevertheless this report has been able to identify the 3 main drivers of the recycling industry within Malaysia:

1) Economic value of recyclables

Similar to other countries, the market is a primary driving factor for recycling businesses in Malaysia. The recycling rate of materials that has a high market demand (especially for plastics, paper, metals and e-wastes) could be much higher than those with a lower demand such as glass. The domestic price of recyclables is directly influenced by international demand.

2) Charitable mentality and increasing awareness of recycling and the environment

Many NGOs and charity organizations are often linked with Christianity and Buddhism, and are engaged in the recycling business to earn a profit and use the profit for social services, education and other charity programmes. This is a unique factor compared with other countries. These organizations receive higher attention and trusts by residents rather than government initiatives.

3) Government policies and legislation

The Government has enacted Act 672 which will be fully enforced in 2014. This Act regulates all players related to solid waste management including the recycling businesses. In the long run, this will create a better system for the recycling sector in Malaysia, including proper data management, as well as overall improvement in the

operation of the players. Some small players unable to fulfil the requirements of the Act or regulations will be phased out.

Some small incentives are given by the government such as tax exemptions for the importing of recycling facilities; and also a special “Green Technology Financing Scheme” for certified green technology projects, including recycling sectors. However, not many recycling projects are eligible due to the fact that many of these recyclers are operating in conventional way and most of them are running on low operational standards, with minimal environmental control measures. This has caused these recyclers not able to fulfil the requirements of Scheme, and failed in the evaluation.

#### **4.3.2 Barriers and recommended actions**

##### **1) Government Initiatives are Ad-Hoc and Not Sustained, Leading to Weak Government Control**

The government’s recycling initiatives, such as awareness raising, are still ad hoc and rarely sustained most of the time. The separate scheduled collection of recyclables is planned but not enforced yet. This means that overall control of recycling activities by the government is weak, leading to poor overall performance on environmental control by stakeholders engaged on recycling business, due to the fact that recycling is mainly profit oriented.

Recommendations:

- The national government needs to sustain its initiatives through (i) financial support (ii) sustained implementation of the policies (iii) targets and indicators against which actions can be measured
  - Financial Support – this is key to the sustainability of any policy. Without adequate finance, it is impossible to sustain or expand work. Stories of bins being provided but not replaced when damaged strongly imply a lack of financial resources beyond initial costs.
  - Sustained Implementation – this element is strongly linked to finance, nevertheless it is a key consideration in its own right. The national government must have a clear and strong support for continued implementation.
  - Targets and Indicators – alongside finance, targets and indicators are the best means for national governments to ensure that responsibility is taken for action and that such action is sustained until targets are met. However, it is difficult for targets and indicators to be set without a sound understanding of the current level of activity, making data collection a necessity.

## 2) **Lack of Recycling Data**

Databases or information about the detailed activities of the recycling players are very limited because there is no appropriate control over the players. This therefore creates a barrier for further improvements of the overall recycling systems, and also creates barriers in attracting investors.

### Lessons Learnt from Wongpanit

Wongpanit has attempted to overcome this barrier by announcing its bid prices to the public via its price board and webpages. It also collaborates with the local government and uses public events and the media to advertise itself. The company has thereby become well known and is frequently contacted by a wide range of stakeholders wishing to do business.

Moreover, Wongpanit has developed a franchise database and sends information concerning the waste dealers and prices offered to all franchises thus assisting franchises in making business decisions.

### Recommendations:

- As Act 672 does not currently stipulate data reporting requirements the national government should make the reporting of recycling data in particular, and solid waste management data in general, a legal requirement. From this the actual status of solid waste management and recycling rates in the country can be determined and verifiable targets can be set.
- A database of all recycling stakeholders should be established to support networking amongst stakeholders to make the sector more transparent which would enable the creation of a more efficient supply chain by cutting out redundant middle men and enabling more informed decisions by stakeholders. Greater levels of data would also enable new investors to better understand the scope of the industry, its profile and the risks attached to investment. Once risks are better understood, increased investment would follow.

## 3) **Lack of a Relationship Between Market Actors and the Government**

Due to the reason that recycling is mostly in the informal sector, there is a lack of a good relationship between the players and the government. In most cases, the players keep a distance from the government due to concerns about enforcement.

### Lessons from Wongpanit

Wongpanit partners local governments in promoting waste separation at source for sale, improving the relationship between the waste buyers, local governments and residents. As a result, the local government can significantly reduce waste collection and landfill disposal, waste buyers can receive a larger amount of recyclables, and residents can earn extra income which can be used for private expenses or donations to community funds.

Furthermore, some franchises have established partnerships with large generators of recyclable waste such as banks, schools, universities, offices and institutes and provide an on-site collection service. The franchises can secure guaranteed amounts of recyclables, informing Wongpanit headquarters' analysis of supply volumes and their negotiations with clients.

### Recommendations:

- The national government needs to urgently implement Act 672 clearly in order to clarify the situation to the market participants and improve the quality of overall recycling players by providing capacity building to stakeholders engaged in the recycling business regarding the impact of recycling on environment and health and providing technical support for upgrading recycling practices and facilities. Having done this, the national government can encourage stakeholders to work together, particularly through public-private partnerships utilising the model illustrated by Wongpanit. Nevertheless, in order to do this it is necessary to establish possible incentives such as provision of subsidized loan interests.

#### **4) Low Operational Standards and Labour Quality**

Operational standards in Malaysia, especially for the small-scale recycling players, are still relatively low, because of a lack of capacity building and mainstreaming education and awareness raising on impacts of improper recycling on environment and health through the media. As the sector is very much informal and profit oriented, there is a lack of willingness to invest in higher standard operations, and important issues of health and safety as well as working conditions have always been neglected. A long-term vision for the business in this sector is lacking because it is a volatile business dependent on market forces.

As operational standards are low and the sector is seen as only providing dirty jobs, local workers are not willing to work in this sector. The recycling sector relies heavily on foreign workers, and it is a problem to find quality foreign workers.

### Lessons learnt from Wongpanit

Wongpanit has overcome this barrier by coordinating with local governments to promote recyclable waste separation at source. The company trains residents, community and waste pickers on recyclable waste separation for value added, thus reducing the labour requirement at the company. Furthermore, the company uses its franchise system to scale up its business, spreading employment across the country and not concentrating it in just one area.

Wongpanit has also made efforts to improve the image of recycling leading to increased interest by the labour force. The company offers a reasonable salary, training, safety and health insurance similar to other businesses. These strategies reduce the risk of labour shortages and enable the company to continue to scale up its operations.

### Recommendations:

- The national government should set up standards for safety operation and environmental control of recycling facilities and waste buyer shops. Moreover, the government should provide capacity building regarding the impact of recycling on the environment and health and provide technical support to upgrade recycling practices and facilities. These standards should apply for issuing certificates or licenses to waste buyers and recyclers.
- Local government should conduct an annual monitoring and evaluation to determine whether waste buyers and recyclers comply with the national standards.
- The waste buyers and recyclers should establish health and safety standards as set by the national government. Furthermore, health and occupational safety insurance and annual health check should be provided to all staff.

### 5) **Market vulnerability**

Price fluctuations sometimes cause certain materials to lose their market, and they therefore need to be stored. Low prices for materials such as glass bottles causes a lack of interest to collect or buy back glass bottles. The price fluctuation problem is particularly a main concern for most small-scale waste buyers and recyclers.

### Lessons learnt from Wongpanit

Wongpanit has tried to overcome this barrier by buying a wide range of recyclable materials to lower risks associated with price volatility. Wongpanit has additionally developed an SMS system to provide real time price information to all franchise members thus enabling them to swiftly effect price changes and decide whether to sell or stock recyclables. Moreover, Wongpanit has created channels to both domestic and international markets which enable the company access other markets if the profits from domestic sales are lagging.

### Lessons from China

The Chinese Government provides subsidies to certified electronics recycling companies based on quantity of recycled goods. The subsidy enables companies to overcome market volatility and preserve profits.

### Recommendations:

- The national government should bring in a subsidy scheme for certified facilities similar to that done in PRC. Such a scheme would need modifying to Malaysia's national context. Furthermore, an insurance system should be created to address price related uncertainties and fluctuations.
- Recyclers should follow the Wongpanit model of real time price notifications to enable waste buyers and recyclers to better assess risk and make decisions accordingly.
- Small waste buyers who are lacking of sufficient storage space are particularly vulnerable to price volatility. Local government intervention by purchasing recyclables or providing storage space. This could be funded via savings made from reduced waste collection and landfill operation costs due to non-disposal of the recyclables at landfill.
- At the macro-scale, a market for recycled products could be created through green procurement by government agencies could help minimise the fluctuation of recyclable waste prices.

#### **4.4 Support from the ADB: Four Proposals for Follow-Up**

The following aspects could be explored for possible interventions by ADB in Malaysia in terms of enhancing the existing practice for recycling:

**i) Technical assistance for implementation of pilot projects and network strengthening**

The Wongpanit model from Thailand gives a clear model of how private companies can fit into a clearly established framework and provides a model example of private public partnership with clear co-benefits for the government, private sector and local communities. Through the implementation of pilot project(s) to apply the Wongpanit recycling model at pre-determined local government areas there is a strong opportunity to boost local employment and solid waste management capacity whilst benefitting the environment and raising awareness. The Wongpanit model further naturally creates recycling networks between the various players ensuring that the solid waste management system flows in an efficient and environmentally friendly manner. However, this pilot project is not necessarily led by Wongpanit but could be led by any existing waste buyers and recyclers who can apply this model for creating good reputation of the organizations toward sustainable recycling business.

**ii) Technical assistance for capacity building across the sector**

In tandem with the above approaches, it is necessary to implement a capacity building programme for both small-scale and large-scale players, to enhance local skills and reduce the reliance on foreign workers, as well as to improve performance and efficiency. Such capacity building should not only emphasise the technical aspects of solid waste management and recycling but should also focus on health, safety issues and environment. Capacity building could focus on the Wongpanit model where training for the workers has not only increased efficiency but has also lead to the amelioration of concerns that waste is dirty and has increased interest in the industry by the work force. Capacity building would therefore increase staff pride in working in the sector, helping to reduce staff turnover.

**iii) Loans for recycling companies to improve the recycling business practice toward an environmentally and socially acceptable model**

Upgrading of the quality of existing recycling practices is one possible way to improve the overall performance of recycling activities, not only for the small-scale informal sectors but also possibly medium to large-scale players. Therefore, offering attractive financing loans to the players to improve their existing condition could be beneficial for all, especially if the loan can be offered by an international body such as ADB.

In additional, all the financing loans or grants should be linked to capacity building or training for good practices of recycling, as a value added supporting approach.

**iv) Technical Assistance on Institutional Strengthening**

Although the Government of Malaysia has enforced the Act 672 to regulate the activities of solid waste management in the country, the capability of the National Solid Waste Management Department is still lacking and the competence level is sometimes still relatively low as a result of lack of experience and guidance. Several Action Plans and Master Plans are in place but the extent of implementation is still low without much achievement.

Technical assistance for improving the institutional setup and capability could therefore be helpful, to guide the national department towards implementation of several important strategies, such as establishment of the National Waste Database System, setting up of a recycling network collaboration, waste exchange programme and the others. Guidance from external expertise such as ADB on these aspects will be beneficial to strengthen the competency and capability of an institution at the national level.