CHAPTER 7 CONCLUSION, DISCUSSION, AND RECOMMENDATION

Conclusion and Discussion

From all mentioned chapter, it can be concluded as follows:

- Wastes which have the possibility to be exchanged among factories in Bangpoo Industrial Estate are shrimp shell & tail, cotton scrap, fabric scrap, glass scrap or cullet, PVC scrap, spent sand, PP scrap, aluminium scrap, steel scrap, empty steel drum (180l), nylon scrap, polyester scrap, HDPE scrap, and paper scrap.
- Amount of waste which has the potential to be exchanged among factories in Bangpoo Industrial Estate for shrimp shell & tail, cotton scrap, fabric scrap, glass scrap or cullet, PVC scrap, spent sand, PP scrap, aluminium scrap, steel scrap, nylon scrap, polyester scrap, HDPE scrap, and paper scrap are 450, 12.5, 6.5, 2,206.08, 12, 990, 80.868-104.268, 69.75, 8,971.402-11,199.546, 12.24, 688.2, 9-27, and 18,023.364-18,126.444 t/y respectively and for empty steel drum is 23,106 unit/y.
- Four scenarios are used to calculate Benefits-Costs ratio of proposed waste exchange model for cotton scrap, fabric scrap, glass scrap or cullet, , spent sand, PP scrap, aluminium scrap, steel scrap, empty steel drum (180l), nylon scrap, polyester scrap, HDPE scrap, and paper scrap. Scenario 1 is the basis of calculation. Reduction by 20% of amount of exchanged waste is occurred in Scenario 2. Scenario 3 is calculated Benefits-Costs ratio based on 20% increasing in operation and transportation costs. Scenario 4 is the combination of Scenario 2 and Scenario 3. The results from calculation if shown in the Table 7-1.
- If amount of waste from factories located in EPZ cannot be exchanged with factories in GIZ, Benefits-Costs ratio of aluminium scrap, steel scrap, and paper scrap will be changed as shown in Table 7-2. For glass scrap, if amount of wastes from factories in EPZ cannot be exchanged with factories in GIZ, Benefits-Costs ratio of this waste cannot be calculated.

Table 7-1 Benefits-Costs ratio of proposed exchanged models

Type of Waste	Benefit-Cost ratio			
	Case 1	Case 2	Case 3	Case 4
Cotton scrap	5.21	4.17	4.34	3.47
Fabric scrap	2.17	1.73	1.81	1.44
Glass scrap	4.29	3.43	3.57	2.86
Spent sand	2.29	2.75	1.91	2.29
PP scrap	65.14	52.11	54.28	43.43
Aluminium scrap	24.91	19.93	20.76	16.61
Steel scrap	10.66	10.23	8.88	8.53
Empty steel drum	4.94	5.13	4.12	4.23
Nylon scrap	0.82	0.66	0.68	0.55
Polyester scrap	3.40	2.72	2.83	2.27
HDPE	81	64.8	67.5	54
Paper scrap	6.53	6.62	5.44	5.52

Table 7-2 Benefits-Costs ratio of some proposed exchanged models when wastes from factories in EPZ is not included in calculation

Type of Waste	Benefit-Cost ratio			
	Case 1	Case 2	Case 3	Case 4
Aluminium scrap	23.13	18.5	19.27	15.42
Steel scrap	10.52	10.1	8.77	8.42
Paper scrap	6.44	6.53	5.37	5.44

- If exchanging waste which cause benefits less than costs or B/C ratio less than 1, this waste is not feasible to be exchanged. As a result of this, nylon scrap is only one type of waste generated in Bangpoo Industrial Estate which is not feasible to be exchanged. The other wastes are feasible to be exchanged among industries in Bangpoo Industrial Estate in all scenarios. In case of factories in EPZ cannot exchange their waste with factories in GIZ, aluminium scrap, steel scrap, and paper scrap are still feasible to be exchanged among the factories in GIZ.
- There is no specific law and regulation in Thailand regarding waste exchange. However, there are some laws and regulations which may affect when waste will be exchanged. These laws and regulation are section 51, 54, and 55 in Industrial Estate Authority Act B.E. 2522, Notification of the Ministry of Industry No. 6 B.E. 2540 and No. 1 B.E. 2541. But MOI or IEAT can promote waste exchange by issuing the standard criteria for waste exchange or specific legislation and regulations for waste exchange.

Furthermore, subsidiary company of IEAT which will be established in the future to provide the utilities services for industrial estates under control of IEAT can promote waste exchange concept. it can act as middle man to sell and buy wastes from factories in industrial estates, set up waste information centre to share among factories in industrial estate and factories or waste users outside industrial estate, or provide transportation services for waste users and waste generators.

- From preliminary review, there are possibilities to exchange wastes among factories in Bangpoo Industrial Estate with the other Estates such as Bangplee Industrial Estate or Bang Chan Industrial Estate and factories located in Samutprakarn province. These wastes are paper scrap, glass scrap, plastic scrap, steel scrap, aluminium scrap, copper scrap, brass scrap, spent acid, fabric scrap, empty steel drum (180 l), leather scrap, and foam scrap.

Recommendation

Since information for analysis of this thesis came from questionnaire, sampling interview, and secondary sources with no in depth details i.e. material balance of all factories, the results from this thesis can be used as a guide for further investigation of each proposed model.

In order to more precisely evaluate the feasibility of each proposed exchange model, further investigation should be done. The followings describe the area of study which should be further investigated to see how it affect the waste exchange:

- survey of remaining factories which are excluded from the analysis;
- detailed analysis of feasibility of each proposed exchange model;
- detailed analysis of possibilities in exchange waste of factories in Bangpoo Industrial Estate and factories in the other Estates;
- promote waste exchange of the feasible waste exchange model; and
- investigation of waste minimisation of waste generators and waste users.

Database which is provided in this study and submitted to IEAT can be used for implementation of waste exchange by providing information of wastes users, waste generators, or any agencies who would like to buy or sell wastes. Moreover, there are other types of wastes which are not included in waste exchange models since they cannot be used by factories in Bangpoo Industrial Estate but they have potential to exchange such as copper, spent catalyst, spent lubricant oil etc. If this information can be provided for

potential waste users, it can help to promote waste exchange concept. This database can be used for planning of other waste management concepts such as pollution prevention or waste minimisation by IEAT or other government agencies e.g. DIW, PCD.

Since database of this study belongs to IEAT and information in each year may be changed, IEAT should update this information every year, if possible. This will help any organisation who use this information to have the accurate data for their works.

From the survey, there are many recycle which operate their businesses in Samutprakarn Province. And some wastes generated by factories in Bangpoo Industrial Estate have possibilities to be reused or recycled. Furthermore, there are many types of factory in this area. Possibilities of exchange wastes from factories in Bangpoo Industrial Estate with other recyclers or other factories in Samutprakarn Province should be considered in order to promote this concept and reduce amount of waste for treatment.