

Collection and recycling of beverage cartons at AIT
A research project report



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Summary

One week in April 2008 was devoted to collect as many discarded beverage cartons as possible in order to estimate the future possibilities to source segregate and recycle brick packages at AIT. One labourer was employed to separate drinking boxes from the mixed solid waste during three hours per day for the period of seven days. To facilitate public participation (waste segregation at source) five waste bins were strategically placed and well indicated as “recycling bins for drinking boxes”. A small campaign was conducted with information leaflets distributed at some AIT vendors and information was sent on the weekly e-bulletin of AIT.

It is estimate that more than 2000 beverage cartons per week (“Tetra Brik” and “Combibloc”) are sold, consumed and disposed at AIT University Campus. People who buy them from outside markets also bring additional packages. The short recycling campaign resulted in 13.8 kg empty drinking cartons, about 1000 packets. 65% was separated by the labourer and 35% voluntarily by the public using the collection bins. The project shows that people are willing to separate waste at source if waste collection containers are strategically located and well indicated, but longer information campaigning and follow up is needed.

Project initiator: 3RKH. The project was a part of the work the 3RKH (Reduce Reuse Recycle Knowledge Hub) does in order to increase recycling of beverage cartons in Southeast Asia.

Project monitor: Ms. Vivi Pietikäinen, student from Södertörn University College in Sweden, masters Programme of Environment and Development. This short research project served as a practical experiment for her master thesis about Solid Waste Management and recycling tendencies at AIT.

Project location: The University Campus of Asian Institute of Technology (AIT) in Klong Luang, Pathumthani, Thailand.

Duration: One week, Saturday 5th to Friday 11th, April 2008.

1.1 Background

Today 93% of the solid waste generated at AIT is disposed on landfill. Only 4% is recycled including plastics, metals, paper and cardboard¹. The main reason to the low recycling level is that AIT lack a systematization of waste segregation at source. Today the janitors separate the recyclables after staff and students have mixed everything in one garbage bin. Several campaigns and projects would need to be conducted with the aim to increase environmental awareness (*why recycle?*) and public participation (*i.e. source segregation*) at AIT in order to reduce the amount of solid waste taken to landfill².



Figure 1: Beverage cartons
(Photo V. Pietikäinen 2008)

It is estimated that more than 2000 beverage cartons are sold per week at AIT campus (see table 1). Several kinds of juice, milk and chocolate drinks in brick shaped paperboard boxes (packaged by Tetra Pak and SIG Combibloc) are sold at AIT campus as well as outside (see figure 1). The total amount of waste generated from the drinking packages most surely exceeds the 2198 packages sold within AIT, since many students and staff buy them from external vendors but dispose the empty packages at campus.

The carton packages consist of six layers of plastic coating, cardboard and aluminium (see figure 2). The cardboard layer can be separated and recycled into new paper products³. Both big size (1000ml) and small size (250ml) cartons are suitable for recycling. If a noticeable amount of

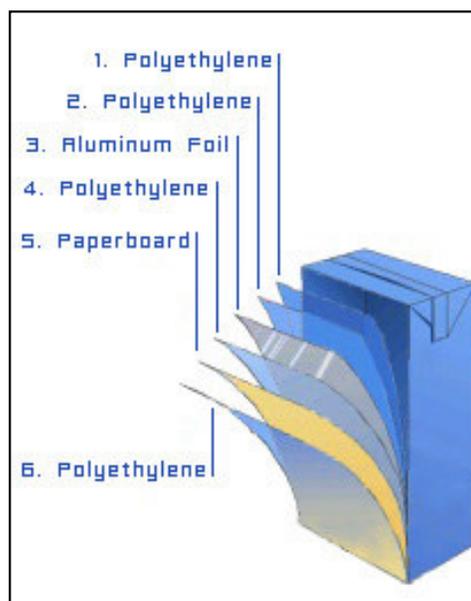


Figure 2: The six layers (Tetra Pak)

¹ Dev, S. B. (2007), *Application of 3R principles to solid waste management on the Asian Institute of Technology (AIT) campus*, AIT, Thailand, Master Thesis No. EV-07-46, p.50

² Soulalay, V. (2006), *Development of environmental sustainability concepts for the Asian Institute of Technology (AIT) campus*, AIT, Thailand, Master Thesis No. EV-06-39, p.90

³ <http://www.recyclenow.com/what_more_can_i_do/can_it_be_recycled/beverage_carton.html> [accessed 2008-03-27]

the packages could be separated from the solid waste and recycled, both AIT and the environment would benefit from this measure. By selling this waste fraction to the nearby paper mill (“Fiber Pattana”) AIT would decrease the negative environmental impact in several ways: The paper layer is 100% recyclable and less nature resources (virgin raw material) is then needed to produce new beverage cartons⁴. Furthermore, the amount of waste disposed on the municipal landfill would reduce.

The aim of this practical experiment was to provide data on the potential AIT has to implement some 3RKH concepts by starting recycling of beverage cartons.

Quantity of packages sold by AIT vendors	Sold per day	Average per day	Sold per week	Average per week
The Groceries store	135	135	7 * 135	945
108 Shop	~ 100	100	7 * 100	700
Jammy Mart	40	40	7 * 40	280
P.S. Mini mart	15 ~ 20	~ 18	105 ~ 140	122.5
SERD kiosk	32.5 / 7	~ 5	30 ~ 35	32.5
Community school kiosk	~ 1	1	~ 7	7
IT service coffee shop	10	10	5 * 10	50
AFE canteen	~ 2	~ 2	12	12
SOM canteen	7	7	49	49
Total	314.6 – 319.6	318	2178 – 2218	2198

Table 1: Data of paper packages sold by AIT campus vendors

1.2 Objectives of the project

- Measure the possibility to beverage cartons at AIT. These drinking boxes have high recycling potential but are deposited on the municipal landfill.
- Increase the environmental awareness among people at AIT by informing them about the project and encourage them to participate in the collection during one week.
- Promote 3RKH (Reduce, Reuse, Recycle Knowledge Hub) concepts.

⁴ <<http://www.tetrapakrecycling.co.uk/lifecycle.asp>> [accessed 2008-04-26]

1.3 Expected results

- Calculate and quantify the volume of beverage cartons separated from other solid waste at AIT.
- By the end of the week, the collection bin at AIT Community school will contain many beverage cartons, so as the one on the stairs of 108 Shop. The Groceries store (no benches outside), UFM bakery/Jammy Mart and SOM Canteen (don't sell many) are not expected to contain as many as the others.
- The project will provide guiding information about how students and staff are either willing or unwilling to segregate waste at source when bins are provided for this.

1.4 Delimitations

This was a pre-study research project, not a large scale implementation of recycling drinking cartons. The budget was small, the people involved in the moderating few and the time-frame limited. Seven days can be considered as a too short period for a research project if more reliable data needs to be collected about the public participation. Nevertheless, this project serves to give some general implications of how many cartons can be gathered at AIT even though the amount of sold and disposed cartons varies from week to week.

All calculations are impaired by errors. There was no information campaign carried out before the start of the collection week and the campaigning during the week was modest.

2.1 Method

All vendors of any cafeteria, canteen or shop at AIT University Campus were asked to estimate how many packages they sell per week. Since I don't speak Thai (and many vendors don't speak English) I had the questions translated to Thai to ease the data gathering.

Five collection bins were masked to stand out from the other bins and to resemble drinking cartons (see figure 3). They were positioned outside vendors around AIT one outside the Community school to facilitate public participation. To increase the collection rate, a waste collector was employed to gather packages from the mixed wastes of AIT.



Figure 3: The collection bins
(Photo V. Pietikäinen 2008)

2.2 Project implementation procedure

March 28th – The janitorial service companies were informed about the project on their monthly meeting with Infrastructure Office.

Before April 5th – Preparation

- Five 20L waste collection bins were given a remake. Volunteers from SU Campus and Environment Committee helped out with the masking of the bins.
- Information leaflets were written to be distributed at vendors.
- A labourer was employed to separate drinking packages during 7 days, 3 hours/day, 50 THB/hour.
- The AIT Community school was contacted and asked to participate in the project.

April 5th – 11th – Separation of Tetra Brik and SIG Combibloc from other waste by one labourer and voluntary waste segregation (public participation).

- Information leaflets were distributed to 108 Shop, Jammy Mart and The Groceries store. They were also put on the fridges so that people notice the project when they buy the package.
- Additional information was put near the bins in order to avoid misunderstandings about what was to be collected.
- The collection bins were checked every day and the misplaced waste removed.

After April 11th – Analyse results

- The collected drinking cartons were weighed. Tetra Pak in Thailand was contacted. The possibilities for future recycling of drinking cartons were estimated.

2.3 The location of the collection bins

All the five collection bins were placed sheltered from the rain. No bins were put in residential areas since then we would have needed far more collection bins. We couldn't find only *one* residential area where to put the bin. Better that people know they can bring their beverage cartons to the same place as where they purchased it. It might be easier to bring them there than to the neighbouring village of yours. Since the amount of collection bins was limited to five, the priority was given to vendors.

2.3.1 AIT Community school

Almost no cartons are sold in this area, but consumed. Children are good to include in the recycling project both since they drink more milk than the average AIT resident does and since they are an important target group to educate about the 3R concepts. They were informed on Friday the day before the project started and asked to start on Monday after the week-end.

2.3.2 Outside 108 SHOP

The shop is open 24/7 and many people pass by daily (see figure 4). The shop sells about 700 drinking cartons per week and a lot of people stay outside the shop at the tables to consume their goods.

2.3.3 Between UFM bakery and Jammy Mart

Jammy Mart sells about 280 beverage cartons and outside there are tables and chairs where people can enjoy their drinks.



Figure 4: Bin outside 108 Shop
(Photo V. Pietikäinen 2008)



Figure 5: Bin outside SOM Canteen
(Photo V. Pietikäinen 2008)

2.3.4 Next to Groceries store

More than 900 packages are sold at the Groceries store. There are no benches outside the store but many people pass by during one week.

2.3.5 School of Management (SOM) Canteen

SOM canteen is a popular place for students to have their lunch. There is a great variety of drinking cartons in the canteen and about 50 packages are sold per week. Therefore, this was chosen as the fifth place for a collection bin (see figure 5).

3.1 Results

Approximately 1380 drinking cartons were collected during one week, half of what is sold. The hired waste collector gathered 9.0kg of drinking packages (see table 2). This was almost twice as much compared with how many drinking cartons were amassed voluntarily by people. 35% was collected voluntarily and 64% by the labourer (see figure 6). The collection bins near the Groceries store and UFM bakery contained 0.5kg each. More was put in the bins outside 108 shop and SOM canteen, 1.0 and 1.2kg respectively. The collection bin outside AIT Community school had to be emptied once and gathered a total of 1.6kg in five days. All the cartons were empty and flattened (and straws removed by the project monitor and the waste collector).

Location	Cartons collected (kg)
The employed waste collector	9.0
AIT Community school	1.6
108 Shop	1.0
Jammy Mart/UFM bakery	0.5
Groceries store	0.5
SOM canteen	1.2
Total	13.8

Table 2: Results from the beverage carton collection

The average number used by Tetra Pak weighing beverage cartons is that one carton weighs 10 grams, which gives us 100 cartons per kilo⁵.

Total mass of cartons:

13.8 kg

Total number of cartons:

$100 * 13.8 = 1380$ cartons

However, the amount of cartons per kilo varies depending on the size of the carton.

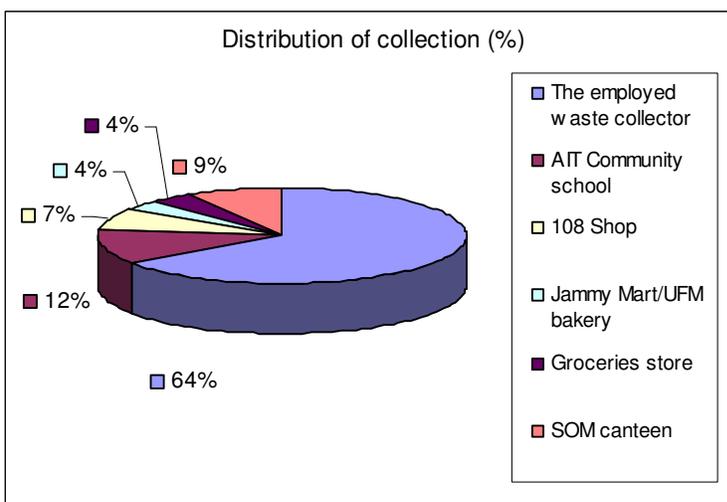


Figure 6: The distribution of collection

⁵ Personal communication with Environmental Activity Coordinator of Tetra Pak Thailand [2008-04-24]

3.2 Analysis

The objectives of the project were partly fulfilled. The amount of beverage cartons separated from other solid waste at AIT was indeed calculated and quantified, but the results are somehow deficient due to the short time-frame. I cannot say that 1000 cartons would be collected each month. In comparison, the voluntary participation was much lower than the employed one, the labourer who was paid to separate. The voluntary segregation would probably have been higher if the project was run longer (people get used to use the recycling bin) and if an extensive information campaign was carried out (increase public awareness). Still a 35% recovery of the cartons is

a satisfactory amount collected voluntarily without adequate campaigning. The collection bins were checked every day and unwanted waste removed (see figure 7). The samples in the one between UFM bakery and Jammy Mart had most elements of mislaid items, predominantly coffee cups (see figure 8). The reason for this was might be the lack of a normal waste bin within a short distance. The collection bin happened to be the nearest bin for people and was therefore used for any kinds of packages. The content of the bin outside Community school was homogenous (see figure 9).

The information leaflet was kept very short and only included the most important message: *What to do (Drink – Flatten – Recycle), when and*



Figure 7: Bin outside Groceries store
(Photo V. Pietikäinen 2008)

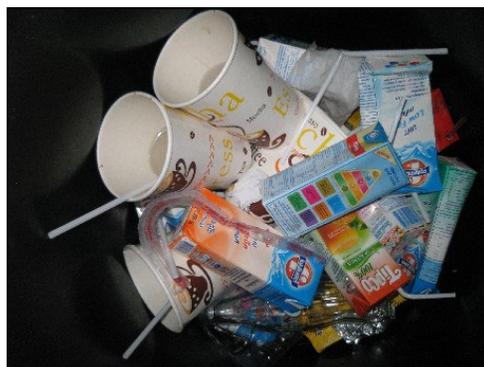


Figure 8: Bin between UFM/Jammy Mart
(Photo V. Pietikäinen 2008)



Figure 9: Bin outside Community school
(Photo V. Pietikäinen 2008)

where (location of bins). This campaigning was not sufficient for a measurable increase of environmental awareness. The students and staff were reminded about the project through the e-mail list (e-bulletin) but it was not sufficient since not everyone pays attention to all the electronic information distributed. The 3R concepts were highlighted, in the project but in a small scale (by the labels on the bins).

4.1 Discussion

It seems like people are participating in source segregation practices if bins are provided and unmistakable directions are given on what waste should be put where. The comments from the Internet survey tell that people ask for more bins to make segregation at source possible. The environmental awareness is high among staff and students, but practicing the 3R concepts is more difficult. Someone highlights the fact that separating recyclables from mixed waste is consuming both more time and money compared to source segregation (see Appendix).

Since the project was a “recycling project” many people wanted to also put other recyclables in the bins, like plastic bottles and cans.

4.1.1 The location of collection bins

The best participating group of people at AIT was certainly the children at the **Community school**. Surely, they are great consumers of milk and juice, but in the collection bin at the school there was also nothing else but drinking cartons. They followed the simple instructions to 100%.

The location outside **108 Shop** was theoretically very strategic since many people pass it, the shop is always open. However, the number of cartons gathered outside 108 Shop was not as high as one could have supposed, and the bin was full of all kinds of recyclables (cans, glass and plastic bottles). This would be a perfect location for a larger recyclables collection container.

Between **UFM bakery and Jammy Mart** was maybe not the best location since people were confused about what was collected – they interpreted “drinking carton” to mean plastic coated paper coffee cups as well. There wouldn’t have been big problem sorting out the cups if it wasn’t for people putting cups full of ice which eventually melted and soaked the waste. High moisture makes waste smelly and unpleasant to handle. To clarify what was to be put in the collection bin, I attached a flattened drinking box on top of it as a pedagogic example. This corrective action had only a slight effect.

In front of the **Groceries store** the same measure was taken to clarify that only the drinking cartons were supposed to be put in the bin. It is difficult to say whether this had effect or not since so little was collected in the bin in total. Even though the Groceries store was not the

best location during the project week, it would still be a good point for a recyclables collection container if recycling at source is carried out on a larger scale. Many students live near the store (in the dorms A-F) and many people visit it frequently to do their shopping.

The collection bin put outside the **School of Management (SOM) Canteen** contained a higher amount of drinking cartons than expected. This was maybe thanks to the voluntary campaigning and separation done by the woman working there. Since SOM canteen is not the point where most cartons are sold, I guess the other points have more potential to amass recyclables (108 Shop in particular) than what was shown during the short project time.

4.1.2 Public participation

I believe that the rate of collected cartons would have been higher if the time-frame was longer. It takes some time for people to adapt and change manners.

I think there are two main groups of people; some did not even notice the project running and others did and also participated following the prerequisites – the box shall be empty and flattened.

People have to be notified before a project begins, and reminded during the time the project is carried out. The five collection bins for voluntary segregation at source were wrapped in paperboard and painted to resemble beverage cartons. The bin was used as an information board and shortly told about the project and posed: “Put your empty drinking boxes here” and “Drink – Flatten – Recycle”.

As a coincidence, the 108 Shop had a promotion price on chocolate milk this week due to short expiry date. This surely increased the amount of sold packages but the rate of these cartons was not remarkable in the collection bin.

4.2 Conclusion

The project shows that it is possible to recollect half of all the beverage cartons sold at AIT during one week. This can be done by either segregating recyclables voluntarily (public participation) or employing a waste separator to separate the recyclables from mixed waste. The attitude on AIT is positive towards voluntary waste segregation and recycling but investments need to be done in waste segregation facilities (buy designed collection bins) and campaigning (inform the public about *what* is to be put *where*) if it shall be implemented on a larger scale.

4.3 Recommendations

AIT could allocate someone to be an “Environmental Coordinator” of the campus. His/her mission would be to organize the environmental plan of AIT where the solid waste management is an essential part. Areas that need to be highlighted are:

- The funding. Design an economically viable waste collection system for AIT.
- The location of the collection containers. On public areas strategic locations must be chosen to maximise the separation rate. Each household should have three bins in order to fully be able to segregate waste at source (into recyclable/hazardous, biodegradable and non-biodegradable).
- The design of the collection containers. What is suitable volume, what is the size of the opening, should it be fixed or mobile? Use Thai standards for container colours.
- The education. Information campaigns and follow-up. SU Campus and Environment committee members change each term and can be helpful but not in charge.
- Laminated posters to each household with basic information and guidelines on how to segregate waste.

The neighbouring Thammasat University has a waste sorting centre and sell beverage cartons to “Fiber Pattana” once a month. The paper mill company could come to AIT on the same day.

To go on with recycling activities at AIT further research is needed. The 3RKH (Reduce, Reuse, Recycle Knowledge Hub) can be involved in this.

4.4 Acknowledgements

I would like to express my sincere gratitude to the whole AIT family for the compliance and for offering an inspiring study environment. I would like to express my thankfulness to the 3RKH (Reduce, Reuse, Recycle Knowledge Hub) for giving me the research project idea and for their financial support. I thank Mr. Binod Chaudhary for supplying waste bins for the project. I am thankful for the time and valuable help provided by my friends and members of the SU Campus and Environment Committee. I express my sincere appreciation to CSM and Khun Chad who undertook the work to segregate the cartons from the mixed waste. Finally yet importantly, I want to thank all people who participated voluntarily in the project!