

# Cleaner Production Clubs Surabaya

## MORUWA CLUB

### Final Report



ASIE/2006/122-578

Improving the living and working conditions of people in and around  
industrial clusters and zones

December 2008

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## **Table of Contents**

Table of Contents .....	2
INTRODUCTION .....	3
METHODOLOGY .....	3
RECRUITMENT .....	3
TRANSFER OF KNOWLEDGE .....	5
COMPANY VISIT .....	7
RESULTS .....	7
OPTIONS IDENTIFIED AND IMPLEMENTED .....	7
CATEGORIZATION OF OPTIONS .....	12
FINANCIAL SAVING .....	13
ENVIRONMENTAL SAVING .....	14
BARRIERS & SUCCESS FACTORS .....	15
FEEDBACK FROM COMPANIES .....	15
PROJECT CONCLUSIONS .....	16
RECOMMENDATIONS .....	16

## **INTRODUCTION**

Lasting improvements of living and working conditions of people in and around industrial clusters and zones is achieved only if all stakeholders are involved. It will be not sufficient to focus on only individual enterprises and local governments; it requires the integration the estates' management as well.

One of the three pillar concept are the Cleaner Production activities on the level of the enterprises. The environmental impacts are reduced by carrying out cleaner production pilot measures in selected industries. The driving force for companies participating in the project will mainly be economical benefits such as reduced resources consumption (energy, raw materials, water), improved product quality, reduced waste streams, and reduced waste treatment costs (if any)..

## **METHODOLOGY**

The form of a self-organized club tackles issues of Cleaner Production by the club members namely the participating enterprises. The CPCs focus on the principles of Cleaner Production and club members are supposed to execute internal assessments, cause analysis, develop case studies, implement selected improvements, and sharing the experience with other club members.

## **RECRUITMENT**

Earlier, the establishment of club was planned to be done through recruitment system which involved government institutions such as the department of trade and industry, businessman associations, etc. However this system did not work well because direct involvement from those institutions were very limited. According to industrial data obtained from the department of trade and industry in each area/region and also from the network of CBIS (Center for Business and Industry Study) from the University of Surabaya, the approach should be done from industrial forum existing in each area. By making appointments with and under permission from the forum committee, informative meetings could be done during regular meetings of the industrial forum (in average 1-2 times/month). Some of the industrial forums which have given us the chance to conduct informative meetings are industrial forums in Driyorejo, Karang Pilang, Ngoro, Manyar Gresik, Mojokerto and SIER (Surabaya Industrial Estate Rungkut). On the other hand, these forums' meetings could not be the only way for the recruitment process, because the time interval between the forums' meetings are quite long and in some cases the meetings were also cancelled. In addition, almost all attendants of these meetings are industrial representatives (staffs) who do not have the power to make a decision by themselves. Thus the confirmation whether an industry will join the club or not could take such a long time. Therefore, the recruitment method was changed into the "door to door" system, that is conducting informative meeting in each industry, but this method has a consequence in that it took a lot more time and efforts to spend. In spite of that, the effectiveness of this approach is much higher, because by having a more 'personal' approach, the top management would be easier to reach and to get involved.

MORUWA club is the "youngest" club compare to others, the last recruitment process was done on March 2008. After several meeting, either through forum or "door to door" meeting, there were 12 companies joined to the club. List of industries who have joined the club can be seen in the table below:

No.	Industry	Company Profile	
1.	PT. VARIA USAHA BETON 1	P.T. Varia Usaha Beton ( <a href="http://www.variabeton.com">www.variabeton.com</a> ) was established in Gresik (East Java) on May 1991 by Legal Act. No. 18/1991. It has five line of businesses, which are: <ul style="list-style-type: none"> <li>• Ready-mixed concrete</li> <li>• Pre-stressed/Pre-cast concrete</li> <li>• Concrete masonry</li> <li>• Crushed stone</li> <li>• Service business</li> </ul> At this moment, the company has 853 workers which consist of 394 permanent workers and 459 contracted workers.	
2.	PT. VARIA USAHA BETON 2		
3.	PT. SPINDO 1	PT. SPINDO (STEEL PIPE INDUSTRY OF INDONESIA) is a national entrepreneurship company with wide experience in producing various types of pipe and steel tube and providing related services. PT. SPINDO pledges itself to always be innovative and maintain best quality to fulfil every specific need of the consumers. This company was founded on 1971 in Surabaya, with former name PT. Radjin Steel. After several years, this company grew up very fast – recently, the company has been divided into five independent plants (four in East Java region and one in Karawang, West Java). Each plant produces specific product. <p>PT. SPINDO 1 Located in Surabaya Industrial Estate Rungkut 1 (SIER 1), PT. SPINDO 1 is the oldest among other plants. PT. SPINDO 1 produces electric resistance welded (ERW) and provides galvanizing, slitting and shearing services. Total employees are 420 and annual capacity is 100,000 MT</p> <p>PT SPINDO 2 Located in Surabaya Industrial Estate Rungkut 2 (SIER 2). PT. SPINDO 2 produces stainless steel pipe sand tubes. Total employees are 220. Annual capacity is 2,400 MT and 30,000 MT for stainless steel and tubes respectively.</p> <p>PT. SPINDO 3 Located at Warugunung, Surabaya. PT. SPINDO 3 produces ERW and provides galvanizing and custom steel fabrications services. Total employees are 360. Annual capacity is 74,000 MT</p> <p>PT. SPINDO 4 Located at Beji, Pasuruan. The company produces spiral welded pipes and provides pipe coating services. Total employee is 256, 156 permanent staffs and 100 outsourcing. Annual Capacity is 120,000 MT</p>	
4.	PT. SPINDO 2		
5.	PT. SPINDO 3		
6.	PT. SPINDO 4		
7.	PT. TJIWI KIMIA 1 (Chemical)		Tjiwi Kimia (full name: PT Pabrik Kertas Tjiwi Kimia Tbk.) is located in Desa Kramat Temenggung, kecamatan Tarik, Sidoarjo. It is a national investment company, established in October 2, 1972 by Mr. Eka Tjipta Widjaja (Sinar Mas Group Chairman) as a small caustic soda manufacturer and publicly listed since April 1990. Tjiwi Kimia is a leading member of Sinar Mas Group (Asia Pulp and Paper – APP) and chief manufacturer of writing/printing paper and stationery in Indonesia. Sinar Mas Group's pulp, paper, stationery and chemical division is Asia Pulp and Paper Co. Ltd. (APP), and is one of the world's leading pulp and paper companies and the largest vertically integrated pulp & paper producer in non-japan Asia. Asia Pulp and Paper Co. Ltd. was incorporated on October 12, 1994 in Singapore,
8.	PT. TJIWI KIMIA 2 (Converting)		
9.	PT. TJIWI KIMIA 3 (Carton Box)		

		<p>which has since remained as its headquarter till today. Like other major global companies, APP shares are traded on the New York stock exchange since April 1995. Some of its subsidiaries are listed on the Jakarta and Surabaya stock exchange in Indonesia.</p> <p>Chemical plant is actually the oldest (first) plant in Tjiwi Kimia. It produces caustic soda (NaOH), chlorine gas (Cl<sub>2</sub>) and hydrogen gas (H<sub>2</sub>). The NaOH and Cl<sub>2</sub> are sold to the market, but H<sub>2</sub> gas is supplied to sister company (PT Sindopex Perotama) who produces hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>). The number of employees in this plant is around 400 people. Production capacity of the Membrane 1 Division in this plant is around 5700 ton/month.</p> <p>Converting 4 plant is the newest converted stationery paper products, including the publisher books division, where very good books from many international publisher are printed &amp; bound. Its products are sold both domestically and exported to Asia, America, Australia, East Europe and Africa. The number of employees in this plant is around 500 people. Production capacity of the Perfect Binding Division in this plant is around 800 ton/month.</p> <p>Carton Box plant produces various packaging products from carton, such as boxboard used for cigarette, perfumes, tissue and cereal packaging. The chemical plant. The number of employees in this plant is around 400 people. Production capacity of this plant is around 7000 ton/month.</p>
10.	PT. WIM CYCLE	WIM cycle is a factory which produces bicycle. There are 3 bicycle types produced by the company: children bicycle, mountain bicycle and Mini bicycle. It was established in 1979 with 1000 employees. The production capacity is 800,000 units per year. The market are local, Europe and Middle East.
11.	PT. PANGGUNG ELECTRONIC	PT PANGGUNG is a factory produces electrical appliances. It is a National Investment Plant, which is founded in 1970. The products are consumer electronic, audio magnetic tape and media furniture. The area of the company is 88.000 m <sup>2</sup> and the company has 1557 employees.
12.	PT. FORINDO	Forindo is national enterprise which located at Wringinanom KM.33, Gresik. The factory produces plastic bag with various types. Process production is run 24 hours with total employee 500 workers and total capacity 4000 T per year. The products are distributed only for national market.

## TRANSFER OF KNOWLEDGE

Transfer of knowledge was done through workshop/training followed by networking meeting. Materials given in the workshop is an application of Cleaner Production concept, consists of problem identification (inefficiency sources), cause analysis, option generation, selection, implementation and monitoring. Workshops given to club members were accompanied by setting up action plan to guide each industry to apply the materials they got from the workshop in their own industry. In the network meetings, progress achieved by each industry was presented in front of all club members and then discussed if there are any barriers during implementation. In this meeting the club members can share with each other so that everyone can give/receive feedbacks from experiences in each industry to handle or minimize barriers faced during the implementation.

Run down activities (workshop & network meeting) that have been conducted for MORUWA club:

## 1. Workshop 1 for MORUWA Club (13-14 February 2008)

First activity for MORUWA club was the workshop which was delivered by BPPT Team. Within 2 days all club members received material on:

- Concept of Non Product Output (NPO) , including exercise (group work) : Identify NPO from an process industry (Old Fritz)
- Set up Process Diagram (flow chart) and NPO flow
- Calculation of NPO, including exercise (group work) : Ink TECH
- Set up Process Diagram and NPO flow for each industry, followed by presentation and discussion
- Introduction of green house gas emissions calculation
- Active Learning Set (ALS)

Because this club was the newest, information was given at the beginning of workshop. That information was:

- Introduction/basic principle of Cleaner Production
- Production Efficiency Club – The Rule of the Game
- Simple Tools To Find Inefficiency Sources

At the end of each group's workshop, every company set up their action plan to make NPO Diagram and the Calculation. These will be discussed on next meeting.

## 2. Networking Meeting & Workshop 2 (27 – 28 May 2008)

The first network meeting and second workshop for MOWARU club were conducted at the end of May 2008. All club members gathered for two days, one day for network meeting (27 May) and one day for a workshop lead by BPPT (28 May).

In the network meeting, each member presented their progress in NPO calculation done in their company. Most of inefficiencies sources in the industries come from raw material handling, operation processes, usage of excessive packaging material, and cleaning/washing activities. Discussions were done in groups, where each industry representative shared the problems they have encountered during the process of NPO data gathering and calculation. Inputs or feedbacks from peer industries were gathered and further analyze as alternative options/solutions.

The subject explained and worked out in the second workshop was "Cause Analysis". This topic was directed to help industries to find the main causes from inefficiencies sources identified during the process of NPO calculation. Cause analysis was done with the help of "mind mapping technique". Then the identified causes were grouped according to whether they are related to:

- human resources capacity → working habits, work procedures, etc
- new/additional investment needed → new equipment purchase, machine modification, process modification
- environmental improvement efforts

Option generation then based on the cause analysis, the appropriate options are selected based on priority which can be differed from one to another.

### 3. Network Meeting (19 September 2008)

On 19 September 2008, network meeting has been held. A general review progress has been presented by facilitators, followed by detail progress sharing by each club member. Efforts to find root cause of inefficiency, through mind mapping technique, have been implemented by most of club members. Based on the cause analysis, several options have been developed and implemented.

## **COMPANY VISIT**

Company visit was performed after club member industries gave feedbacks to the facilitators. The idea is that industry wants to have more facilitation during the implementation of the cleaner production concept they have obtained from the workshop in their own workplace. In this regard, the facilitator does not act as a problem solver, but more as a brainstorming/discussion partner. Efforts to implement the learned concept are completely the responsibility of the efficiency team established in each industry.

Company visit has given very positive impacts, because each industry received new experiences in conducting their efficiency program. This also influences the network meeting held periodically during the project, where industries can share their experiences in doing the efficiency program in their environment. This is very beneficial because each industry's experience could be a solution to other industry that might have problems in that area.

Most of MORUWA members were very active in following the program. During the visit, they presented the progress of action plan. Through intensive communication between member and facilitator, and among the members itself, this club could catch up the lag from other clubs.

## **RESULTS**

The Non Product Output (NPO) concept and mind mapping technique is felt as very useful by most of the industries who are actively involved in the program. For those industries who have not known the concept of cleaner production/production efficiency before, this tool is still a new thing for them. But for those who already had/knew this concept, this tool can still be merged/integrated with the existing program.

After running for about 8 months, the progress of each club member industry can be categorized into:

- Industries who have implement selected programs/action plans to improve efficiency level
  - Industries who have obtained quantified results (financial saving)
  - Industries who are still under monitoring process to obtain real data from the impacts of selected program/action plan implementation
- Industries who have finished calculating their non-product output (NPO) but still have not or still doing their program/action plan
- Industries who have not finished their NPO calculation

## ***OPTIONS IDENTIFIED AND IMPLEMENTED***

From the obtained results, non-product outputs (NPO) which become priorities of the industries to be taken care of are not only waste, but also energy (electricity and water) as

well as raw material. Thus, the developed action plans consist also efforts to minimize waste or reject product, energy and raw material. Identified and implemented action plans can be seen from this table below:

INDUSTRY	OPTIONS IDENTIFIED	OPTIONS IMPLEMENTED
Varia Usaha Beton 1	<ol style="list-style-type: none"> <li>1. Introduce SOP for unloading material (N)</li> <li>2. Set up training for operator (N)</li> <li>3. Procure weight scale (H)</li> <li>4. Reuse concrete sludge from ready mix process for “kanstin” (railway sleeper) (L)</li> <li>5. Introduce new standard for cutting process of wermes (steel plat) (N)</li> <li>6. Equipment improvement : install volume indicator in silo tank (L)</li> <li>7. Equipment improvement : replace bulk pump in unloading area (H)</li> <li>8. Introduce SOP for maintenance schedule of bulk pump (N)</li> <li>9. Equipment improvement : renew loader in sand &amp; stone area (H)</li> <li>10. Improve unloading area : roof installment (L)</li> <li>11. Process modification : regular spray to the unloading area to prevent sand losses (because of wind blow) (L)</li> <li>12. Equipment improvement : redesign hopper for loading process (M)</li> </ol>	<ol style="list-style-type: none"> <li>1. Introduce SOP for unloading material (N)</li> <li>2. Set up training for operator (N)</li> <li>3. Introduce SOP for maintenance schedule of bulk pump (N)</li> <li>4. Improve unloading area : roof installment (L)</li> <li>5. Process modification : regular spray to the unloading area to prevent sand losses (because of wind blow) (L)</li> </ol>
Varia Usaha Beton 2	<ol style="list-style-type: none"> <li>1. Introduce SOP for unloading material (N)</li> <li>2. Set up training for operator (N)</li> <li>3. Procure weight scale (H)</li> <li>4. Introduce SOP for maintenance schedule of bulk pump (N)</li> <li>5. Equipment improvement : replace bulk pump in unloading area (H)</li> <li>6. Process modification : regular spray to the unloading area to prevent</li> </ol>	<ol style="list-style-type: none"> <li>1. Introduce SOP for unloading material (N)</li> <li>2. Set up training for operator (N)</li> <li>3. Introduce SOP for maintenance schedule of bulk pump (N)</li> <li>4. Process modification : regular spray to the unloading area to prevent sand losses (because of wind blow) (L)</li> </ol>

	sand losses (because of wind blow) (L)	
SPINDO 1	<ol style="list-style-type: none"> <li>1. Equipment improvement : install new seal to reduce oil leakage in solenoid (L)</li> <li>2. Equipment improvement : covering solenoid terminal to prevent short circuit (L)</li> <li>3. Introduce SOP for ordering material (N)</li> <li>4. Equipment improvement : repairing toilet's tank and installing shower (L)</li> <li>5. Equipment improvement : installing roll press on diagonal adjusting table to reduce power (M)</li> <li>6. Training for middle position and operator (N)</li> <li>7. Introduce new standard in electrode utilization (N)</li> <li>8. Equipment improvement : replace cable power for diesel battery (L)</li> <li>9. Equipment improvement : rubber roll installment in conveyor table to prevent scratch on the products (M)</li> <li>10. Waste minimization : reuse old bandyzer for local order and black pipe (N)</li> <li>11. Process modification : optimizing the usage of plastic rope in packaging unit (N)</li> <li>12. Equipment improvement : installing capacitors in drad and erecting machines (L)</li> <li>13. Introduce new SOP in packing pipe (N)</li> </ol>	<ol style="list-style-type: none"> <li>1. Equipment improvement : install new seal to reduce oil leakage in solenoid (L)</li> <li>2. Equipment improvement : covering solenoid terminal to prevent short circuit (L)</li> <li>3. Introduce SOP for ordering material (N)</li> <li>4. Equipment improvement : repairing toilet's tank and installing shower (L)</li> <li>5. Equipment improvement : installing roll press on diagonal adjusting table to reduce power (M)</li> <li>6. Training for middle position and operator (N)</li> <li>7. Introduce new standard in electrode utilization (N)</li> <li>8. Equipment improvement : replace cable power for diesel battery (L)</li> <li>9. Waste minimization : reuse old bandyzer for local order and black pipe (N)</li> <li>10. Process modification : optimizing the usage of plastic rope in packaging unit (N)</li> <li>11. Equipment improvement : installing capacitors in drad and erecting machines (L)</li> <li>12. Introduce new SOP in packing pipe (N)</li> </ol>
SPINDO 2	<ol style="list-style-type: none"> <li>1. Equipment improvement : install capacitor (L)</li> <li>2. Training for operator (N)</li> <li>3. Introduce SOP for electrode utilization (N)</li> <li>4. Introduce SOP on maintenance schedule (N)</li> <li>5. Introduce SOP for ordering materials (N)</li> <li>6. Introduce new standard in electrode utilization (N)</li> <li>7. Equipment improvement :</li> </ol>	<ol style="list-style-type: none"> <li>1. Equipment improvement : install capacitor (L)</li> <li>2. Training for operator (N)</li> <li>3. Introduce SOP for electrode utilization (N)</li> <li>4. Introduce SOP on maintenance schedule (N)</li> <li>5. Introduce SOP for ordering materials (N)</li> <li>6. Equipment improvement : repair water tank in bathrooms to prevent water</li> </ol>

	<p>repair water tank in bathrooms to prevent water losses (L)</p> <p>8. Process modification : optimizing the usage of plastic rope in packaging unit (N)</p> <p>9. Equipment improvement : replace old hydraulic pumps (H)</p>	<p>losses (L)</p> <p>7. Process modification : optimizing the usage of plastic rope in packaging unit (N)</p> <p>8. Introduce new standard in electrode utilization (N)</p>
SPINDO 3	<p>1. Process modification on cross roll by setting control parameters in the machine (N)</p> <p>2. Lay out modification, by shifting the cross roll machine close to the pipe making process/machine (M)</p> <p>3. Process modification : wastewater treatment plant (H)</p> <p>4. Training for operator (N)</p> <p>5. Waste minimization : reuse worn 7" grind stone for 4" hand grinding machine (N)</p> <p>6. Introduce SOP for erecting procedure (N)</p> <p>7. Equipment improvement : install new seal to reduce oil leakage in solenoid (L)</p> <p>8. Introduce new standard on cutting unit to minimize waste (L)</p> <p>9. Introduce new standard in electrode utilization (N)</p>	<p>1. Process modification on cross roll by setting control parameters in the machine (N)</p> <p>2. Training for operator (N)</p> <p>3. Waste minimization : reuse worn 7" grind stone for 4" hand grinding machine (N)</p> <p>4. Introduce SOP for erecting procedure (N)</p> <p>5. Equipment improvement : install new seal to reduce oil leakage in solenoid (L)</p> <p>6. Introduce new standard in electrode utilization (N)</p>
SPINDO 4	<p>1. Install 1 unit hydraulic pump to increase hydraulic pressure on flattening roll (M)</p> <p>2. Training for operator (N)</p> <p>3. Recycle flux for welding process (L)</p> <p>4. Reuse grind stone, reject from big size, used for smaller size (N)</p> <p>5. Introduce SOP for maintenance (N)</p> <p>6. Introduce new standard in electrode utilization (N)</p> <p>7. Introduce SOP on painting for big size pipe (N)</p>	<p>1. Install 1 unit hydraulic pump to increase hydraulic pressure on flattening roll (M)</p> <p>2. Training for operator (N)</p> <p>3. Recycle flux for welding process (L)</p> <p>4. Reuse grind stone, reject from big size, used for smaller size (N)</p> <p>5. Introduce SOP for maintenance (N)</p> <p>6. Introduce new standard in electrode utilization (N)</p> <p>7. Introduce SOP on painting for big size pipe (N)</p>
TJIWI KIMIA 1 (Chemical Plant)	<p>1. Equipment improvement : repair leaking pipe for water</p>	<p>1. Equipment improvement : repair leaking pipe for water</p>

		<ul style="list-style-type: none"> <li>and steam distribution (M)</li> <li>2. Training for operators (N)</li> <li>3. Equipment improvement : install capacitors (M)</li> <li>4. Introduce new standard for H<sub>2</sub>SO<sub>4</sub> utilization (N)</li> <li>5. Process modification : readjust parameter control setting to minimize chemical (flocculants &amp; Na<sub>2</sub>CO<sub>3</sub>) utilization (N)</li> <li>6. Equipment improvement : replace old bag filter (H)</li> <li>7. Introduce SOP for cleaning activity (N)</li> </ul>	<ul style="list-style-type: none"> <li>and steam distribution (M)</li> <li>2. Training for operators (N)</li> <li>3. Equipment improvement : install capacitors (M)</li> <li>4. Introduce SOP for cleaning activity (N)</li> </ul>
TJIWI KIMIA 2 (Converting)		<ul style="list-style-type: none"> <li>1. Training for operator (N)</li> <li>2. Introduce SOP for folding process (N)</li> <li>3. Introduce standard on blocking book (N)</li> <li>4. Introduce standard on glue utilization per book/product order (N)</li> <li>5. Introduce SOP on cutting process (N)</li> </ul>	<ul style="list-style-type: none"> <li>1. Training for operator (N)</li> <li>2. Introduce SOP for folding process (N)</li> <li>3. Introduce standard on blocking book (N)</li> <li>4. Introduce standard on glue utilization per book/product order (N)</li> <li>5. Introduce SOP on cutting process (N)</li> </ul>
TJIWI KIMIA 3 (Cartoon Box)		<ul style="list-style-type: none"> <li>1. Training for new operator and refreshment training for senior operators (N)</li> <li>2. Process modification : rotation on working position (N)</li> <li>3. Process modification : replace lubrication oil (L)</li> <li>4. Process modification : reposition bearing cover (L)</li> <li>5. Process modification : use original spare part (M)</li> <li>6. Introduce SOP on maintenance activity (N)</li> <li>7. Introduce SOP on detailing spec order (N)</li> <li>8. Introduce SOP on setting up machines (N)</li> <li>9. Introduce SOP on communication line between production and purchasing department (N)</li> </ul>	<ul style="list-style-type: none"> <li>1. Training for new operator and refreshment training for senior operators (N)</li> <li>2. Introduce SOP on maintenance activity (N)</li> <li>3. Introduce SOP on detailing spec order (N)</li> <li>4. Introduce SOP on setting up machines (N)</li> <li>5. Introduce SOP on communication line between production and purchasing department (N)</li> </ul>
WIM Cycle		<ul style="list-style-type: none"> <li>1. Process modification : optimizing tube utilization (N)</li> <li>2. Training for operator (N)</li> </ul>	<ul style="list-style-type: none"> <li>1. Process modification : minimize tube consumption (N)</li> <li>2. Training for operator (N)</li> </ul>
Panggung		<ul style="list-style-type: none"> <li>1. Equipment improvement :</li> </ul>	<ul style="list-style-type: none"> <li>1. Equipment improvement :</li> </ul>

	install capacitor (L) 6. Training Operator (N) 7. Introduce SOP on maintenance activity (N) 8. Introduce SOP on cleaning activity (N) 9. Introduce SOP on solid waste handling (N)	install capacitor (L) 2. Training Operator (N) 3. Introduce SOP on maintenance activity (N) 4. Introduce SOP on cleaning activity (N) 5. Introduce SOP on solid waste handling (N)
Forindo	1. Introduce SOP on extruder process (N) 2. Training for operator (N) 3. Introduce SOP for solid waste handling (N)	1. Training for operator (N) 2. Introduce SOP for solid waste handling (N)
<b>TOTAL</b>	<b>87</b>	<b>65</b>

### **CATEGORIZATION OF OPTIONS**

Identified and implemented action plans can be categorized as below:

According to types of action plans

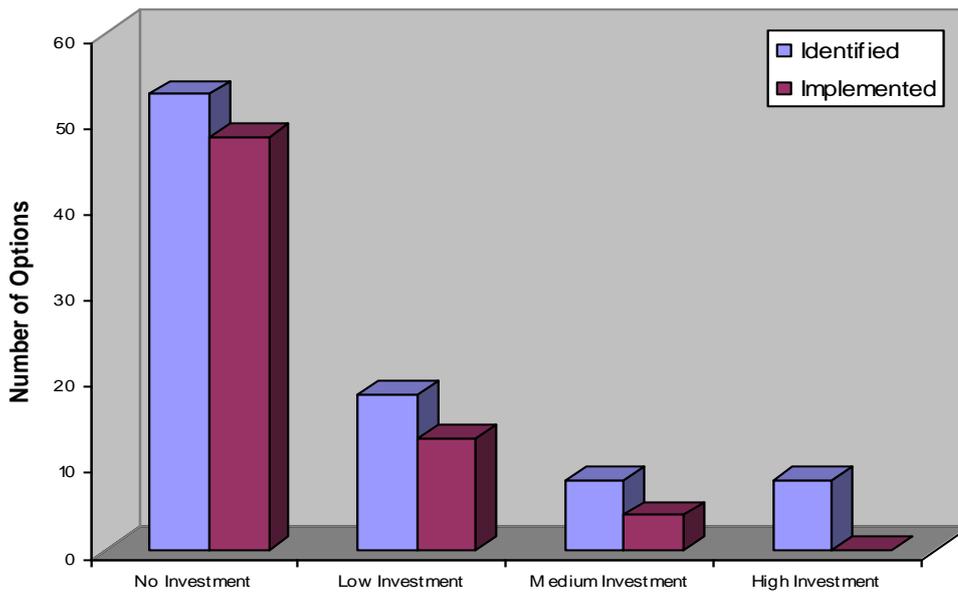
<b>No.</b>	<b>Action Plans</b>	<b>Identified</b>	<b>Implemented</b>
1.	Training	12	12
2.	Introduce new standard/SOP	33	29
3.	Process Modification	12	6
4.	Equipment Improvement	20	12
5.	Install/Procure New Machine/Instrument	3	1
6.	Reuse/Recycle waste/reject product	5	4
7.	Others (work area improvement & layout modification)	2	1
<b>TOTAL</b>		<b>87</b>	<b>65</b>

2. According to amount of investment::

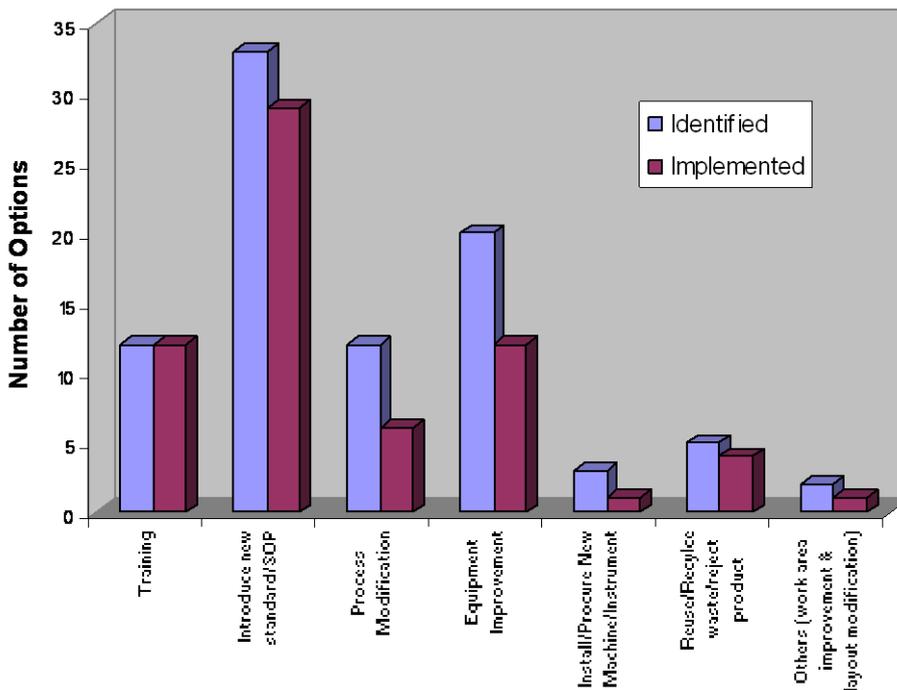
1. No Investment (N)
2. Low Investment (below IDR 15,000,000.00) (L)
3. Medium Investment (IDR 15,000,000.00 – IDR 75,000,000.00) (M)
4. High Investment (more than IDR 75,000,000.00) (H)

<b>No.</b>	<b>Investment</b>	<b>Identified</b>	<b>Implemented</b>
1.	No Investment	53	48
2.	Low Investment	18	13
3.	Medium Investment	8	4
4.	High Investment	8	0
<b>TOTAL</b>		<b>87</b>	<b>65</b>

### OPTION DISTRIBUTION BASED ON INVESTMENT



### OPTIONS DISTRIBUTION BASED ON TYPES

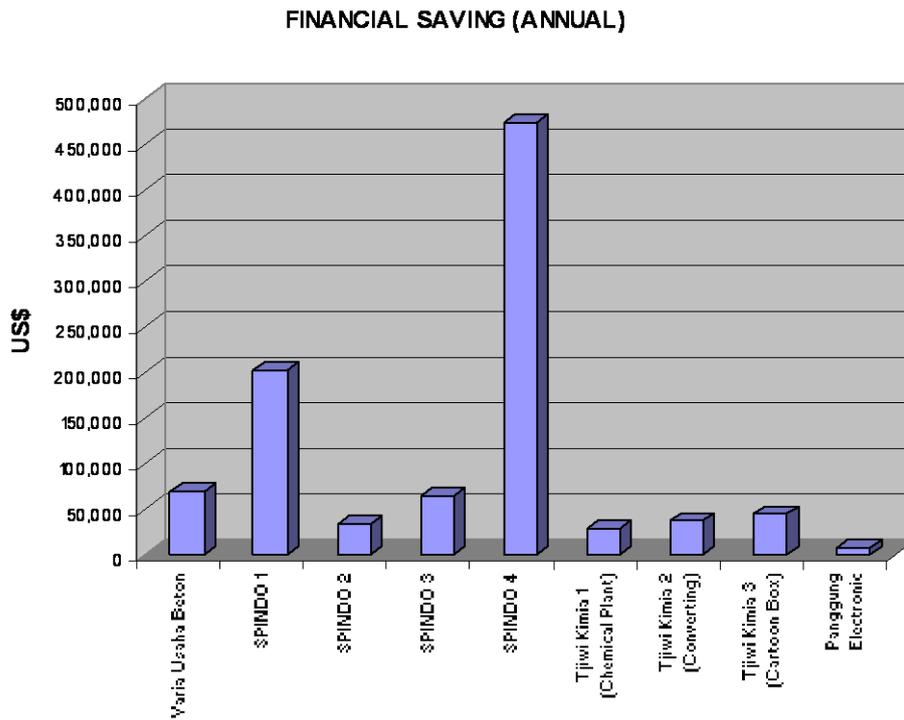


## FINANCIAL SAVINGS

Some industries who have implemented options to increase their efficiency level have also felt benefits which can be converted into financial saving, while some others are still in their preliminary stage of option implementation or option implementation monitoring stage.

Majority of options implemented are no investment options. All high investment options have not been implemented. Option with medium level investment has been taken by PT. SPINDO 1, PT. SPINDO 4 and Tjiwi Kimia 1.

The saving value reported is based on monthly monitoring result and then it is projected into uniform time period (annual). Some industries who have calculated their financial saving are:



## **ENVIRONMENTAL SAVING**

Efforts to implement options in order to reduce inefficiency level have also influenced the environmental protection program. Environmental saving obtained could be grouped into direct saving and indirect saving.

Identified environmental direct saving are among others:

- PT. Varia Usaha Beton : waste minimization (cement losses) as much as 100 kg per day
- PT. SPINDO1 : reduction on water consumption as much as 4000 m<sup>3</sup> per month
- PT. SINDO 3 : reduction on solid waste (4"grind stone) as much as 25% from previous condition (use to be 2600 pieces per month reduce to 1930 pieces)
- PT. SPINDO 4 : waste minimization on solid waste (scrap metal from about 400 tones per month to 100 tones, flux powder as much as 1300 kg/month, and grind stone as many as 1478 pieces per month)
- PT. Panggung Electronic : reduction on water consumption as much as 1359 m<sup>3</sup> per month

Environmental indirect saving includes minimization effort of raw material such as implemented by some industries. By reducing raw material consumption, there is an indirect saving in natural resources consumption. In addition, energy saving efforts (electricity saving, heat optimization, etc.) are also indirect efforts which can give benefit to the environment.

## **BARRIERS & SUCCESS FACTORS**

From interview with the industries, barriers faced during the implementation of the Cleaner Production Club program can be grouped as follows:

1. Lack of commitment from top management  
This is revealed by either not allowing the efficiency team in his/her company to implement/complete the sequence of CPC program or not giving full support. Some top management prefers to stay in the “old paradigm” by focusing only in production operational. It is difficult to change the mindset of the top management that production efficiency is very important for a company. There is also a case that the top management is ‘afraid’ that implementation of this PEC program in their company will uncover their mistakes and losses/inefficiencies which (they think) would give negative impacts to their future career.
2. Old paradigm/work habits/mindset of the workers  
To change existing culture/mindset, especially from low level workers (operators) is also quite a big problem. They are so used to the ‘old’ ways of handling and doing their works. The people have thought that the old system is the best & tested one, and a change means additional workload. Several industries faced this problem.
3. Lack of inter-departmental coordination  
Some industries have problem in accessing data from other departments (e.g. purchasing, utility, etc) in their company. Therefore, to identify the exact number of non product output and/or to express the implementation result in a quantitative way is difficult. In fact, this is also due to low involvement of top management.
4. Not enough member in production efficiency team  
In some cases, the number of efficiency team members could be an issue. Team members have other responsibilities, so that sometimes it is very difficult to spend special time and concentrated effort to think of ways to eliminate inefficiencies between the routine work loads, especially when there are lots of orders to finish. Progress in some industries could be faster if they have enough team members.
5. Financial Barrier  
Some options, especially with high investment, could not be implemented because of financial reason. This is also influenced by the global financial crisis.

Meanwhile, some success factors which aid to the success of CPC program implementation are as follows:

- a. Commitment and support from top management
- b. Commitment and high engagement from staffs, especially those who are engaged in the production efficiency team (solid team)
- c. High motivation and focus on the program
- d. A strong cooperation from all related divisions to support the implementation of efficiency programs

## **FEEDBACK FROM COMPANIES**

Most MOWARU club members found that CPC program is very useful especially in terms of new knowledge gained. CPC’s components (NPO concept and Mind Mapping – Cause Analysis) are very helpful to identify the root causes of inefficiencies. The delivery methods

are very easy to follow and company visit give them chances to discuss the existing problems in the field from many viewpoints (not only based on field experience). The idea of a club is still relatively new for them. The companies could learn many new things including success or failure stories from other members vice versa by mutually sharing opinions or ideas. By following this program, they are able to get financial saving, environmental saving and experiences in a learning organization.

In the future, the companies hope to continue the club which will bring all the industries together in solving not only technical problem, but also in the insight of business perspective.

## **PROJECT CONCLUSIONS**

After run for about 8 months there are significant financial and environmental benefits, as well as organizational learning which could be obtained by most of the club members. Of course in the process not all industries could be in the same level of implementation (progress) because of various barriers in the field. In spite of that, developed options - which most of them have been implemented – are still efforts/results that should be highly appreciated. By going through series of learning processes, the industries can acquire additional knowledge, such as how to identify inefficiency sources and how to develop action plan to minimize the inefficiencies. This knowledge is proved to be a very valuable and useful matter for the industries.

Ideas about 'club' is also responded enthusiastically by most of the industries who have joined. They felt that through this sharing forum, their knowledge and experiences are much broadened. Majority of the industries have agreed that this media is very effective to find solution of problems faced by industries. In the end, industries who are members of the CPC have agreed to maintain the sustainability of this club independently, even though funding from the European Union APE project has ended.

## **RECOMMENDATIONS**

According to experiences from the implementation of CPC program in Surabaya, the facilitation function could not be separated from efforts to give technical guidance. Principally, developed options to minimize inefficiency level are not only managerial approach, but also technical approach. For industries, especially those who do not have the technical capacity in technical field, certain guidance is required. It is realized that giving technical guidance does not mean closing the learning opportunity of the respective industry. Guidance can be in the form of brainstorming together, so that the team from the respective industry could have a chance to learn and develop.

Related to the club, ideally each member should have equivalent experiences (positive or negative), so that there is a balance between giving and taking experiences to and from fellow members of the club. Facilitators should have the capacity, both in terms of management and technical aspect (not only facilitation function to lead/moderate the meeting), in a way that help the member industries to have experiences which could eventually be shared.