

Cleaner Production Clubs Surabaya

DRIYOREJO CLUB

Final Report



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

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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 involvements 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.

List of industries who have joined the "**DRIYOREJO PLUS**" club can be seen in the table below:

No.	Industry	Company Profile
1.	PT. SURABAYA WIRE	<p>SURABAYA WIRE is a factory which produces nails and string. It was a Foreign Investment Plant, which is founded in Indonesia based on "UU Penanaman Modal Asing No.5/1967", which is also based on "Ketetapan Presiden Republik Indonesia 9 Mei 1973, No. 8/47/Pres/5/73", "Ketetapan Menteri Perindustrian 12 Juni 1973 No. 149/M/SK/6/1973", "Menteri Kehakiman 10 Oktober 1973 No. Y.A.5/353/73"</p> <p>It is a joint Venture Company between Japan (MARUBENI CORPORATION) with 50 % share, National Entrepreneur (N.V. Djawa Indah) with 25 % share, and PT JASINCO with 25 % share. It is located in Jl. Raya Bambe 88 Driyorejo, Gresik. At the moment, the company is sold to national partner (NV Djawa Indah) , hence the share is totally belongs to NV Djawa Indah, and the company is a national company which is registered by "Badan Koordinasi Penanaman Modal Pusat No. 13/IV/1985"</p> <p>The product is Nail, "Bendrat" (Annealing Wire), Tie Wire and Cutting string. The capacity of nail wire is 24000 tons/year, nails is 18000 tons/year with 24 operational hours. The company has 181 staffs and workers which consists of 17 officers, 13 staffs, 60 permanent workers, 2 coordinators, 89 non permanent workers.</p>
2.	PT. SETIALIM	<p>PT Setialim Gunungsari is a textile factory producing mops, blankets, dish clothes, grey textile, sewing thread and stove wicks under the registered brand "Gunung Air". The company is located in jalan Raya Cangkir no 388 Driyorejo, Gresik. They have two units: spinning and weaving. the production capacity is 40 ton/month for spinning and 55,200 meters/month. Their products are mostly sold to local/national market. The number of employees is 190 people (25 staffs and 165 operators). The spinning unit works in three shifts and the weaving unit works only in one shift.</p>
3.	PT. PENGASIH JAYA	<p>Pengasih Jaya is a national enterprise which produces automotive break lining. Located at Driyorejo KM.25, the factory has 120 workers. The products are distributed to national market. Production processes mostly run manually with total capacity 5000 MT per year.</p>
4.	PT. MITRA SARUTA	<p>PT Mitra Saruta is a factory producing yarn (colored, polyester cotton, 100% cotton, CVC bleach, T/C raw white) and working gloves from recycled textile waste. It is located in jalan Raya Krikilan km. 28 Driyorejo, Gresik. Mitra Saruta buys textile wastes up to 2,000 ton monthly. Their products are exported as well as sold in local market. The factories are located in three plants: KM28 plant, PT Forindo plant and KM33 plant with a total of 2763 employees.</p>
5.	PT. SURYA PLASTINDO	<p>Surya Pastindo is national enterprise which located at Krikilan, Driyorejo, Gresik KM.28. The factory produces plastic bag with various types. Process production is run 24 hours with total employee 650 workers and total capacity 5000 T per year. The products are distributed mostly for national market; export is done only for Chile.</p>
6.	PT. SURYA KERTAS	<p>PT Surabaya Agung Pulp and Paper (PT Surya Kertas) was established in August 31st, 1973 as a national company based on letter from Badan Koordinasi Penanaman Modal (BKPM) on November 9th,1973, no. 723/SK/BKPM/X/1973. PT Surya Kertas is located in Jalan Raya Driyorejo, Gresik, East Java with total area of land about 38 hectare. Paper production has been started from 1976 by producing photo copy paper, NCR paper, HVS paper, calendar paper, board paper, wrap paper, machine glaze paper, base paper, computer paper form, and coating based</p>

No.	Industry	Company Profile
		paper. Now, it has nine paper machine with total production capacity about 456.800 ton per annum.
7.	PT. AGRINDO	Located in desa Bambe, Gresik, East Java, PT. Agrindo was established in 1976. Over the course of its development, PT. Agrindo has developed a number of production units, such as: machinery unit, rubber-roll unit, foundry unit, and engineering unit. The management has a strong commitment to implement a qualified management system according to ISO 9001:2000 standard. The company has rapidly developed and reached forth not only domestic market, but also international market. On September 10, 1997, the rubber-roll unit obtained SNI 19-9001/ISO 9001 from B4T-QSC Bandung, which was converted into ISO 9001:2000 on December 2001. Meanwhile, on December 17, 2002, the foundry unit received the same certificate, followed by the machinery unit in 2003. At this moment, the company has 800 workers
8.	CV. DIRGAHAYU	CV Dirgahayu is a factory produces stationary such as paper, folder, envelope etc. It is located in Waru and was build on 4 hectares area of land. It is a National Investment Plant, which is founded in 1980 . The capacity of the envelope department plant is 6300 rim per day. There are 400 employees in the company. The product is used for local and also exported to USA. The plant is operated for 24 hours.
9.	PT. TIRTA INVESTAMA	PT AQUA Golden Mississippi was established in 1973 by Tirto Utomo as a pioneer of bottled mineral water company in Indonesia. The first factory was built in Bekasi. In 1988, a strategic alliance occurred between AQUA Group (with PT Tirta Investama as its holding company) and DANONE Group. The merger has further improved AQUA's performance in terms of product quality, market share and the industry's advanced bottling technology requirements. AQUA has 13 plant locations and 11 water intake sources, distributed in all Indonesia. One of the plant which joined the PEC program is the Pandaan Plant, which is located in jalan Raya Surabaya-Malang Km 48,5 Pandaan Pasuruan-East Java, with a total area of 79,980 m2, consisting of 39,995m2 built area and the rest is a protected forest area. In 1984, there were only 28 workers, but now there are 1.177 employees. The Pandaan Plant produces bottled water in 240ml, 600ml, and 1500ml packaging (bottle) as well as bottled isotonic water under the brand of "Myzone".
10.	PT. BHIRAWA STEEL	Bhirawa Steel is a factory which was founded in 1973 and produced flat bar and small round bar. The plant is located in Margomulyo, Surabaya. The products are distributed for local and overseas market (especially middle east). Recently, the factory has 400 workers with annual product 250,000 MT. Production process is run continually, 24 hours per day.
11.	PT. SIANTAR MAJU	PT. Siantar Maju is a consumer goods manufacturer, which produces slipper/rubber soles. Their products are distributed either for local/national market or export. The company is located in Driyorejo, Gresik and has 700 employees. Production process runs for 24 hours per day with three different shifts.

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 “**DRIYOREJO PLUS**” clubs are:

1. Preliminary Meeting (16 May 2007)

This first meeting for “**DRIYOREJO PLUS**” club was delivered by UBAYA and IVAM. The contents of meeting were:

- Refreshment on the information of the program (by UBAYA Team)
- Introduction/basic principle of Cleaner Production (by Jaap/IVAM)
- Production Efficiency Club – The Rule of the Game (by Jaap/IVAM)
- Simple Tools To Find Inefficiency Sources (by UBAYA Team)

At the end of meeting, sharing forum was held to share the condition at each industry. This meeting was ended up with an agreement to set an action plan and to apply the tools given to look for inefficiency sources in each industry.

2. Network Meeting (27 September 2007)

The first network meeting for Driyorejo Plus Club was held on 27 September 2007. In this meeting first action to map inefficiency sources in each industry was discussed. At this stage, it was indicated that the implementation progress among these industries were varied. Some of them were succeeded to find the inefficiency areas, but the others still stuck on the implementation plan.

3. Workshop 1 (11-12 February 2008)

This workshop was delivered by BPPT Team. The contents of workshop were :

- 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)

At the end of workshop, every company set up their action plan to make NPO Diagram and the Calculation. These will be discussed on next workshop (Workshop 2 – on 1st week of May 2008).

4. Networking Meeting & Workshop 2

The second network meeting and workshop were conducted at 3 & 4 June 2008, one day for network meeting and one day for a workshop lead by BPPT.

In the network meeting, each industry 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 “mindmapping technique”. Then the identified causes were clustered/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 differ from one to another.

5. Network Meeting

On 18 September 2008, network meeting has been held. A general review progress has been presented by facilitators, followed by detail progress sharing by each industry. Efforts to find root cause of inefficiency, through mindmapping technique, have been implemented by most of club members. Based on the cause analysis, several options have been developed and implemented.

Summary of Industry Participation on CPC Events

No.	Industry	Pre-Meeting	Network Meeting 1	Workshop p 1	Network Meeting 2	Workshop p 2	Network Meeting 3
1.	PT. Surabaya Wire	√	√	√	√	√	√
2.	PT. Setia Lim	√	√	√	√	√	√
3.	PT. Pengasih Jaya	√	√	√			√
4.	PT. Mitra Saruta	√		√	√	√	√
5.	PT. Surya Plastindo	√	√	√	√	√	√
6.	PT. Surya Kertas	√	√	√	√	√	√
7.	PT. Agrindo	√		√	√	√	√
8.	PT. Dirgahayu	√		√	√	√	√
9.	PT. Tirta Investama			√	√	√	√
10.	PT. Bhirawa Steel	√		√			
11.	PT. Siantar Maju			√			

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.

In several visits, with permission from the company, Ubaya has involved students, especially from the Chemical Engineering Department, to be involved in the discussion and field visit. Some ideas on efficiency programs could come also from the students. This is considered as a good practice, because not only the industry itself would get the benefits, but also the students could have great opportunity to get in touch with real problems in the field.

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.

All members in Driyorejo Plus club have been visited by facilitator; some of them were visited more than once. Lively discussions were done during the visitation.

RESULTS

The Non Product Output (NPO) concept and mindmapping 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 16 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 (PT. Tirta Investama)
- Industries who have not finished their NPO calculation (PT. Bhirawa Steel and PT. Siantar Maju)

OPTIONS IDENTIFIED AND IMPLEMENTED

From the obtained results, non-product output (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
Surabaya Wire	1. Install new travo for balancing electrical load (M) 2. Equipment improvement : increasing blower capacity (M)	1. Install new travo for balancing electrical load (M) 2. Equipment improvement : increasing blower capacity (M)

INDUSTRY	OPTIONS IDENTIFIED	OPTIONS IMPLEMENTED
	<ol style="list-style-type: none"> 3. Equipment improvement : adding preheating pipe and glass wool in the pipe (L) 4. Equipment improvement : Install insulation material in the body of oven (L) 5. Install 1 unit cooling tower (M) 6. Equipment improvement : Reduce well pump from 10 hp to 0,5 hp. (N) 7. Equipment substitution : Change 400 W mercury lamp to high pressure sodium lamp 250/350 W (from 32 lamps to 24 lamp) (M) 8. Reuse waste (fine particle from wire rod skin) for paving (N) 9. Training for operator (N) 	<ol style="list-style-type: none"> 3. Equipment improvement : adding preheating pipe and glass wool in the pipe (L) 4. Equipment improvement : Install insulation material in the body of oven(L) 5. Install 1 unit cooling tower (M) 6. Equipment improvement : Reduce well pump from 10 hp to 0,5 hp. (N) 7. Equipment substitution : Change 400 W mercury lamp to high pressure sodium lamp 250/350 W (from 32 lamps to 24 lamp) (M) 8. Training for operator (N)
Setialim	<ol style="list-style-type: none"> 1. Process modification : change empty shuttle with the loaded (full) one without stopping (shutting down) the machines (N) 2. Install a new trunking chimney (L) 3. Material substitution : boiler fuel from diesel into coal/wood (N) 4. Equipment improvement: repair/change some leaking taps/valves and pipes for steam, especially those who are at the direction of sizing machine (L) 	<ol style="list-style-type: none"> 1. Process modification : change empty shuttle with the loaded (full) one without stopping (shutting down) the machines (N) 2. Install a new trunking chimney (L) 3. Equipment improvement : repair/change some leaking taps/valves and pipes for steam, especially those who are at the direction of sizing machine (L)
Pengasih Jaya	<ol style="list-style-type: none"> 1. Equipment improvement : Install new capacitor (L) 2. Equipment improvement : install new plat in pressing machine (L) 3. Adjustment of work hours (N) 4. Equipment improvement : Modification on drilling process to minimize time consumption (N) 5. Install wet scrubber to eliminate gas emission (M) 	<ol style="list-style-type: none"> 1. Equipment improvement : Install new capacitor (L) 2. Equipment improvement : install new plat in pressing machine (L) 3. Adjustment of work hours (N)
Mitra Saruta	<ol style="list-style-type: none"> 1. Process modification : minimize rubber yarn consumption (N) 2. Process modification : minimize rubber band consumption (N) 3. Introduce SOP for spare part order (N) 4. Process modification : minimize polyester yarn consumption (N) 5. Process modification : eliminate clear material consumption (N) 6. Process modification : minimize element for dotting oven (N) 7. Packaging modification : reduce cartoon box size (N) 8. Packaging modification : reduce strapping band consumption (N) 9. Process modification : wastewater treatment plant (H) 10. Training (N) 	<ol style="list-style-type: none"> 1. Process modification : minimize rubber yarn consumption (N) 2. Process modification : minimize rubber band consumption (N) 3. Introduce SOP for spare part order (N) 4. Process modification : minimize polyester yarn consumption (N) 5. Process modification : eliminate clear material consumption (N) 6. Process modification : minimize element for dotting oven (N) 7. Packaging modification : reduce cartoon box size (N) 8. Packaging modification : reduce strapping band consumption (N) 9. Training (N)
Surya Plastindo	<ol style="list-style-type: none"> 1. Process modification : readjust plastic container (L) 	<ol style="list-style-type: none"> 1. Process modification : readjust plastic container (L)

INDUSTRY	OPTIONS IDENTIFIED	OPTIONS IMPLEMENTED
	2. Process modification : readjust process control parameters (N) 3. Introduce SOP for minimizing availing/defect intermediate product/solid waste (N) 4. Training for operator (N)	2. Introduce SOP for minimizing avalan/defect intermediate product/solid waste (N) 3. Training for operator (N)
Surya Kertas	1. Process modification : readjust piping system from discharge line of vacuum pump and water from settling tank (M) 2. Process modification : increase performance of wastewater treatment plant result in reuse treated effluent (L) 3. Training for operators (N) 4. Reuse effluent/treated wastewater in production line (N)	1. Process modification : readjust piping system from discharge line of vacuum pump and water from settling tank (M) 2. Process modification : increase performance of wastewater treatment plant result in reuse treated effluent (L) 3. Training for operators (N) 4. Reuse effluent/treated wastewater in production line (N)
Agrindo	1. Equipment improvement : install capacitor on ban bury & open mixer machine (L) 2. Equipment improvement : install cubicle on transformer (L) 3. Install dust collector (M) 4. Process modification : adding natural rubber layer to reduce inconsistent finished product (L) 5. Process modification : substitute cream detergent with liquid detergent in calendar process (N) 6. Introduce new standard for compound sheet width from calendar process (N) 7. Training for operator (N) 8. Adjustment work hours (N)	1. Equipment improvement : install capacitor on ban bury & open mixer machine (L) 2. Equipment improvement : install cubicle on transformer (L) 3. Install dust collector (M) 4. Process modification : adding natural rubber layer to reduce inconsistent finished product (L) 5. Process modification : substitute cream detergent with liquid detergent in calendar process (N) 6. Introduce new standard for compound sheet width from calendar process (N) 7. Training for operator (N) 8. Adjustment work hours (N)
Dirgahayu	1. Introduce SOP in production process (envelope) to reduce waste/reject product (N) 2. Training for operator (N) 3. Equipment improvement : re-set machine (L)	1. Introduce SOP in production process (envelope) to reduce waste/reject product (N) 2. Training for operator (N)
TOTAL	47	40

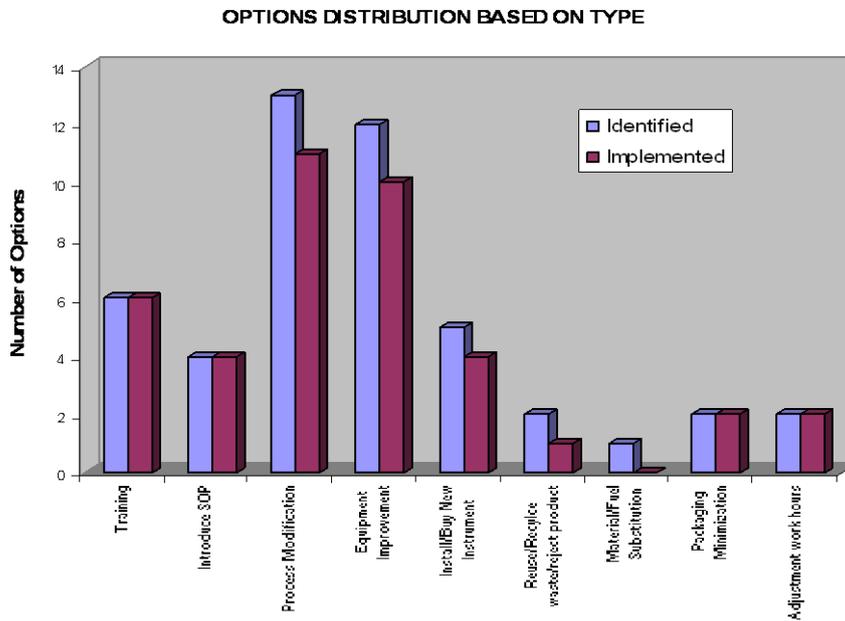
CATEGORIZATION OF OPTIONS

Identified and implemented action plans can be categorized as below:

1. According to types of action plans

No.	Action Plans	Identified	Implemented
1.	Training	6	6
2.	Introduce new standard/SOP	4	4
3.	Process Modification	13	11
4.	Equipment Improvement	12	10
5.	Install/Procure New Machine/Instrument	5	4
6.	Reuse/Recycle waste/reject product	2	1
7.	Material/Fuel Substitution	1	0

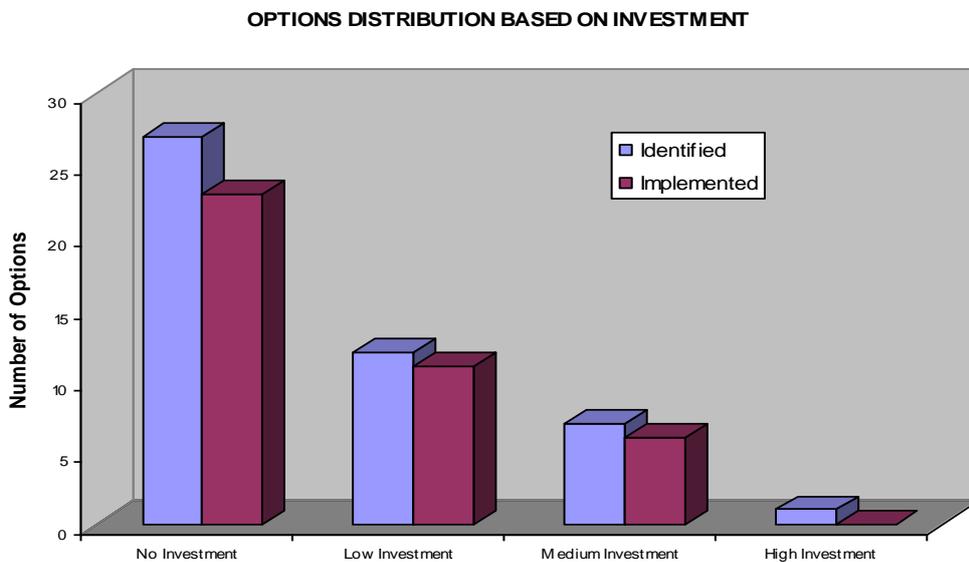
8.	Packaging Minimization	2	2
9.	Others (adjustment work hours)	2	2
TOTAL		47	40



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)

No.	Investment	Identified	Implemented
1.	No Investment	27	23
2.	Low Investment	12	11
3.	Medium Investment	7	6
4.	High Investment	1	0
TOTAL		47	40

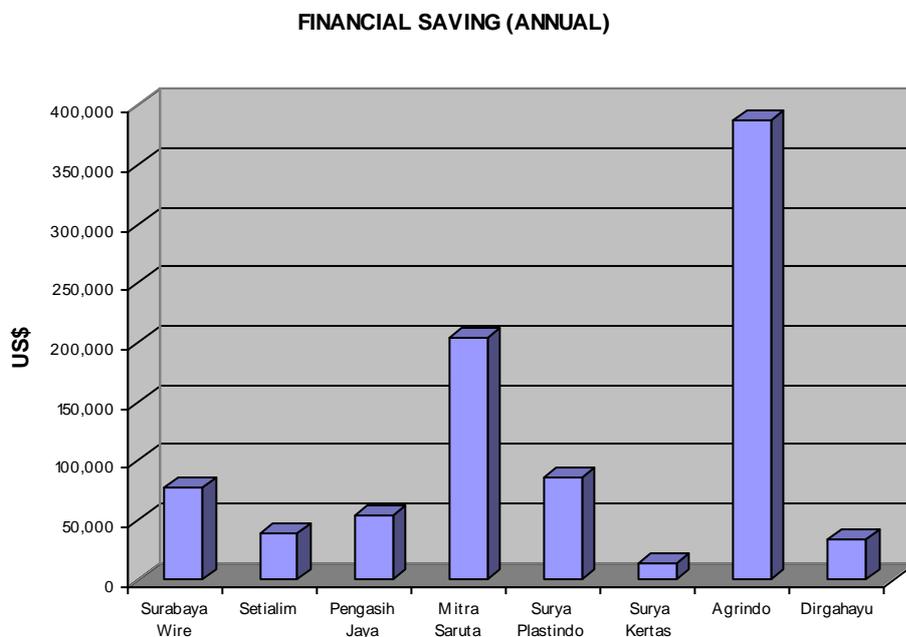


FINANCIAL SAVING

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.

Most of the savings were obtained from efforts to modify process. Majority of options implemented are no or low investment options. Medium investment options have been selected by PT. Surabaya Wire (4 out of 8 options implemented), PT. Surya Kertas (1 out of 4 options implemented) and PT. Agrindo (1 out of 8 options implemented). One option with high level investment has been identified by PT. Mitra Saruta but has not been implemented yet.

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:

- Reuse waste (fine particle from wire rod skin) of PT. Surabaya Wire, as much as 55 tones per month, which will be used for paving
- Waste minimization, solid waste/avalan/defect product, by PT. Surya Plastindo, as much as 32 tones per month

- Reduction of effluent wastewater of PT. Surya Kertas, as much as 450 m³ per day where treated wastewater is reused for production process.
- Reduction of solid waste (kompon = defect intermediate product), by PT. Agrindo, as much as 15 tones per month

Environmental indirect saving includes minimization effort of raw material such as implemented by PT. Mitra Saruta (saving 2.2 tones rubber per month, 68.4 kg polyester yarn per month and 40.625 tones clear material/pigment per month). 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 prefer 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 industries 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

Although the progress among Driyorejo Plus Club members was not the same, PT. Tirta Investama, PT. Bhirawa Steel and PT. Siantar Maju were not able to follow complete circle of Cleaner Production concept; however, the achieved results could not be taken for granted, because there are still 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 club members.

Ideas about 'club' are also responded enthusiastically by most of the industries that 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/PEC 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.