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FINAL report

project
"promotion of cleaner industrial production in the lao people's democratic republic" US/lao/03/049

Submitted to:United Nations Industrial Development Organization(UNIDO)

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Abbreviations

CP	Cleaner Production
CPA	Cleaner Production Assessment
BAT	Best Available Technology
VNCPC	Viet Nam Cleaner Production Center

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I INTRODUCTION

This report summarize results of the project named" **Promotion of Cleaner Production in Laos "** that taken place in 2005.
The project will assist the government of Laos to improve the productivity and competitiveness of its growing industry base, as well as improve industry's access to international and more local markets, through the application by export-oriented enterprises of cleaner production techniques and technology. Activities will focus on building national capacity in cleaner production through awareness-raising, conduction of in-plant demonstrations at se and running of training programs. As indicated in the project document as well as confirmed in the inception report, the project consists of 2 main activities: cleaner production training for and in-plant demonstration at selected textile companies.

II. RESULTS FROM THE PROGRAM

2.1 Training Activities

In order to sustain the CP in the participating companies after the program completed, the training modules on cleaner production assessment methodology were held for representatives from enterprises of textile sector, demonstration companies, from provinces, related Ministries and Departments and Academic institutions, national consultants. Through the training, the program had tried to build-up a resource base of national experts on cleaner production. The four training modules were implemented which instruct all steps and specific tasks in systematic CP assessment methodology and related subjects to the trainees of the training.

The above in-depth training was done mainly by Dr. Heinz Luenberger, CTA of the project; Dr. Permod Gupta, Director of India CPC, CP expert and Ms. Vu Tuong Anh, Deputy Director of VNCPC, CP expert. Besides, Mr. Do Trong Mui, Mr. Nguyen Thai Hoa and Mr. Bertrand Collignon from VNCPC had participated the training as resource persons.

Addition to the in-depth four modules- training, awareness-raising seminars were organized to introduce the CP concept to a number of enterprises and other stakeholders. In the awareness raising seminars, numbers of CP case study from India and Vietnam were presented by Dr. Permod Gupta and CP experts from VNCPC.

Content of the 4module - training covered all the essential knowledge/information to CP to the trainees. The content of the 4 training modules is presented below:

Module 1	Module 2	Module 3	Module 4
-CP introduction (concept, benefits) - Detailed CPA methodology (theory and exercises): baseline data collection, selection of CPA focus, develop detailed flow diagram, material balance, energy balance -Wet textile processing Work plan	-Participants present their work -Discussion of results -Identify missing data - CPA methodology (cont.): Assign costs to waste streams; Analyze causes for waste streams; Develop CP options - Energy Efficiency	-Participants present their work -Discussion of results - CPA methodology (cont.): Technical feasibility study; Financial feasibility study, Environmental impacts study -Cleaner technology in textile - BAT in wet textile processing	-Participants present their final draft reports - Discussion of results - Action plan for CP implementation - Related topic to CP: Social responsibility (SR) and Occupational Health and safety (OHS) -CP Investment proposals

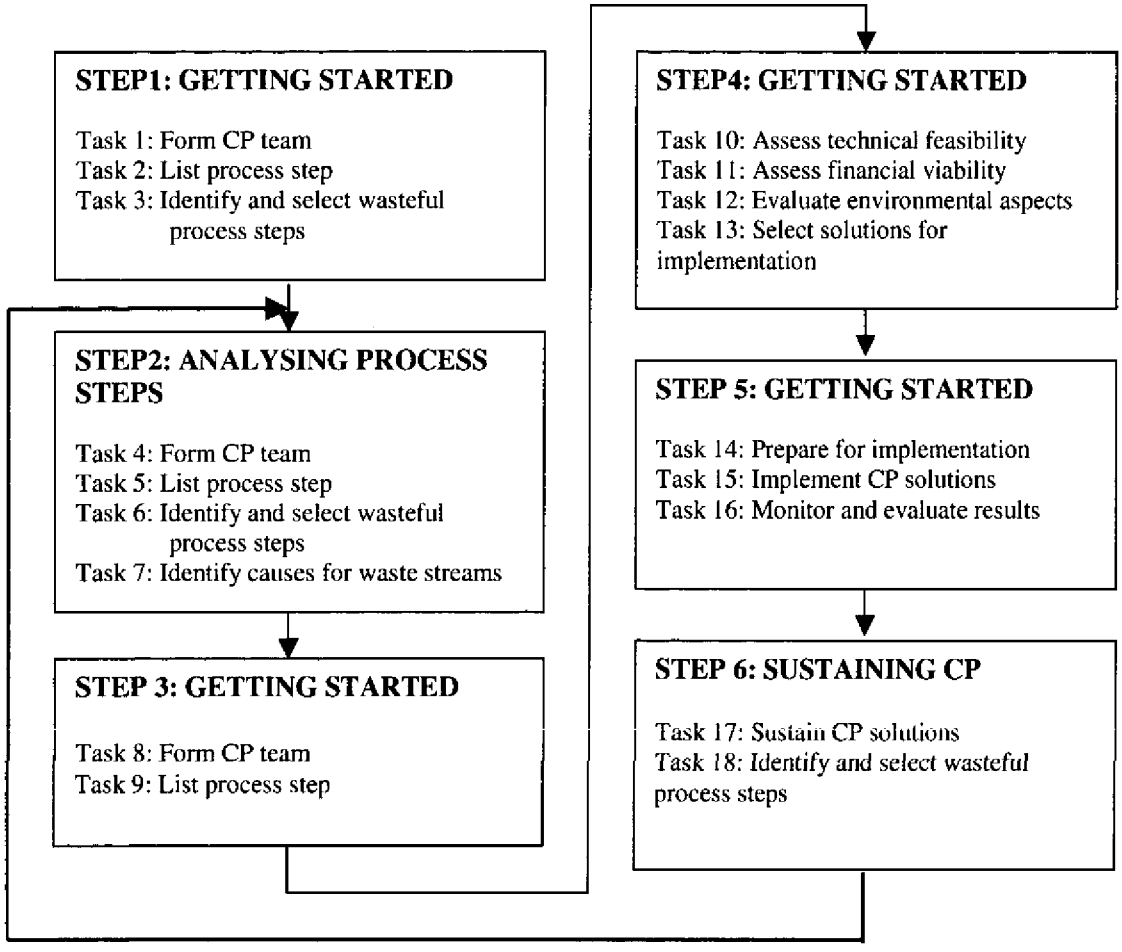
The four training modules have delivered 417 person days of training. See detailed in annex.

After every training module, trainees were asked to evaluate the training. Trainees highly appreciate the quality of the training. The

evaluation of training modules from participants were at good level.

2.2 In-plant demonstration activity

In-plant assessments at enterprises used as practical training for CPA methodology and using the results for dissemination for CP application in Laos industry. The participating companies were on-job trained the below systematic CP methodology for sustaining CP in their companies :



The in-plant assessments were implemented at 4 selected production units named:

1. Inter Export Company
2. Export Garment Company
3. UK Printing
4. Nikon Handicraft

Participants were divided into 4 groups. Each group is in charge in following one demo units. After every in-class training module, an in-plant working visit was done by the assigned group and international experts.

The in-plant assessments consisted of data collection, CPA focus selection, flow diagram preparation, material balance preparation, analyzing causes for waste streams, CP options generation, feasibility analyzing of CP options.

The results are all demo units have produced a list of CP options. The number of CP options generated at every demo units was presented below:

Company	Inter Export	Export Garment	UK Printings	Nikon Handicraft
No of CP options	25	40	28	20

All demo units have implemented simple CP options. The benefits from CP implementation at participating companies are presented below:

a. Results achieved in Inter – Export Garment Company

Economic benefits	**Environmental benefits**	**Technical benefits**
Investment: 5,000USD Saving: (direct saving): 4,800USD Payback:<13months	Wastewater volume reduced by 30% Reduce pollution load by 30% due to consumption chemical reduction	Reduced electrical energy consumption by 2.5% and water by 30%, auxiliary chemical consumption by 20%.

	Significant reduction in gaseous GHG emission	Improved product quality Reduce reprocess rate

However, due to low production at the monitoring time, specific consumption data may not be representative therefore actual benefits of CP will not be recognized.

b. Results achieved in Export- Garment Company

Economic benefits	Environmental benefits	Technical benefits
Investment: 30,000USD Saving: 50,000 USD Payback: < 1 year	Wastewater volume reduced by 33% Reduce pollution load in due to consumption chemical reduction GHG emission reduced by 80%	Reduced electrical energy consumption by 30% and fuel oil by 78% and water consumption by 25%. Improved product quality Reduce reprocess re-dying rate by 50%

c. Results achieved in UKS Printing Co.Ltd.

Economic benefits	Environmental benefits	Technical benefits
Investment: Insignificant Saving: Significant but not available due to it is	Wastewater volume reduced by 50% Reduce pollution load by 60% Solvent emission	Reduced waster consumption by 50%; solvent by 90% . Improved product

controlled in Thailand	reduced by 90% Solid waste reduced by 30%	quality Reduce reprocess rate

d. Results achieved in Nikone Handicraft

Economic benefits	Environmental benefits	Technical benefits
Investment: 500USD Saving: 400 USD	Wastewater volume reduced by 60% Significant reduction in pollution load Gaseous emission reduced by 65% Improved working environment	Reduced dye liquor by 14%, charcoal consumption by 40% . Improved product quality : uniform shade and depth of colour Reduce reprocess rate therefore may increase its production

III. FINDING AND RECOMMENDATION

3.1 Findings

1. The results achieved by the 4 participating demo units indicated that the model of integration in-class training and in-plant assessment for demo units was found very useful.

2. The in- depth 4 training modules had been well designed, that help participants well understand a circle of CPA and how to do a CPA.

3. All of four participating companies have achieved very promising results that proved the advantage of the CP approach and it is feasible to Laos' industries.

4. Generally, companies have less awareness on specific resource consumption losses, environmental effect of production on actual costs of production (total costing including environmental costs). Their monitoring systems of production are very week. Most of them have no water meter, limited number of electricity meters, and monitoring of material consumption. Then it is a big obstacle for CPA.

5. There is a lack of technical resource at some demo companies and it exists a challenge of how to maintain CP in their production.

3.2 Recommendations

From the program, it is recommended that:

1. The model of integration 4-module in-class training with in-plant assessment demonstration should be applied for the next round of the project, for other industrial sector.

2. It should have more careful, well designed process for selection of demo units that make sure to get real commitment from management of the demo units.

3. For better efficiency of capacity building, national consultants should more involvement in CPA at demo units.

4. It should have more CP introduction in public media then communities get information on the preventive approach for sustainable development.

CONCLUSIONS

The demonstration program on cleaner production at textile sector in Laos has achieved the purpose of capacity building in application of CP approach of the program.

It is necessary to expand the number of national experts in CP who can later maintain CP in Laos industry. The number of demonstration units should also be increased to convince the community in the approach.

ANNEX

Training time

Module	Time	No of participants	Person. days
Module 1	28-30 March	34	102
Module 2	13-15 June	36	108
Module 3	15-18 August	35	105
Module 4	7-9 November	34	102
Total			**417**