

Part C - SEAM Project: Sustaining Cleaner Production

10.0 Overcoming Barriers to Cleaner Production Adoption In Egypt

The majority of barriers to Cleaner Production confronted by industrial establishments can be placed into one of two categories:

- Those that are **internal** to the establishment, including:
 - ⇒ Economic concerns.
 - ⇒ Technology and technical skills.
 - ⇒ Cultural concerns.
 - ⇒ Quality considerations.
 - ⇒ Information dissemination.

Examples of Barriers to CP Adoption in Factories

- ⊗ Lets think about this later.
- ⊗ Its good to talk about but won't work in practice.
- ⊗ It just won't work.
- ⊗ We don't have the time for this.
- ⊗ Has anyone done this before?
- ⊗ What is wrong with the present system?
- ⊗ We are already doing this!
- ⊗ You don't understand the problem.
- ⊗ Talk to someone else. This is not my field.
- ⊗ We are too big/too small for this.

- Those that are external to the establishment, including:
 - ⇒ Difficulty in Accessing Cleaner Technology Information.
 - ⇒ Difficulty in Accessing External Sources of Finance.
 - ⇒ Lack of Economic Incentives.

Several factors are involved in the evaluation of the above constraints. A constraint could be significant or trivial depending on:

- The size of the establishment
- The type of ownership (public, private, joint)
- The type and cost of required modification
- The level of available technology
- The level of pollution (environmental status)

In this way, the profitability of a business will increase whilst its adverse impact upon the environment will diminish.

Whilst carrying out the industrial audits and during demonstration project implementation, the following attitudes were frequently encountered in the food processing industry, all of which will act as barriers to Cleaner Production adoption:

Waste and process losses are a fact of business - waste has and always will happen.

Valuable raw materials and recoverable product are normally **dumped, lost or treated as waste**.

Attitudes to waste, pollution and process problems are **reactive** and accepting.

The workforce not interested in issues outside of their **job description, process area, pay**.

Employees ideas are often disregarded by management.

Quality control only meets **minimal standards, customers needs** or expectations - not forward looking.

For every barrier identified there needs to be a strategy developed to overcome or ameliorate it. Otherwise, they will tend to slow down the adoption of Cleaner Production practices and slow down change.

10.1 Internal Barriers

10.1.1 Economic Barriers

Economic barriers can occur when a company believes it does not have the financial ability or sufficient incentive to implement waste minimisation.

Similarly, the low costs associated with the abstraction of water and the disposal of wastes means that there is little incentive for companies to make savings in these areas.

10.1.2 Technical Barriers

Experience in Egypt has shown that many companies are well aware of local pollution problems but have little appreciation of the wider environmental issues. However, the level of knowledge is limited so that there may be a belief that a subject is well understood but in practice is poorly applied. This problem is compounded by a generally poor quality and low availability of up-to-date technical information.

Changes in the way in which a company operates will frequently present technical difficulties such as:

- Lack of suitable information.
- Concern about changes to product quality and customer acceptance.
- Retrofitting of processes causes shutdown of existing operations.
- New operations may not work.
- There is insufficient space to easily accommodate any additional equipment.
- Adverse employee reactions.

Most of the food processing factories in Egypt do not have effluent treatment plants. Water is subsidised and hence there is no pressure on the food factories to practice water conservation. The lack of effluent treatment plants will also result in disposal of effluent to receiving water bodies or on land.

10.1.3 Cultural Barriers

Many companies are over-manned in comparison to international norms. This may lead to a lack of individual responsibility and a perception that no individual can achieve change. In many factories, this is compounded by an "autocratic" management structure with all instructions coming from the top so that workers do not accept personal responsibility for change.

Resistance to change and friction between personnel may introduce barriers and can be caused by:

- Lack of senior management commitment.
- Lack of awareness of corporate goals and objectives.
- Poor internal communication.
- Restrictive employment practices.
- Inflexible organisational structure.
- Bureaucracy inhibiting change.

There can also be a lack of communication between the different departments within the industrial establishment causing the isolation of the department responsible for environmental affairs. This is clearly a top management responsibility to make sure that all departments:

- are aware of environmental issues.
- are willing to cooperate.
- present their feed-back regarding in-process or in-plan modifications.
- are held responsible for clean environment and public health.

There is a prevailing culture throughout the industry that reflects itself in the behaviour of both management and staff. The main features of this is:

- lack of strong discipline.
- lack of tidiness and neatness.
- no concern about details and perfectionism.
- little pursuit of knowledge and information.

As a consequence:

- There is a resistance of the part of engineers who have acquired the skills to manage existing systems, to acquire the new knowledge and skills that new technology often demands.
- Housekeeping measures are not enforced.
- There is abuse of water and energy consumption.

However, the same manpower with the same cultural background is managing perfectly well in multinational companies.

10.1.4 Quality Considerations

The lack of quality (defined in this context as fitness for the purpose) of many products is low and consistency is poor. Down-graded products are common but still finds market outlets in Egypt. Where companies have export markets, customer demands often ensure that production methods are better controlled.

There is a need to establish a quality culture within companies and whilst ISO 9000 is widely recognised it is poorly understood. Too often it is regarded as a marketing aid and not as a management tool for maintaining quality, improving efficiency and reducing wastage. However, where a company is considering ISO 9000 it can be used as a vehicle to assist in implementing change within an organisation.

10.1.5 Information Dissemination

To date, information concerning Cleaner Production opportunities has not been readily available. There are no independent associations dedicated to providing technical assistance and information to industry, government departments and others involved in the industry. No formal centre exists which could serve as a clearinghouse of information and as a counselling centre for the promotion of Cleaner Production in the country.

In the dissemination of information, language can be a barrier as all documents, manuals etc. have to be translated into Arabic to ensure that the information is available to the widest possible audience.

10.2 External Barriers

In addition to the internal barriers identified, there are a number of external barriers to Cleaner Production over which firms have little or no direct control. These include:

10.2.1 Difficulty in Accessing Cleaner Technology Information

Most of the food processing sector facilities in Egypt are small and medium scale enterprises (SMEs). These are particularly susceptible to a range of complexities that undermine their ability to access new technologies, even when they may benefit financially from them.

In-plant modifications: recycling, recovery water and energy conservation can be easily implemented and understood. However, process modifications could require a level of technology too complex to be adopted by SMEs. It could require a level of personnel training difficult to attain.

10.2.2 Difficulty in Accessing External Sources of Finance

The implementation of Cleaner Production processes and technologies has been hindered by a lack of access to finance. SMEs in particular are frequently unable to make investments in cleaner technologies for a wide variety of financial reasons, the lack of available external capital being of particular importance.

10.3 Overcoming Internal Barriers to Cleaner Production Implementation

10.3.1 Economic Factors

Economic arguments are all too often the only justification given for a change within an organisation. There is little doubt that in a business sense, profitability is the most significant factor but company profits have little short term effect on the way in which individuals respond within a company.

If individuals perceive a threat to their livelihood, and there is a chance that they may lose their jobs, this will be a strong motivator as it has a direct bearing on their ability to satisfy their physiological needs for water, food and shelter. But making more money for their employers and shareholders is rarely a strong motivator and other more intangible factor such as pride, status, achievement etc. are more significant. Once people feel personally secure and safe they become more concerned with the wider environmental issues such as global warming and damage to the ozone layer. The quality of life is as important, if not more so, than the economics alone.

However, any recommendations made have to be financially sound and will include:

- Monitoring to determine the full cost of pollution control, waste management etc..
- Cost/benefit calculations and pay back periods for investments.
- Target setting, based on true data, to achieve reductions in usage of materials.
- Identification of potential liabilities through a failure to control an environmentally damaging activity.
- Details of environmental funds, customs and tax credits, fixed interest loans to encourage cleaner technologies etc. if/when these are available.
- Identification of cost savings.

Action: Reduce wastage of raw materials.

⇒ **Effect:** Raw materials costs decrease.

Action: Reduce the volumes of waste generated.

⇒ **Effect:** Waste treatment, transportation and disposal costs decrease.

Action: Reduce labour time spent monitoring and handling waste.

⇒ **Effect:** Valuable labour time can be channelled elsewhere.

Action: More efficient use of energy.

⇒ **Effect:** Reduced electricity, oil and/or gas bills.

Action: More efficient use of water.

⇒ **Effect:** Reduced water bills where relevant and potential knock-on effect regarding effluent volumes and associated costs.

Taking these actions will also reduce long-term environmental liability and insurance costs.

There are other, wider environmental benefits such as less fossil fuel being burnt at power stations, less need for landfill for solid wastes, etc..

10.3.2 Technical Factors

This is the area in which the company personnel will feel most at home since they know their business well. It is also the area in which they can be highly conservative. To overcome initial reservations, personnel will need to be shown that Cleaner Production can be very successful. This can be achieved through:

- Source of up-to-date information from within the company and outside.
- Identification of training opportunities.
- Pilot scale projects prior to major change.
- Reviews of customer requirements.
- Involvement of all relevant departments in the planning process.

- Use of well-tried technology wherever appropriate.
- Examples of successful applications in other businesses.
- Provision of work instructions, safety data sheets, "duty of care" for hazardous wastes.

Environmental management systems (such as ISO 14000 and BS 7750) also have the potential to play a crucial role in the adoption of a "Cleaner Production mindset" within business management structure.

Application of Quality Assurance techniques and methods like HACCP can have more tangible effects on consumers. Export driven industries will be interested in such environmental certificates such as ISO 14000 for competitive reasons especially when European markets are targeted. Even in the field of export aspects other than environmental are given priority Quality Assurance (QA), packaging, market survey etc.

10.3.3 Cultural Factors

A large number of surveys have been conducted in a variety of countries as to the factors which contribute to the quality of life of an individual. Invariably the list includes a number of essential factors which are in order:

- Good education.
- Clean/healthy environment.
- Personal/family health.
- Good social relationships.
- Money.
- Employment.

Individuals will also describe a wide range of other factors including moral and spiritual values, freedom, peace of mind, stable government etc.. The significant factor is that money, in itself, is not a prime motivator and companies can encourage change through a wide variety of techniques.

Recommendations to overcome cultural barriers will include:

- Company policy and management changes.
- Identification of training needs.
- Identification of incentive schemes which can include financial bonuses, recognition of achievements, "employee of the month", issue of certificates.
- Allocation of responsibilities to individuals, goal setting, timescales for change, use of staff suggestion boxes.
- Company news letters, publicity for achievements, involvement of local community.
- Education in wider environmental issues and protection of the global and local environment.
- The use of the company as an environmental "champion" to stimulate other similar companies; the formation of waste minimisation "clubs" within a geographical area or industrial sector to pool ideas and share experiences.
- Religious beliefs of relevance to the protection of the environment.

Change in Egypt, as with anywhere else in the world, will occur slowly and by a multiplicity of influences. Motivation is complex and frequently difficult to predict. It is important that any recommendations made are realistic and also consider how the changes can be achieved.

10.4 Conclusions and Recommendations

The adoption of Cleaner Production is a cost effective means to achieve higher productivity and lower treatment cost. It can be subdivided into two categories.

- Housekeeping measures and low cost modifications requiring low investments.
- Process changes requiring high investments.

Egyptian industry will choose any of these categories depending on their specific priority which will be based on:

- The status of existing technology (old or new).
- The exporting capabilities of the establishment.
- The financial status.
- The investments required for end-of-pipe treatment.

The SEAM Project promotes the implementation of housekeeping and low cost projects. The success of SEAM depended heavily the attitudes of the factories themselves. A lot of time was spent discussing ideas and modifying proposals to ensure that each factory was satisfied with the end product.

With the coming GATT agreement, Egyptian companies will be more reluctant to raise their expenses for the sake of environmental protection through end-of-pipe treatment. However, rehabilitation and replacement of old technologies can be prohibitive. A step by step approach and temporary waivers could be applied.

10.5 Organisations interested in Cleaner Technology in Food Processing

Following are some organisations that could help promote cleaner technology:

- The National Research Centre – Food technology and Biotechnology labs.
- Agricultural Research Centre – Food Technology Research Institute.
- Chamber of Food Industries, Cairo.

11.0 Promotional Strategies for Adopting Cleaner Production in Egypt

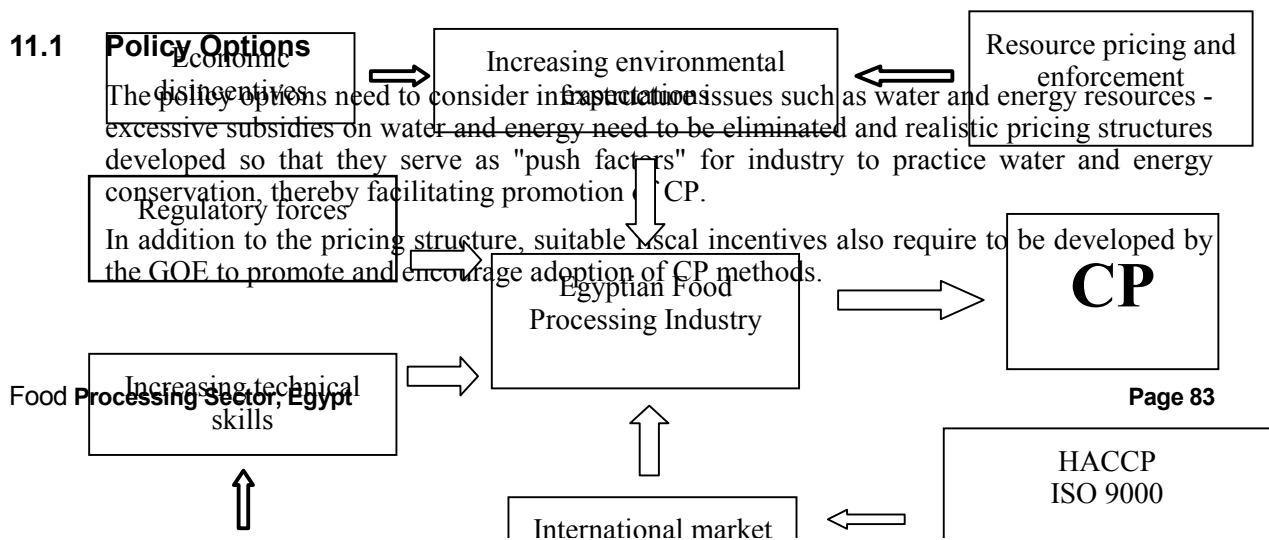
Development of a strategy for cleaner production entails identification of:

1. The "approach" to be adopted (whether product, process, technology or operation related);
2. The "options" available;
3. The "pollution prevention practice" to be adopted (for the sector, specific to Egypt) and finally;
4. The "measures" (i.e., the specific demonstration projects for each factory) that should be taken to implement Cleaner Production.

Given the barriers identified in the previous section, the shift from end of pipe approach to Cleaner Production in the Egyptian food processing industry may take a long time to implement. This delay may adversely affecting company productivity, causing environmental degradation and a threat to self - reliance. However a number of factors as shown in, may help accelerate the "push" of the food processing industry towards adopting Cleaner Production (see Figure 11.1 below).

Figure 11.1

"Push" Factors on the Egyptian Food processing Industry to move towards Cleaner Production



Policy options should target provision of subsidy schemes for SMEs for the implementation of CP options and establish a system for banning of "dirty technologies" and phasing out banned chemicals.

11.2 Company Performance Improvement

It is too early to speak definitively about company environmental performance, however there are some definite pointers of improvements. Misr for Dairy and Food for example opted to take part in a programme to improve the overall quality of its products and at the same time improve its product safety and reliability, as well as seeking a new outlet for a waste. Edfina has instituted substantial changes in the way it manages energy, which have resulted in significant improvements in its energy bills. Kaha has also made large cost savings which will add to its profitability and improve its competitive position. The HACCP project especially, despite its early difficulties, will be a valuable lead project for the rest of the food processing community to follow. Food quality will be improved, food safety will be enhanced and workers will enjoy new levels of protection and safety.

11.3 Capacity Building and Technical Assistance

The experiences from the various SEAM demonstration projects need to be disseminated across the sector. The Guidance Manuals and case studies prepared under the SEAM Project need to be disseminated to enable other factories to implement the Cleaner Production options. This will bring about a "multiplier effect" of the demonstration projects.

Awareness workshops and training programmes need to be organised for industry, government officials, industry associations in the food processing sector. The training programmes should be structured to target the following groups:

- **Senior management** of industry and policy makers and decision makers in government on the economic and environmental benefits of Cleaner Production;
- **Middle level technical and managerial personnel** in industry on production technologies, health and safety aspects;
- **Factory workers** particularly on health and safety aspects.

The GOE also needs to support development of counselling centres for Cleaner Production options targeted primarily at the SMEs.

There is a need to strengthen independent technical skills in the food processing sector, with reference to Cleaner Production. Capacity building to create a middle level of such experts is essential. Senior technical personnel from the sector who have extensive experience in the industry and who have retired from active service should be targeted for development of such a technical corps.

Capacity building for the sector should also commence at the educational institution level where food production and processing technologies, Cleaner Production etc. should be integrated into the curricula to build local technical capacity in the sector.

11.4 Impact of the SEAM Demonstration Projects

The SEAM Project has, through the implementation of the demonstration projects, facilitated the introduction of the technology component of Cleaner Production into the Egyptian food processing industry. This has resulted in demonstrating that the Cleaner Production options are credible, feasible and economical whilst enabling pollution prevention to take place.

Some of the achievements of SEAM have been; implementation of HACCP systems in Misr for Milk and Food, Mansoura and Edfina Company for Preserved Foods, Alexandria; demonstrating in all factories the financial and environmental benefits of simple, low-cost "housekeeping" interventions and demonstrating how a previously wasted substance - cheese whey - can be recovered and used, rather than being wasted to the effluent.

This however, is the first step in the promotion of Cleaner Production in the Egyptian food processing industry. From this point on the onus is on the Government of Egypt to initiate aggressive promotion of Cleaner Production. The experience from the demonstration projects has to be scaled and multiplied across the sector.

The Government of Egypt therefore needs to play a major role in providing the necessary "push" factors to enable Egypt's food processing sector to compete in the global market. These factors include:

- Developing suitable policy options.
- Strengthening enforcement strategies.
- Providing support for technical assistance in technology transfer, training and awareness, developing innovative Cleaner Production options locally for the sector and disseminating the experiences from the project across the sector.

11.5 Conclusions

The activities described in this document have demonstrated the range of improvements that have happened directly as a result of SEAM working in this sector. SEAM has assisted industry by developing **REAL** interventions which are **SUSTAINABLE** in the long term and can be easily **REPLICATED** in other factories.

Implementation of these demonstration projects has resulted in the following savings:

- 700 tpa of diesel and emissions saved.
- >1000 tpa of fuel oil and emissions saved.
- 120000kl/a of water and wastewater saved.
- Up to 9000 tpa whey and permeate saved and reused.
- Up to 200tpa of milk saved.
- Unknown savings of reject product and other quality issues.
- Many employees and consultants with a larger environmental awareness.

The factories involved have each achieved financial and/or strategic positioning savings from these simple, low cost projects. Significant environmental improvements have also been made.

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