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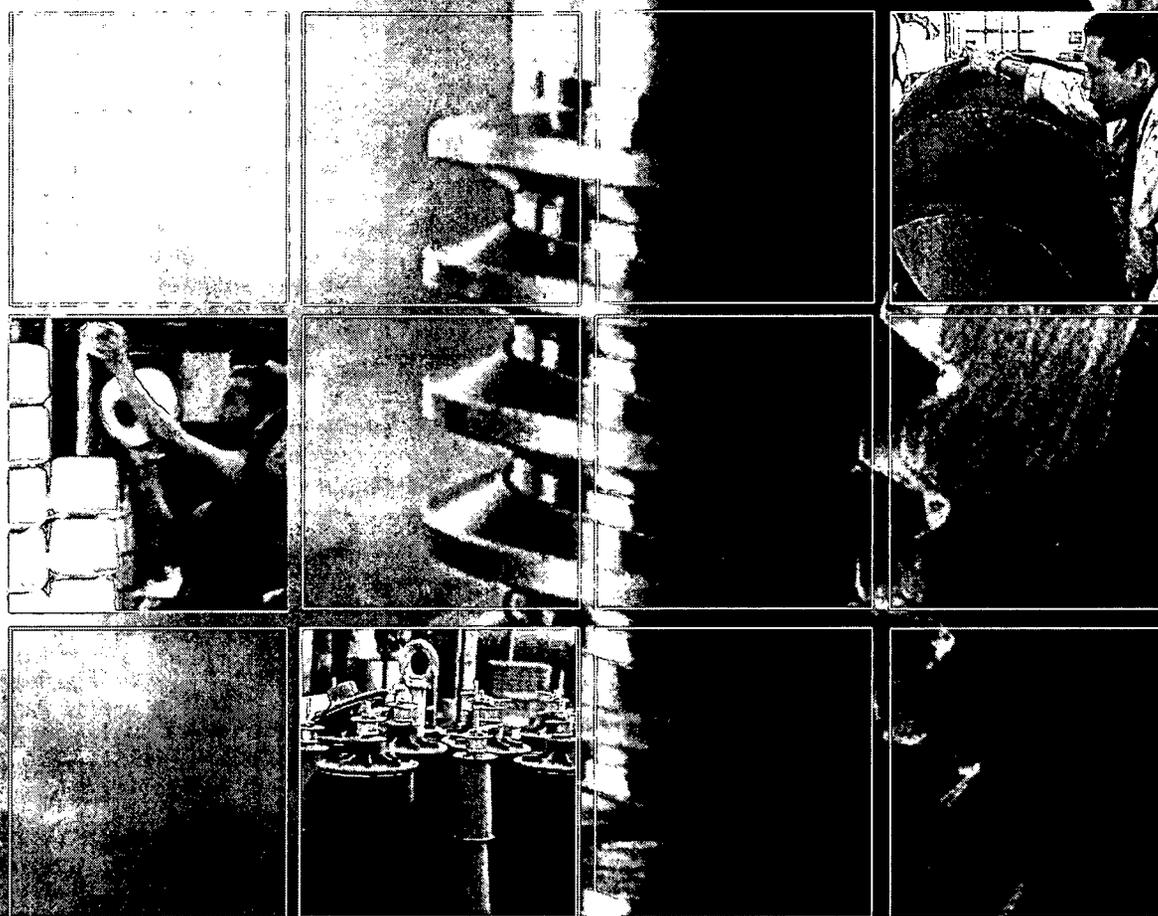
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# *Eco-Efficiency for SMEs in the Moroccan Dyeing Industry*



**BASF**



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UNIDO and the World Summit on Sustainable Development

*Eco-Efficiency for SMEs in  
the Moroccan Dyeing Industry  
(Phase I)*

*A Sustainable Approach to  
Industrial Development*



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION  
Vienna, 2002

## **Abbreviations**

<b>CSO</b>	<b>Civil Society Organization</b>
<b>NCPC</b>	<b>National Cleaner Production Centre</b>
<b>SME</b>	<b>Small and Medium Enterprise</b>
<b>UN</b>	<b>United Nations</b>
<b>UNEP</b>	<b>United Nations Environment Programme</b>
<b>UNIDO</b>	<b>United Nations Industrial Development Organization</b>

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# UNIDO Business Partnership Programme

Partnership Fact Sheet: Eco-Efficiency  
for SMEs in the Moroccan Dyeing  
Industry (Phase I)

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through Business Partnerships

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## Eco-Efficiency for SMEs in the Moroccan Dyeing Industry (Phase I)

Programme Partners:	United Nations Industrial Development Organization (UNIDO) United Nations Environmental Programme (UNEP) BASF AG, Germany National Cleaner Production Centre (NCPC), Morocco
Target Group:	Small and medium sized enterprises
Sector:	Dyeing industry
Duration:	6 months
Pilot Sample:	7 SMEs in Morocco (Phase I: February to September 2002)
Final Sample:	Dissemination to SMEs through NCPCs in 27 developing countries (Phase II: to be launched in January 2003)
Activities implemented:	<ul style="list-style-type: none"><li>• 1<sup>st</sup> technical meeting at BASF HQ (February 2002)</li><li>• 1<sup>st</sup> company assessment in Morocco by BASF for data collection (April 2002)</li><li>• Development of eco-efficiency manager software for textile dye works</li><li>• 2<sup>nd</sup> company assessment in Morocco by BASF: Application of eco-efficiency manager at company level (July 2002)</li><li>• 2<sup>nd</sup> technical meeting at UNIDO HQ (July 2002)</li><li>• Finalization of eco-efficiency manager (August 2002)</li><li>• Training of UNIDO and NCPC staff (August/September 2002)</li></ul>
Results:	<p>Process improvements (two-tier process for the dyeing of mixed fabric changed to unitary process) led to:</p> <ul style="list-style-type: none"><li>• A positive environmental impact through a decrease of energy and water consumption at constant costs</li></ul> <p>Change of chemical input (acid substitution) led to:</p> <ul style="list-style-type: none"><li>• A positive environmental impact through less hazardous acid at reduced costs</li></ul>
Project Funded and Supported by:	BASF AG, UNIDO, UNEP and National Cleaner Production Centre Morocco (CMPP)

# I. Sustainable Industrial Development through Business Partnerships

UNIDO (United Nations Industrial Development Organization) and BASF, a leading transnational chemical corporation, met for the first time during UNIDO's expert group meeting on business partnerships in October 2000<sup>1</sup>. At this meeting the idea to jointly develop a project supporting small firms in the developing countries was conceived. The business partnership building process was based on the UNIDO guide on Business Part-



nerships for Industrial Development<sup>2</sup>, which proved to be an essential tool for the design and implementation of the eco-efficiency project in Morocco.

The successful participation of any firm in global markets depends heavily on the capacity to innovate and improve its international competitiveness so as to meet requirements of potential buyers. Long-term profitability requires continuous improvement of a firm's performance to stay ahead of competitors through new, economically viable products and processes. In this context, the environmental soundness of products and production processes is becoming more and more important. Yet, small and medium sized enterprises (SMEs) often lack the know-how or financial resources to keep abreast with cutting edge technologies. While many factors that have an impact on sustainable development are beyond the direct control of the individual SME, broader business partnerships can be an important factor in inducing change.

Business partnerships provide access to specialized expertise and encourage changes among all partners - greater openness and efficiency, new ideas - which can lead to a sustainable impact on economic development. Business increasingly recognizes the benefits of such partnerships. This partly reflects the debate on corporate citizenship

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<sup>1</sup> UNIDO (2001), UNIDO Partnership with Private Business: Rationale, Benefits, Risks and Approaches; Vienna

<sup>2</sup> UNIDO (2002), UNIDO Business Partnerships for Industrial Development; Vienna

- the commitment of the business community to contribute to economic development, while at the same time behaving ethically and improving the quality of life for their workforce and society and preserving the natural environment. Moreover, many large firms now support the Global Compact, initiated by the Secretary-General of the United Nations (UN) in 1999. It provides a basis for dialogue between the UN, the business community, labour and civil society on human, social and environmental aspects of business, to ensure that globalization benefits all.

BASF was among the first transnational corporations to sign up to the Global Compact, and it is within this framework that UNIDO, BASF and UNEP have initiated a pilot Eco-Efficiency Programme for SMEs in the Moroccan dyeing industry. During phase I (February to September 2002) of this project the main objective has been to develop an eco-efficiency analysis tool so as to help small scale dyeing enterprises to produce and manufacture competitively in an environmentally sustainable manner, adhering at the same time to international standards of safe working conditions.

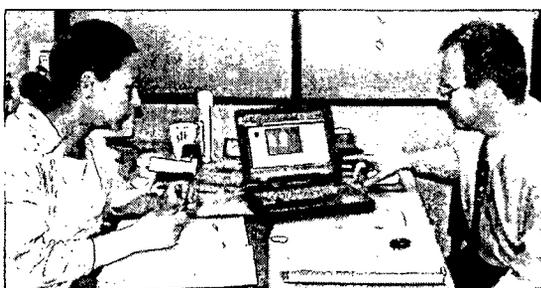
In Morocco, the dyeing industry plays a vital role, providing significant employment by many SMEs. In order to stay competitive in an environmentally sound and economically viable manner, it is imperative for the companies to continuously change and modernize their production systems. This not only requires resources, but first and foremost, access to methods of analysis and introduction of new production processes at the highest international standard. However, these technologies and methodologies are difficult to obtain and, moreover, to apply at the SME level.

Therefore, UNIDO, within its mandate of promoting sustainable industrialization, alongside with UNEP, started a partnership project with the multinational chemical corporation BASF of Germany, to develop

and disseminate an eco-efficiency analysis tool, which will eventually promote the upgrading of production processes in the small scale dyeing industry in Morocco. The eco-efficiency analysis aims at achieving a balance between environmental and economic factors in production processes: To manufacture cost-effective products with the smallest possible amount of raw material and energy use and minimised emissions. The methodology, based on exclusive know-how of BASF, is made available for the first time through this partnership to SMEs in a developing country, which otherwise would not be able to obtain and absorb cutting edge international know-how.

## II. The Approach: UNIDO's Business Partnership Programme in Morocco

The eco-efficiency analysis and training has been implemented within the UNIDO Business Partnership Programme for Sustainable Industrial Development, which seeks to support SMEs in the developing world, at the base of most economic activities, by integrating them into partnerships with large business corporations, Governments, Civil Society Organizations (CSOs) and international organizations. These partnerships facilitate the transfer of know-how contributing to sustainable industrial development and help the given industry sector, in the case of Morocco the dyeing industry, to catch up while creating a balanced economy.



In this partnership programme, BASF, the National Cleaner Production Centre (NCPC) in Morocco, UNIDO and UNEP have developed a service that achieves concrete results for the sustainable development of SMEs in the Moroccan dyeing industry. In general, business partnerships between public and private actors can effectively comple-

ment each other's development resources (technical expertise, funds, management know-how, institutional knowledge, policy advocacy, etc.). In Morocco, UNIDO, UNEP and BASF are bringing in their expertise and know-how in the dyeing industry and securing the funding of the project, whereas the National Cleaner Production Centre enables access to the target companies and ensures wider dissemination of the methodology and training of a large number of companies.

Based on the results of the pilot sample in the Moroccan dyeing industry, the eco-efficiency manager tool will be customized by the NCPC in Morocco so as to meet the requirements of a large number of manufacturing SMEs in the country. Once the adaptation and customisation is finalized, the NCPC staff will be trained on the application of the eco-efficiency manager and the related improvements at the company level. Thereafter, the service will be rolled out to as many SMEs as possible.

# III. The Pilot Application: Eco-Efficiency for Small Producers in the Moroccan Dyeing Industry

## □ **The Issue**

How can the present economic and environmental needs of society be met without compromising development opportunities for future generations? In other words, how can SMEs in developing countries establish themselves in national and international markets where it is imperative to adjust the economic and environmental performance to the needs and requirements of their potential buyers? Finding this balance is essential for achieving sustainable industrial development and particularly pertinent in developing countries.

As there are numerous alternatives of organizing production processes, it is almost impossible for SMEs to comprehensively assess the environmental impact of their production and at the same time know all the economic implications which a change in their processes or inputs might have. Moreover, most SME are not aware of alternative production processes and accessible technologies which could help them meet the double target of producing in an economically viable and environmentally sound manner.

In order to support SMEs in their efforts to meet international standards and improve their production processes, the eco-efficiency analysis used in this programme assists in the development and optimization of production processes while considering commercial and environmental aspects at the same time. The objective is to identify production processes yielding the best environmental performance at the lowest cost possible. In this respect, the eco-efficiency analysis is a strategic instrument, which assists SMEs in their selection of the most cost-effective and environmentally sound production processes.

## □ **The Methodology<sup>3</sup>**

The first step of an eco-efficiency analysis is to define a specific benefit by comparing economic and ecological advantages and disadvantages across several product or process solutions which can fulfil the same function. This means that products are not compared with one another in overall terms but rather their performance in applications such as "painting a square meter of furniture front" or "dyeing 1000 pairs of jeans". It is important that the analysis is conducted from

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<sup>3</sup> For a more detailed elaboration, see: Saling, P. et al., Eco-efficiency Analysis by BASF: The Method, in: International Journal of Life Cycle Assessment, June 2002.

the point of view of the final consumer since eco-efficient solutions provide consumer benefits better than other alternatives, in terms of costs and environmental viability.

The eco-efficiency analysis focuses on each phase of a product's life cycle, "from cradle to grave", beginning with the extraction of raw materials from the earth up to the recycling or waste treatment after use. The basis of the analysis is a life cycle analysis according to standard ISO 14040 et seq.

The analysis allows, for example, to measure the pollution of the environment due to the products used. The usage behaviour of the final consumer together with the various possibilities for reuse and disposal are also analysed. In addition, the entire economic picture, including costs, is recorded and the economic and ecological advantages and disadvantages are compared.

#### □ The Indicators

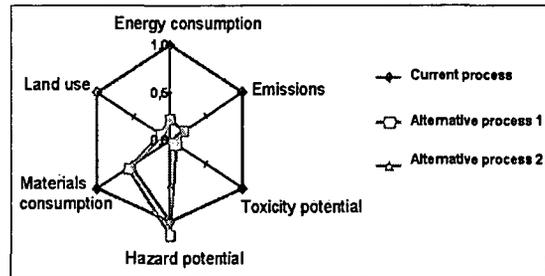
The environmental impact encompasses six categories, which together constitute what is called the "ecological fingerprint" (Fig 1). The six categories include:

- consumption of raw materials,
- consumption of energy,
- land use,
- emissions into air, water and soil (wastes),
- toxic potential of the substances employed and released, and
- potential for misuse and hazard potential.

Each of these six categories covers a large number of detailed individual criteria, which are assessed by so-called relevance factors. These state how strongly individual criteria contribute to the overall environmental pollution, i.e. how ozone destruction potential is weighted relatively to the greenhouse warming potential. The availability and natural occurrence of raw materials is also

included in the calculation. The overall pollution of the environment by a product or process is given by the combination of the individual categories.

Figure 1 The Ecological Fingerprint



In parallel the economic data are put together. For this purpose the material and energy flows, including all relevant incidental flows, are taken into consideration. Also, labour and machine costs are included. Weak points, driving costs and areas affording potential for cost reductions can therefore be readily identified.

#### □ The Benefits

In the textile dye works industry, three important production steps take place:

- Pre-treatment of the yarn or fabric,
- Dyeing, and
- Post-treatment

For each step, chemicals, energy and water are needed, while emissions and solid wastes possibly occur.

The result of an eco-efficiency analysis makes it possible to identify weaknesses in the aforementioned production processes. It allows the identification of factors within those processes whose optimisation would result in distinct improvements, thus creating an alternative production process.

The eco-efficiency analysis permits a condensed presentation of the economic and environmental impacts of a given production process. The impact of a current process,

of which companies are often only vaguely aware, can now be presented in visual terms. Moreover, detailed information gained from the analysis permits simulation exercises as a basis for the selection of alternative production processes. Background information on costs and environmental aspects of a production process from the company's perspective are represented as clear images, and therefore can be used easily for the actual decision making process.

Moreover, a consistent implementation of the eco-efficiency tool shows the company where costs can be saved (e.g. by lower consumption of resources). Opportunities and threats in current and prospective businesses can be identified at an early stage and systematically documented. Thus, the analysis can contribute to constant improvements directed towards increased profits and customer benefits.

The global market increasingly puts pressure on companies to take the ecological (and social) dimensions of their production processes into consideration. Therefore, it will be increasingly important to use an operational tool to check both the ecological and economic efficiency of a company. There are clear signs that sustainable action at the company level will grow into a decisive competitive advantage.

In summary, through the application of the eco-efficiency analysis, SMEs are able to:

- Capture, calculate, evaluate and then transparently depict even complex matters within the production process;
- Improve their decision-making relating to alternative production processes;
- Facilitate communication with customers and consumers;
- Increase acceptance of defined solutions to problems;

- Promote understanding for thinking in overall contexts; and
- Prove and illustrate acceptance of corporate responsibility principles.

□ **Case studies: Two Moroccan pilot companies in the dyeing industry**

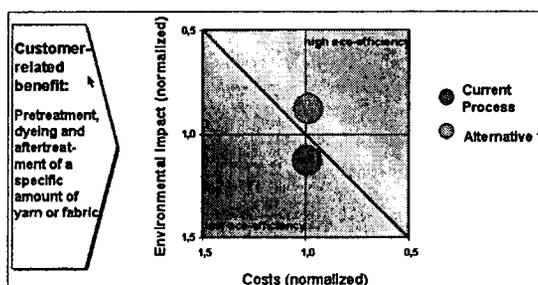
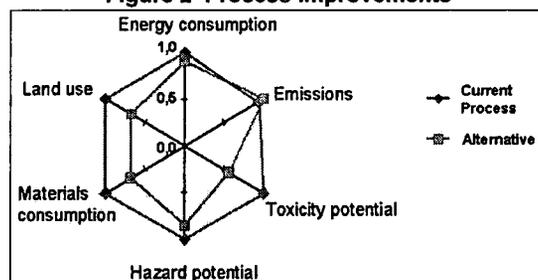
Example: Process improvements

A two-tier process for the dyeing of mixed fabric was changed to a unitary process. This was made possible through the use of a new chemical substance (Fig 2).

Results:

- The purchase of this new chemical substance was more expensive than that of the traditional chemical. However, through more efficient use of energy, water and personnel the overall costs remained unchanged.

**Figure 2 Process improvements**



- Through the decrease of energy and water consumption a positive environmental impact was measured in almost all environmental categories.

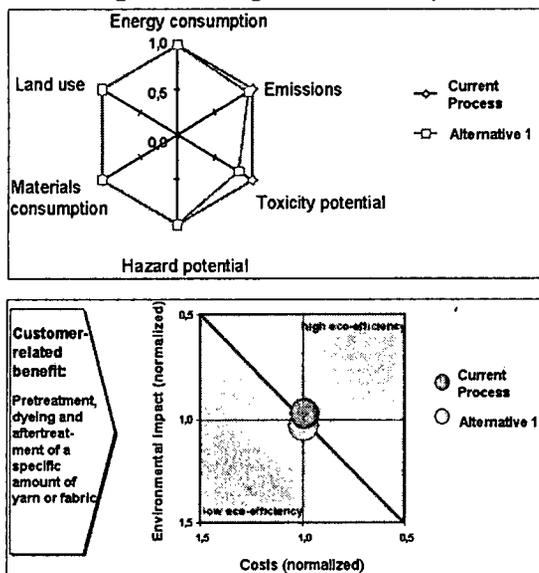
Example: Change of chemical input

In this case, a hazardous acid was substituted by another, less harmful acid in the production process (Fig 3).

Results:

- The substitution of acids achieved cost savings.
- Since the newly used acid had a different, less hazardous, classification, the substitution had a particularly positive impact on the environmental category "toxicity potential".

Figure 3 Change of chemical input



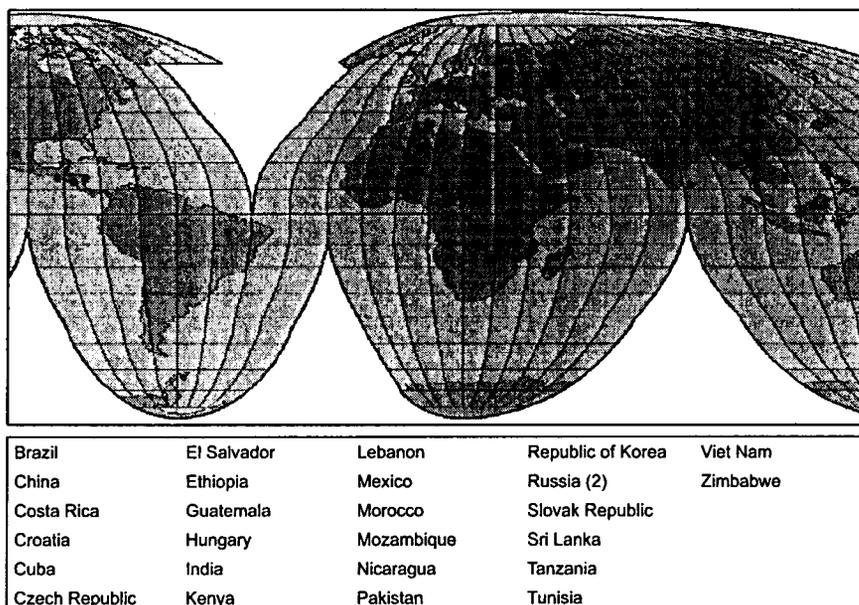
## IV. The Way Ahead

As soon as the CD-rom based eco-efficiency analysis tool is readily adapted and customized for Phase I of the project in Morocco, BASF, will provide training to UNIDO/ UNEP staff enabling them to prepare a version of the tool intended for a wider dissemination to SMEs in developing countries.

In Phase II, the network of the National Cleaner Production Centres, jointly managed by UNIDO and UNEP in 27 developing countries, will function as the base for further outreach of the programme and as the

institutional anchor of the related training services on eco-efficient production systems and processes. BASF will support the training on eco-efficiency analysis of UNIDO staff at Headquarters and in the NCPCs by organizing joint events, e.g. workshops and symposia. This joint work will not only build up a new sustainable service for the NCPCs but will eventually support the build-up of cutting edge know-how and capacity at the NCPCs, which will further foster the outreach and sustainability of this unique service.

Figure 4 World-wide Network of 28 NCPCs



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This project was inspired by  
the Global Compact



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