

## **SUSTAINABLE PRODUCTION METHODS IN THE COFFEE CHAIN AS A STRATEGY TO GAIN COMPETITIVE ADVANTAGE WITH SPECIAL REFERENCE TO A COSTA RICAN CASE**

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### **SUMMARY**

Policies aimed at improving governance, providing stable legal and financial frameworks and prudent attention to the macro economy have been seen as essential to the task of promoting the emergency of robust market systems in Latin America and the Caribbean (LCA). However, it is increasingly evident that such policies do not always elicit the intended supply-side response in the form of increased competitiveness. Yet the ability of enterprises to survive and grow in the face of competition is ultimately where the battle for “national competitiveness” is won or lost. As in other LCA countries, small and medium sized organizations in the Costa Rica coffee sector are faced with a growing demand from overseas clients to deliver high quality and safely produced goods and services on time, in the correct quantities and at competitive prices. Moreover, this sector starts to face a wide range of international standards, which are increasingly required for access to international and regional markets, such as the European Union. The majority of these standards are related to quality and the environment. However, other standards related to labor, health and safety are also projected to grow in importance, such as green labels for organic production methods, HACCP and the Good Agricultural Practices which are defined by the European food industry.

This paper focuses on experiences obtained in the Sustainable Coffee Project (SUSCOF Project) in Costa Rica, which aim is to create sustainable production systems throughout the coffee chain that are flexible enough to adjust to changing requirements. During the last two years, the involved Costa Rican coffee cooperatives have been working hard on implementing environmental management systems in their coffee mills, based on the ISO 14001 norm, which is expected to be certified at the start of 2001. However, in the view of those responsible for the SUSCOF project, being certified according to ISO 14001 is not a license to take it easy. The certification of the environmental management system with ISO 14001 will be a great help in showing what such an advanced position implies in highly practical terms. However, the key word of the ISO 14001 norms is continuous improvement, which implies

that those who sell SUSCOF coffee will represent an advanced position on the road towards sustainability. This means constant improving oneself.

Continuous improvement is greatly helped by generating (preferably) quantitative information on how processes are evolving and whether the professed goals are being met. This type of information is just scarcely available in Costa Rica, which creates a limiting factor for the involved cooperatives to define objectives that will result in significant improvements in their environmental performance. Methods such as defining and measuring Environmental Performance Indicators can be used for this purpose. ISO 14031, a guidance document of the ISO 14000 standards about environmental performance evaluation, has been chosen as main reference for the next stage of the SUSCOF project: the creation of environmental performance indicators that will help the participating coffee cooperatives define their environmental improvement programs. Through the time, the measurement system used should be refined in order to obtain more precise indicators, which will be useful to achieve strategic effectiveness, so that an increasingly integrated body of data is shaped to meet specific objectives, and reprocessed into multiple outputs for various audiences among other product chain members.

## **1. INTRODUCTION: THE GROWING IMPACT OF STANDARDS, CERTIFICATION AND ACCREDITATION**

Policies aimed at improving governance, providing stable legal and financial frameworks and prudent attention to the macro economy have been seen as essential to the task of promoting the emergency of robust market systems in Latin America and the Caribbean (LAC). However, it is increasingly evident that such policies do not always elicit the intended supply-side response in the form of increased competitiveness. It is the ability of individual enterprises to survive and grow in the face of competition that will ultimately determine whether the battle for “national competitiveness” is won or lost.

Due to accelerating flows of trade, foreign direct investment and global production sharing, small and medium sized enterprises (SME) in LAC such as Costa Rica find themselves confronted with a mixture of challenges and opportunities. A major challenge of increasing importance is the growing demand from overseas clients to deliver high quality and safely produced goods and services on time, in the correct quantities and at competitive prices. Among these is the need to demonstrate compliance with a growing number of international standards and technical regulations. Such compliance is demanded by a growing number of domestic buyers, including governments, and is therefore an increasingly prerequisite for entering regional and international markets. The majority of these standards are related to quality and the environment. However, other standards, in particular those pertaining to labor, health and safety are also expected to grow in importance.

A standard can be defined as a document approved by a recognised body, which recommends voluntary rules and guidelines concerning the characteristics of products, processes or methods. Standards promote trade and commerce by transmitting information in a consistent way and permitting comparisons of products and services. Moreover, standards allow

economies of scale, promote the efficient use of parts and components in production, facilitate the diffusion of technology, and can promote product quality and safety and environmental cleanliness. Standards are of growing importance to trade, commerce, and the diffusion of technology. Rapid liberalisation drives the demand for harmonisation and adoption of international standards and related procedures, as does the desire to contain the global consequences of environmental degradation. Yet participation by several LAC countries, among others the Central American countries, in the international standardisation process remains low, and the costs in terms of foregone trade and investment have only recently been a matter for policy discussion (IADB, 1999). For several smaller countries, standards compatibility and conformity have only recently become important issues. One reason for this is that standards did not play a major role in the raw material and primary commodities sectors which have dominated the export structure of such countries. However, due to growing consumer concern on food safety (as well as fairness in trade), the food industry in major consumer markets in Europe and the United States consider it of critical importance to safeguard and enhance consumer trust in the products offered. This affects directly the many SME in LAC producing agricultural export commodities, such as the Costa Rican coffee sector.

## **2. THE CHANGING ENVIRONMENT OF THE COSTA RICAN COFFEE SECTOR**

Since the beginning of the nineteenth century, coffee has been one of the principal sectors driving development in Costa Rica. Nowadays, the sector accounts for approximately 15% of the country's export income, which correspond with 3% of the world trade of *Arabica* coffee. The majority of the Costa Rican coffee farms are small to medium sized (10 to 15 hectares). As to the level of modern technology used in the coffee cultivation and the coffee processing, Costa Rica finds itself in a leading position in the region. Since the 1960's, cultivation techniques have been modernised and 'traditional' coffee plants have been replaced by higher yield varieties, which resulted into higher densities per hectare, ranging from 1600 trees per hectare in 1955 to 3400 trees in 1980 (Blanco, 1999). The current intensive coffee production in Costa Rica is characterised by improved husbandry techniques, such as high-density planting, pruning, intensive use of fertilisers and pesticides, and replanting with high-yielding drought-disease resistant varieties. The advanced production and processing methods resulted at the beginning of the 1990's into an average production of 1,610 kg of coffee/ha., which is considerably higher than the average production in El Salvador (920 kg./ha) or Guatemala and Honduras (690 kg./ha.) and has since then increased. A negative consequence of these intensive production methods is the significant amounts of pesticides and fertilisers used on the plantations and the impact this has on soil pollution and soil erosion.

Following the coffee chain, the Costa Rican farmers generally sell their coffee after harvesting as fresh cherries to small and medium sized private or co-operative coffee mills called "beneficio" (in 1995/1996 a total of 76,819 farmers sold their coffee to a coffee mill (Blanco, 1999)). Over the last decades the Costa Rican milling process has gone through a number of important changes. After the Second World War the properties mainly owned by German residents were expropriated. This resulted in a significant loss of relatively simple technology

that was used for decades (Blanco, 1999). However, the high coffee prices in the 1950's made it possible to import new equipment. The investments resulted in the construction of coffee mills in which both the wet and the dry process are integrated, implying that in the mills the coffee is processed from coffee cherry to the exportable coffee bean. The red cherry is changed into a green-dry-bean by using large de-pulping machines, fermenting tanks, washing channels and drying facilities, the latter being done both in a natural (sun) and mechanical way (ovens and drying machines). To date, Costa Rica counts 95 coffee mills, located in five different coffee production areas. The total production capacity of these coffee mills is approximately 156 million kilograms of green coffee. Regretfully, when designing and constructing the mills, the environmental effects and energetic efficiency were not considered important variables. Because of this, the milling process has caused (and still causes) severe environmental problems at local level. Significant environmental impacts relate to excessive consumption of energy, water, and firewood, as well as to the production of big volumes of organic waste (pulp) and highly polluted waste waters.

This would not have affected the competitiveness of the Costa Rican coffee sector in the international market, if this market had not changed considerably over the last decade. Between 1958 and 1991, international coffee sales were regulated by international treaties which followed the principle of "finding a reasonable equilibrium between the world offer and demand of coffee, assuring fair coffee prices for the consumer and producer". However, for the last four agreements such an equilibrium could not be achieved. On the contrary, production was higher than demand, which resulted at the end of the 1980's to the abolishment of the regulatory system of export quota. As a result, international coffee prices dropped to an all-time low of less than 200 dollar cents per kilogram. This decrease in price also led to change on the consumer market, since consumers gained easier access to higher quality coffees, which were offered for relatively low prices. As a result of all these developments, the Costa Rican coffee sector found itself mid 1990's confronted with the following situation:

1. Continuous increase of area used for the cultivation of coffee
2. Increasing use of agro-chemicals
3. Increasing costs of production
4. Increasing productivity
5. Overproduction of coffee in the world
6. Decreasing market price, even below cost level
7. Changing consumer preferences

Additionally, the growing awareness of the environmental problems caused by the coffee production - *inter alia* articulated by conservationists and their organisations - resulted in recent years into stricter environmental legislation. In order to prepare the sector for the legal criteria they had to comply with, the Costa Rican coffee sector and governmental bodies agreed in 1992 on a five-year action plan. This five-year plan demanded that the coffee mills would implement different technical devices, which strongly reduce the consumption of water in the mills and the emission of waste-water into the rivers. Altogether, the market development combined with the increasing pressures exerted by NGOs and the government concerning natural resource conservation, made the coffee sector aware of the need to change course, and stimulated among the actors in the sector an interest in seeking solutions that would be environmentally sustainable, without having an adverse effect on the level of productivity and

the quality of the grain. Small and medium-sized producers-processors, as well as large centers or processing companies, have initiated, with the support of leading national institutions and the participation of suppliers of technical services and machinery, a gradual re-conversion process to render coffee production less polluting. This has led to modifications in the processing line, which permits a reduction in the negative environmental impact of activities, reduces operational costs, improves performance, and maintains an acceptable quality. The plan has largely been carried out, given the obvious investments in technologies such as water-saving depulping equipment and ponds to treat the waste waters. However, just adjusting certain parts of the production process responding to regulatory requirements, resulted not to be sufficient to meet the needs of the consumer markets and to differentiate from other coffee selling countries in the region. The Costa Rican coffee sector was also faced with growing demand from overseas clients to deliver high quality and safely produced goods and services on time, in the correct quantities and at competitive prices.

Also, the Costa Rican coffee sector has been faced with the upcoming importance of a wide range of international standards, which are increasingly required for those who wish to get access to regional and international markets, such as the European Union. Examples are ISO 9000 and 14001, green labels for organic production methods, HACCP and the Good Agricultural Practices, which have been defined by the European food industry. To support the coffee sector in creating up new market opportunities, the Sustainable Coffee Project (SUSCOF Project) was defined. This project has taken a broad approach in order to take different aspects of sustainability and quality into account. In fact, it aims on creating sustainable production systems throughout the coffee chain (taking into account the various aspects of sustainability (environmental, social and economic aspects) in such a way as to be flexible enough to be able to respond effectively to present and future requirements.

### **3. THE SUSTAINABLE COFFEE PROJECT**

The Sustainable Coffee Project (SUSCOF) is a common endeavour of the Consortium SUSCOF RL, consisting of seven Costa Rican co-operatives of coffee farmers, the Dutch-based Institute for Sustainable Commodities (ISCOM) and the Costa Rican Centre for Technology (CEGESTI). The project (through different consecutive contracts) is being financed by funds from the Sustainable Development Agreement between Costa Rica and The Netherlands as well as the Netherlands Ministry of Environment, along with considerable in-kind contributions from the different involved partners.

The project is based on a chain-oriented management approach aimed at reaching continuous improvements in the subsequent production processes of the coffee chain. Applying this approach to the Costa Rican coffee sector generated a new perspective. Environmental problems were traditionally regarded as mainly technical problems that had to be improved due to upcoming national or international regulation. By prescribing a set of machinery or concrete methods, the coffee sector was believed to be capable of curtailing and controlling its environmental impacts sufficiently in order to meet the regulatory requirements. However, to be able to meet the market requirements and to be able to differentiate, a change had to be

made in order to come to integrated solutions i.e. that are preventive in nature and cost-effective. Environment had to be seen as a managerial problem in the first place. That means accepting responsibility, not only for the installation of certain prescribed inputs but also for the organisation's eventual environmental performance. To fulfil this responsibility, it was considered to be necessary to set priorities and develop verifiable improvement programs. To substantiate this vision and to assess the organisations' environmental strengths and weaknesses, an overview of all relevant environmental effects for each of the seven co-operatives of the coffee cultivation and milling processes was needed, so as to assess the latter's environmental strengths and weaknesses. This led to seven Initial Environmental Reviews which made it possible to quickly make recommendations as to how the most pressing environmental (including human health) problems could be addressed.

Observing the common state of the cooperatives at that time, one could state that they were ill equipped to meet the requirements of international environmental standards on environmental care. Most of them had little or no experience with any management systems while accounting practices were restricted to formalities required by the government. Managerial experience with documentation was slight at best, as witnessed by rudimentary or non-existent accounting systems. However, the seven co-operatives sensed a need for change if they wanted to survive on the long term. In order to reach an improvement of competitiveness, the change process had to start with the most elementary approaches to workplace improvement and good housekeeping.

It was considered that ISO 14001, if implemented in a prudent and cost-effective way, would be a major tool of learning and change, particularly for organizations just at the beginning of launching a program of continuously improving the quality and environmental record of its processes and products. For this reason, it was decided to implement environmental management systems (EMSs) based on the ISO 14001 norms in the coffee mill of each of the seven cooperatives. The EMS implementation started in April 1999, and it is expected that at least 6 mills will be certified during the 2000-2001 harvest. To date, the implementation process has already given the co-operatives a better insight into their environmental performance and resulted in efficiency improvements of the production processes causing a considerable reduction in particularly water and soil pollution.

A next step was defining environmental management activities at farm level, since the coffee quality and environmental impact of coffee production depends on the way the field is managed. The seven cooperatives together cover an area of over 18.000 ha. of farm land, owned by approximately 9.600 farmers. ISO 14001 includes procedures pertaining to the environmental aspects of purchasing. In the case of coffee, the coffee farmers are the mills' main suppliers. To get insight into the common practices of the farmers, a monitoring system based on different criteria related to quality, environment and human health was developed. The parameters for the monitoring were derived from the "Good Agricultural Practices" that had been formulated by a group of European food companies. A survey, the so-called Ecomonitor, has been set up, involving a significant number of farmers, so as to gain insight into the environmental performance of the coffee farmers and the available data related to it. This information will make it possible to define improvement programs for each cooperative in order for the farmers to improve their environmental performance and to comply on a

medium term basis with the Good Agricultural Practices (GAP). The programs defined and monitoring system used, will be part of the EMS of the coffee mills, and as such incorporated in the yearly external audit for the renovation of the ISO 14001 certificate.

The management aspects of environmental care are not only operational in nature but certainly have significant strategic components. In particular, the application of advanced environmental technology and processes are more rewarding if these are communicated to the market with a view to increasing the sales and ensuring a premium price. Originally, the sales aspect was given thought within the framework of discussions with one big roaster/retailer in the Netherlands, AHOLD. In a latter stage, this changed towards a broader market approach by reaching potential clients in different market segments, and the building up of a sales organization at the level of a consortium. In the past the co-operatives to a large extent were not involved in the commercial side of the coffee business. As soon as they had processed the coffee, they sold it to middlemen, being satisfied with the certainty of immediate cash flows. The growing concern about the origins of the coffee by overseas clients during the last decade made coffee farmers and their organizations more aware of the prevailing environmental and social conditions under which they produced their coffees. A strategic answer to this required a direct link with overseas clients so as to present one's own special product qualities and to directly respond to their preferences. This idea was taken up in the project in order to develop it into the sales of a coffee that is produced under a consistent and verifiable sustainability regime.

The project represents a clear contribution to sustainable development, both from a national point of view (Costa Rica) and an international point of view (roasters and consumers in Europe are made aware of the importance to accept their responsibility for the environmental, social and economic conditions under which the products they sell are being produced). The activities already implemented in the project has resulted in that those who sell SUSCOF coffee represent an advanced position on the road towards sustainability. Nevertheless competition is not sitting still. Already other Costa Rican but also Guatemalan coffee producers have shown their interests in implementing comparable adjustments in their organizations. If the cooperatives of the SUSCOF consortium want to keep their leading position, they have to improve themselves continuously. The ISO 14001 will be a great help in showing the consequences of choosing for such a position and to act accordingly. Nevertheless, during the coming phase, it will be important to see that the co-operatives participating in the project do not just meet present market needs, but stay on top of future developments and opportunities to improve using a set of sustainability indicators to facilitate the decision making process. To be certified with ISO 14001 and meeting the requirements as defined by the GAP is just the first step to sustainability. The core of the environmental management system is continuous improvement, which is the greatest challenge the cooperatives will have to face during the coming years.

#### 4. BUILDING ENTERPRISE COMPETITIVENESS THROUGH CONTINUOUS IMPROVEMENT

There remains a lack of insight as to what management standards imply and what they actually deliver. It should be realized that ISO 14001 focuses on processes rather than products. Conformity to these standards certify that an enterprise has put in place a documented environmental management system and can demonstrate this through repeated audits. However, conformity does not guarantee extraordinary positive environmental performance. However, it can provide buyers with greater confidence because they know that a system is in place that at least observes environmental regulations and requires the discipline to implement and maintain such a system. One of the most useful aspects of the ISO 14001 standards is that they provide consumers and producers with useful and predictable information concerning relevant characteristics of products, testing methods and services. Measurement and monitoring are critical factors in determining the quality of an environmental management system, both internally and externally. However, universal metrics to verify and evaluate what “soft” standards like ISO 14001 bring about, do not exist. They do not necessarily produce precise information on products, processes, services, quality, environmental impact, or methods, as in the case of a product standard. Therefore, ISO 14001 seems to resemble a set of guidelines or principles rather than being a fully objective standard. Some may object that these management standards do, in fact, contain an exhaustive set of requirements, which all firms must meet.



Figure 1: Interpretation of the ISO 14001 cycle.

In practice, ISO 14001 can be very flexible and adapted to a firm’s special circumstances. It is this flexibility that permits the certification of a wide range of enterprises, regardless of size or type of business. The key requirements of implementing ISO 14001 are captured in the



expression “write down what you do, and do what you write down”. In essence, a documented management system, either in the field of quality or environment, must be in place, and its implementation and application must be verified by means of external audits. Nevertheless, the norms will make a substantive contribution to the greening of industry only if and in so far as companies are committed to continuous improvement. Without such a commitment the norm will eventually become static ends in the form of improved visibility and a “seal of approval” for market access. If managers do not understand what ISO 14001 means and what it can deliver, they may go through the motions without bringing about any real change for the better. Such a lack of understanding would make the building of documentation systems according to ISO 14001 a very expensive public relations exercise. Therefore, the implementation of a system according to ISO 14001 for SME should be directly linked with the execution of a substantive and verifiable program of continuous improvement.

Good management is the key variable among the many that influence enterprise competitiveness and continuously improvement capacity. It is management that is responsible for creating competitiveness by continuously improving quality (including environmental quality) and containing the costs of production. The central role of quality is not new, it has become part of the vocabulary of business since the phenomenal export success of Japanese and other Asian manufacturers in the 1970s and 1980s. The success of the quality movement can be seen by the degree to which many of its key principles have been internalized in the world’s most successful firms. Different programs and ideas can be identified, such as Total Quality Control, Business Process Reengineering and Total Quality Management. However, they are all based on the same underlying core principle of “continuous improvement”, a process whereby management utilizes all human resources and relevant information to produce a constant stream of improvements concerning all aspects of consumer value. This continual flow of improvements includes many attributes such as quality, functional design and timely delivery, without sacrificing cost reduction. In practice, the world’s most competitive firms simultaneously address technical activities in such a way as to produce a continuous flow of value to the customer, which is the total value a person gains from the use of a product or service, minus what he or she must give up in order to use, acquire, or dispose of it. Price is only one sacrifice made to obtain and use a product. Customer value includes price as well as a range of non-price sacrifices associated with a purchase. These include the costs in time and money for repairs and maintenance, risks and problems associated with using a product, time spent learning to use or purchase a product, or after-sales service and information, but also the health and safety risks associated to the product while produced and when used. Even in the case of agricultural and other primary commodities that are subject to a severe price competition, there remains scope for producers to increase customer value (i.e. to reduce non-price sacrifices) as part of their competitive strategy.

There are several reasons why continuous improvement offers SME a very cost effective way of improving their competitiveness. First, disciplined management is the key variable in any enterprise, and is among the scarcest resources anywhere. Costa Rica has made significant strides in producing well-trained engineers, management specialists, and business specialists. This is the raw material for the management poll, which must drive the process of continuous improvement. Secondly, the soft technologies of continuous improvement are not scale-specific – they can help create customer value in any enterprise, of any size, in any sector.

Continuous improvement, therefore, is a feasible option for SME; it could even bring down break-even points while improving quality – thus presenting the possibility of targeting new growth and niche markets. This approach is also valuable in economies characterized by slow growth, such as Costa Rica and most of its surrounding countries, because it is effective for reducing costs, which is often easier to achieve in the short run than raising revenue. Third, continuous improvement may extend the useful life of machinery because of fewer equipment failures and reduced down time.

Fourth, progress is endogenous to the firm in that it relies on managers and all members of the enterprise or most improvement. Fifth, continuous improvement stimulates a new form of learning in production, by which management can exploit site-specific information by transforming it into a steady stream of improvements in lower cost and higher customer value. Sixth, SME engaged in continuous improvement are better prepared to enter into a range of partnerships and supply arrangements with other local and global firms. Global outsourcing in its varied forms is growing at an exponential rate. This subcontracting has often been associated with low wage assembly operations, but the world's largest firms are increasingly outsourcing certain manufacturing operations and related services. Managers with a good understanding of the principles of continuous improvement will also be better able to adopt the management system standards defined by the ISO norms in a cost effective and value-adding way.

## **5. ASSURING CONTINUOUS IMPROVEMENT USING THE ENVIRONMENTAL PERFORMANCE FRAMEWORK OF ISO 14031**

Achieving continuous improvement, starts by generating quantitative data on the organization's materials flows, their inefficiencies and their potential for improvements. Although there are different frameworks available- such as codes of conduct and checklists of relevant issues- the ISO 14031 related to environmental performance evaluation (EPE) seems to be an interesting point of departure for the development of environmental performance indicators for the SUSCOF project. The central feature of this norm is a definition and detailed discussion of three basic types of indicators that can be used for environmental management. It firstly distinguishes between 'environmental condition indicators' (ECI's) and 'environmental performance indicators' (EPIs), and then subdivides the latter between 'operational performance indicators' (OPIs) and 'management performance indicators' (MPIs) (ISO, 1999).

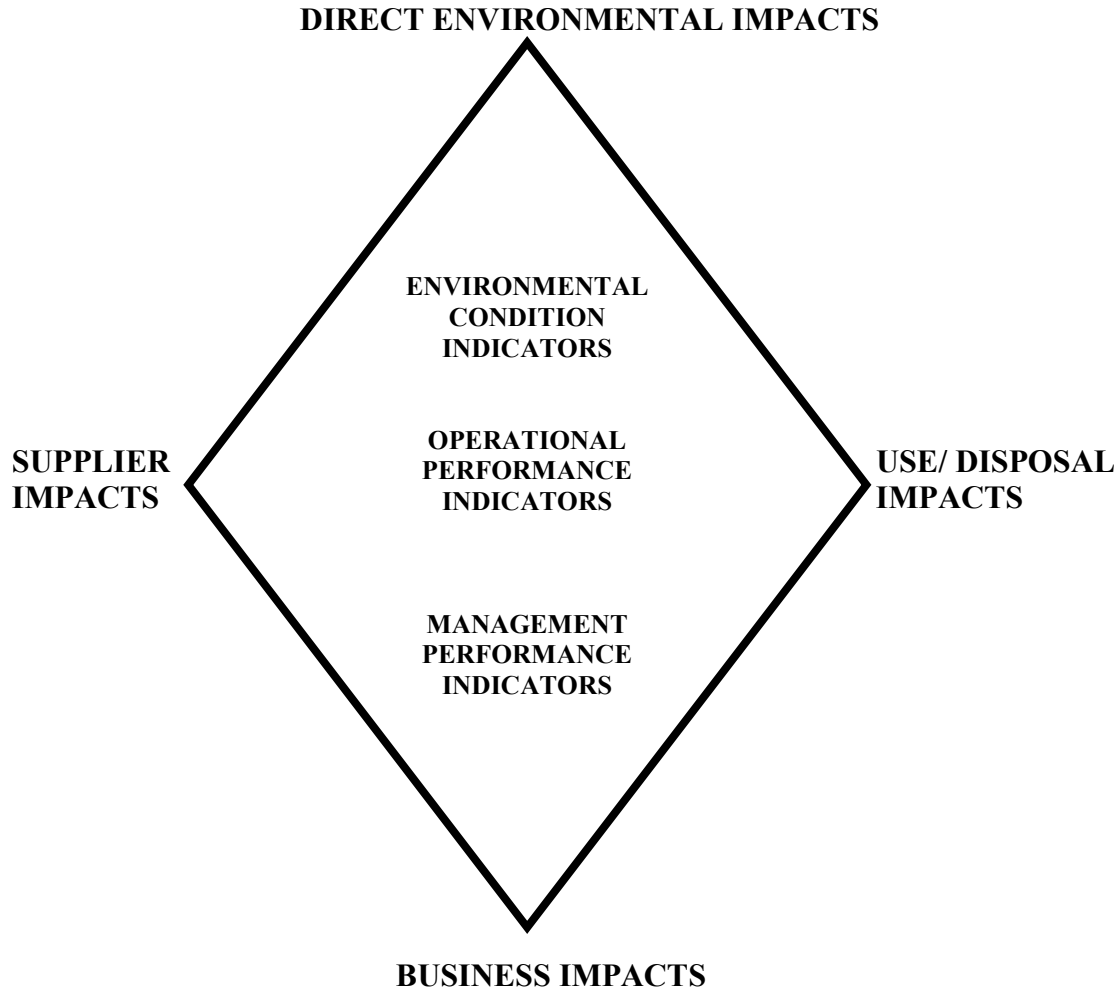


Figure 2: The environmental performance evaluation diamond.

The ECIs provide information on the local, regional, national or global condition of the environment. The OPIs provide information on the environmental performance of an organization's operations. These indicators can be divided in five sub-categories: inputs of materials, energy and services, the supply of inputs, the design, installation, operation and maintenance of the physical facilities and equipment, outputs of products, services, wastes and emissions, and the delivery of outputs. Finally, the MPI is an environmental performance indicator that provides information about management's efforts to influence an organization's environmental performance. This can include policies, people, planning activities, practices and procedures. ISO 14031 identifies seven criteria for assessing indicators: whether they are representative, responsive to change, helpful to prediction, relevant, cost effective, target-related and comparable (Bennett and James, 1998). Of course the value of high quality indicators has to be weighed against the cost of producing them. Certainly in the early stage, it is better to begin simple, readily understood measures and develop them over time.

The ISO 14031 norms will be an important element in the continuous improvement process of the EMS of the cooperatives, since the selection and use of appropriate indicators will enable

them (and their outside stakeholders) to ascertain the effectiveness of their EMS in generating genuine improvements in environmental performance. Hence, ISO 14031 is a welcome and potentially very valuable component to current EPE, but it also has a number of limitations, such as the excessive complexity and the limited emphasis on standardization. The ability to make comparisons between sites, organizations and industries which permits standardized performance data, is an important stimulus of performance improvements, especially for organizations such as the coffee cooperatives involved that act in an environment with a lack of data available. Regretfully, ISO 14031 does not really address the two central issues of standardization: the scope of what is to be standardized and, once this is determined, definition and measurements protocols. As with all the ISO standards, it prefers to leave the companies to make their own choices. Additionally, Bennett and James (1998) very correctly notice that the guidelines do not address issues such as; the basis on which standards should be set, how far the emphasis is to be on providing senior management with the means of operational control rather than on stimulating and supporting and supporting continuous improvement, and the trade-off between, on the one hand, the value of having data that is relevant and reliable, on the other hand, the need to limit the cost of obtaining them.

## **6. ENVIRONMENTAL PERFORMANCE EVALUATION**

Interpreting the norms as such, the most successful approach in the early stages is to develop simple, readily understood measures that reflect environmental priorities, to make maximum use of existing data sources, and to interview the staff of the organization on non-environmental issues by addressing mainstream business concerns. This basic level of EPE, is used to obtain information with which the organization defines mainly reactive environmental policies. In the case of the cooperatives these EPE has supported the continuous improvements of environmental performance already during the implementation process. The information required to define the EPE indicators has for a great part been derived from the information obtained by the Initial Environmental Reviews of the coffee mills. These indicate where without substantial investments improvements can be achieved, and support primarily the improvement process by implementing good house keeping measures. For instance, savings in the use of energy and water have been realized by monitoring more carefully the production process. The information obtained through the monitoring process is used as an input to define work instructions and training activities, which result in more efficient management of peak loads. Husk, a waste created by the production process, can be used as a fuel and substitutes partially the fire wood need. For the entire process from harvesting to export logistics a quality control protocol could be set up and accounting tools can be developed that help to identify cost saving opportunities.

This basic level of EPE, which is based on general ECIs and EPIs, is largely related to risk management and dealing with obvious environment-related costs, such as high-energy consumption, high waste rates or emissions that require expensive pollution control measures. The risks to be managed are those of non-compliance with legislation and of financial liability. The environmental performance data that is available is used largely for internal purposes and is typically the monitoring of audit results by environmental managers and their senior managers.

However, to make a positive impression on external stakeholders, such as regulators and consumers and to achieve specific objectives with regard to their needs, the cooperatives have to move on a medium term to a more advanced EPE system, based on better defined EPIs that give more detailed information on OPIs and MPIs. Key aims of measurement at this level is to stimulate and support continuous improvement, particularly through awareness and tracking measures, and to provide data that is usable by line management. Related to the improvement of the environmental performance, the organization has to move towards a pollution prevention approach. This requires much more detailed data on inputs, throughput and outputs of energy, materials and water. This data is also crucial to increase resource productivity through waste minimization and other initiatives.

For the cooperatives, this level of EPE will be crucial to define investment opportunities in order to implement cleaner technology solutions. It is expected that on the medium term (two to four years) parts of the existing equipment could be eligible for replacement. For instance, a number of electrical engines are over dimensioned and otherwise fairly old. Replacement by newer and more efficient equipment could save energy and costs. In certain cases more advanced technologies could be considered, at least as partial substitutes for existing machinery. For instance, photovoltaic energy equipment could be used in the drying and further processing of the coffee beans, particularly if the investment promises a short payback period. Also the use of worms in the composting of pulp can be a major contribution to replacing chemicals at the farm sites. This implies, however, considerable changes in the production processes. The required investments looked for will need to be paid back on a short term by generating savings or opportunities to sell the obtained results such as the compost to the farmers whom can use it as fertilizer, due to limited funds the cooperatives have available for long term investments.

Finally, for the long term (more than 5 years) it is necessary to extend the horizons of the cooperatives in order to be able to design integrated production systems that consider the entire chain. There is no quick jump into such systems, since they require careful scenario definition and planning processes based on the interactive participation of the different stakeholders in and around the chain. Interactive learning can enhance the information level about the long-term key factors in terms of technology, logistics and commercialization. Scenario development is a necessary mean not only to build up consistent pathways towards sustainability, but also to reach consensus among the major actors in the coffee chain as to how the future should look like.

This third level of EPE is aimed on achieving strategic effectiveness, so that an increasingly integrated body of data is shaped to meet specific objectives, and reprocessed into multiple outputs for various audiences. This requires much more detailed attention to data collection protocols, the maximization of direct measures, incorporation of stakeholder inputs into the framing and implementation of measurement systems and individual indicators, and obtaining stakeholder interpretation and feedback on the results. One aspect of discontinuous improvement is that “unintentional environment”- the improvements in performance that result from non-environmental drivers of action such as investments in new equipment, or cost reduction programs- can be the most important cause of environmental improvement in many industries (Bennett and James, 1998). Therefore, it is vital that measurement activities be

extended into such areas as research, new product development and capital budgeting, that influence the eco-efficiency of future processes and products, so that improvement opportunities can be maximized. Two audiences that become increasingly important at this stage are functional management, especially in development areas such as product development and research and development- and, from a life cycle perspective, chain members.

Altogether, the fine tuning process of EPE is accompanied by a shift in emphasis from individual indicators to the development of scenarios based on multiple actor indicators. Within these, indicators that relate data in different units to each other become more important for comparative analyses, for example emissions per thousands dollars of turnover, or waste per unit of production. Related to the SUSCOF project, the consortium- through which the strategic alliance between the seven cooperatives involved is consolidated- is the appropriated level for the creation of the overall EPE framework. This implies that there should be a set of uniform indicators that are used in each of the seven co-operatives, which makes it possible to translate the indicators from the seven organizations into compounded indicators. Moreover, uniformity allows different kinds of comparison and benchmarking. Of course, along with the common set, individual co-operatives could use other indicators, attuned to their own specific situation, as well.

## **7. CONCLUSION**

During the last three years, the in the SUSCOF project involved Costa Rican coffee cooperatives have been working hard on implementing an environmental management system based on ISO 14001 in their coffee mills. These systems are expected to be certified at the start of 2001. The certification of the EMS based on ISO 14001 will be a great help in showing what such an advanced position implies in highly practical terms. However, the key word of the ISO 14001 norms is continuous improvement, which implies that those who sell SUSCOF coffee, will represent an advanced position on the road towards sustainability. To maintain this position means constant improving oneself.

Continuous improvement is greatly helped by generating (preferably) quantitative information on how processes are evolving and whether the professed goals are being met. This type of information is just scarcely available in Costa Rica, which creates a limiting factor for the involved cooperatives to define objectives that will result in significant improvements in their environmental performance. Methods such as defining and measuring Environmental Performance Indicators can be used for this purpose. ISO 14031, a guidance document of the ISO 14000 standards about environmental performance evaluation, has been chosen as main reference for the next stage of the SUSCOF project: the creation of environmental performance evaluation indicators that will help the participating coffee cooperatives define their environmental improvement programs. However, the ISO 14031 as they are presently defined, have also a number of limitations, such as the limited emphasis on standardization. The ability to make comparisons between sites, organizations and industries which permits standardized performance data, is an important stimulus of performance improvements, especially for organizations such as the coffee cooperatives that act in an environment with a

lack of data available. Additionally, the guidelines do not address issues such as; the basis on which standards should be set, how far the emphasis is to be on providing senior management with the means of operational control rather than on stimulating and supporting and supporting continuous improvement, and the trade-off between, on the one hand, the value of having data that is relevant and reliable, and on the other hand, the need to limit the cost of obtaining them.

For the SUSCOF project the ISO 14031 is seen as a first step towards defining and standardizing Environmental Performance Evaluation indicators that need further development in order to create a useful measurement system. The EPE has to be refined during the next five years in order to obtain more precise indicators, that will be useful to achieve strategic effectiveness. In this way an increasingly integrated body of data is shaped to meet specific objectives, and reprocessed into multiple outputs for various audiences, among others, product chain members. To obtain such precise indicators requires much more detailed attention to data collection protocols, the maximization of direct measures, incorporation of stakeholder inputs into the framing and implementation of measurement systems and individual indicators, and obtaining stakeholder interpretation and feedback on the results. Therefore, measurement activities should be extended into areas such as research, new product development and capital budgeting that influence the eco-efficiency of future processes and products, so that improvement opportunities can be maximized. At this level of EPE, functional management, especially in development areas such as product development and research- and, from a life cycle perspective, chain members become more active participators. During the coming year, research will be done focused on the design of a useful set of indicators, that will help making strategic management decisions in order to improve the competitiveness of the cooperatives involved in a sustainable way. The first input for this research will be the results of the use of the basic environmental and operational performance indicators that are part of the environmental management systems that will be fully in operation during this harvest. This will be followed, by an in-depth research on possible operational and management performance indicators. A major element will be the development and application of so called sustainability indicators (SI) for the supply chains that relate to a company's primary process. The sustainable enterprise is to be aware of the social and environmental effects of the human and natural resources it uses for its own economic purposes. Sustainability indicators are to inform the management of these effects in a concise and manageable way. They serve the purpose of indicating where the hotspots are for the benefit of optimal decision-making, transparency and accountability.

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