

Application of Ecological Monitoring in SMEs in Bulgaria

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Abstract – In the paper are considered aims and instruments of the ecological monitoring. In the last years the increasing ecological awareness of the consumers, the continuous resources shortage as well as the presence of ecological standards, led to the fact that ecological monitoring is essential for successful auditing and management. The first part of paper clarifies the definition of and differences between monitoring and auditing, and outlines their potentially important role in ecological impact assessment. The second part draws briefly instruments of monitoring and their application in SMEs in Bulgaria.

Keywords – Ecological Monitoring, Auditing, SME, ISO 14001:2004, ISO 9001:2000, Ecological Indicator.

I. INTRODUCTION

Today the prosperity of each enterprise depends on the effectiveness of its economic activity and competitive power. The conditions of the open market are based on extensive analysis and application of technical, ecological and economic information. Monitoring can provide essential information to improve ecological impact assessment and project management.

II. THEORETICAL ASPECTS OF THE ECOLOGICAL MONITORING

As a function of the activity of an enterprise the ecological requirements will be differently pronounced.

Monitoring involves the measuring and recording of physical, social and economic variables associated with development impacts.

Rafees [4] represents monitoring as factor to provide information for decision making and also includes broad public participation and stringent administrative review procedures.

Sadlers [5] writes of the need to introduce feedback in order to learn from experience; we must avoid the constant “reinventing of the wheel” in environmental project management.

Davies [6] have examined three types of ecological monitoring which might be associated with the life cycle of an undertaking, these are a) baseline monitoring, b) effects or

impact monitoring and c) compliance monitoring.

“Baseline monitoring” refers to the measurement of ecological variables during a representative project period to determine existing conditions, ranges of variation and process of change.

“Effects monitoring “ involves the measurement during project.

“Compliance monitoring” takes the form of periodic sampling and continuous measurement of levels of waste discharge, noise or other similar emissions to ensure that conditions are observed and standards are made.

The terms of the *ecological monitoring* contain an extension of the monitoring and auditing concept in the sense of all ecologically relevant facts of an enterprise. According to this goal, definitions of monitoring system have to be developed, which consider both economic and ecological and as well social aspects in the long run of preparing a decision. According to ecological monitorings the comprehensive provision of information, information collection and information retrieval, as planning, auditing and a check of all ecological relevant enterprise activities, are thus understood. Monitoring can also provide an accepted date base, which can be useful between interested parties : customers, public, trade unions, owners, outside capital givers, public, coworkers, status of competition, special syndicates, parties etc.(see in Fig.1)

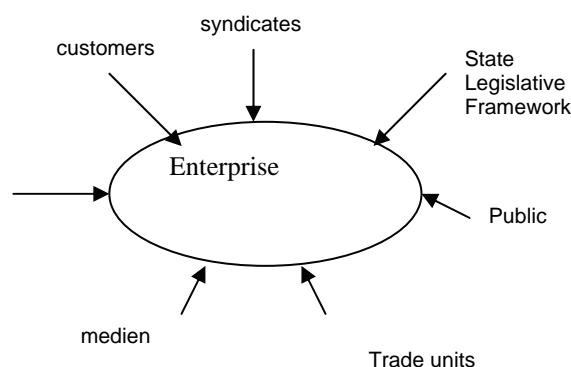


Fig.1. Parties interested in the process of ecological monitoring

The enterprise can exclude itself from the requirement pressure of these groups only if it integrates *social values* antizipativ into the target system and enterprises, the politics result, which consider equally ecological and economic facts.

Above all the ecological monitoring is the impact on the ecological production, which seize and systematically dispose

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consumption, in order to make it moderate and controllable[3].

Purposes of the ecology-oriented monitoring The definition of the aims of ecological monitoring and auditing is very important for the enterprises and their activities.

In table 1 there is an example for a systematization of the aims of the ecological monitoring, based on the study of the SME Agency in Bulgaria[2].

TABLE I
GOALS OF THE ECOLOGICAL MONITORING

Intern goals	Reduction of procurement and production costs High identification of the Personal with the enterprise
External goals	Satisfaction of the demand for ecologically perfect products Ecological image Easier entrance to financial markets Legal fulfilment of ecological protection demands

Ecological Monitoring provides information which can be used to evaluate the effectiveness of innovation activities.

Furthermore it manages to recognize ecological risks connected with the *Ecological monitoring* eliminates them as soon as possible, in order to convert ecological challenges into operational success factors.

II. INSTRUMENTS OF THE ECOLOGY-ORIENTED MONITORING AND AUDITING

A. Ecological information system for the systematic collection of all relevant information, existing planning and control system are to be supplemented around an ecology-oriented ecological information system. Above all such system should fulfill the following functions:

- Supply of information about the enterprise-internal material and energy flows (also regarding the product life cycle;
- Supply from the information to the analysis of economic-ecological restrictions
- Situation analysis of the enterprise;
- Development of ecological programs;
- Supply of the ecological specified condition of the enterprise regarding products and processes representations;
- Supply of control system for the integration of the ecological questions into the master planning of the enterprise
- Supply of all relevant data, facts and information both for enterprise-internal decision makers and for all external information target groups by accordingly arranged information politics.

Above all the intensified meaning of ecological/ecology information in the past turned to external communication. The preferred medium is usually an annually ecological report, which is also required explicitly in connection with Certifying

for the Ecological system ISO 14001:2004 or implementation of EMAS II (Eco-Management and Audit Scheme).

B. Reduction of costs reserves in operational ecological protection can lie considerable reduction of costs. Depending on enterprises and industry the cost can be in the range of 5 to 15 per cent of the operational total expenditure[2].

Sociological investigations show to some extent a similar typology in the behavior of the small and medium enterprises in Bulgaria while they have to apply special measures for ecological protection. The enterprises become passive participants in the process of assimilation of the ecological requirements and they almost never undertake voluntary measures for this aim.

C. Ecological cost

There are two possibilities to set up an ecological cost calculation. In the first case the cost calculation system, which already exists, remains complete[1].

The ecological costs have to be calculated:

- Ecological costs of the piece/total costs;
- Ecological costs of the material/personnel expenditure and writings-off;
- Ecological cost characteristic numbers in the time comparison.

In the other case the ecological costs are assumed for each cost category. These are then assigned on an extended cost apportionment sheet, cost centres and cost objectives.

The expenses for investments are not a priority for the enterprises in Bulgaria. Being asked what part of the investments in last two years are used for protection of the environment, over 73% of the enterprises answer that the investments are not connected with the environment and there is no special control above the ecological expenses. The explanation may be, that enterprises see their competitive priority only cost reduction and may be technological innovations. At the same time SMEs are an important part of the solution of Bulgaria's ecological issues and are therefore the object special support and government institutions (see Table II).

TABLE II
Ecological projects

Areas	Number of projects financed	Total value of projects, BGN
Waste management	10	4485000
Air protection	8	5513000
Waste water	4	4494756
Eco-Agriculture	4	280729
Total	26	14493036

Source : EMEPA and MOEW

D: Ecological Indicators

Numbers in the overview for the setting up an effective ecological monitoring are needed in the operational everyday life information about the effects of operational acting on the natural environment.

This information can be determined by characteristic numbers, whereby characteristic numbers comparisons (time

comparison, comparison of nominal and actual values, operating comparison) are from special interest.

Following ecologically important kinds of characteristic numbers and/or characteristic numbers can be differentiated (see Table 2).

TABLE III
Ecological Indicators

Energie	Total energy consumption Source of energy Energy utilization
Air pollutants	Emission quantity of air pollutants Emission ratios
Water and waste characteristic	Quantities required of individual kinds of water (for example drinking water, groundwater, industrial water, rain water etc.) Quantities of the kinds of waste water (for example process water, cooling water, sanitary and kitchen water etc.) Water utilization
Material usage	Raw material utilization Fuel employment and fuel utilization Secondary raw material utilization
Waste	Waste characteristic numbers arranged according to valuable and special refuse Waste ratio

F. Ecological audit

A goal of the EMAS II is specified in such way, that enters into force in all countries of the European union, is the continuous promotion of operational ecological protection. The enterprises participating in the system receive the authorization, after an external examination, to advertise with the *EMAS II Logo* in order to have an advantage secure itself so a market lead over not participating competition. Since the beginning of the 90's the ISO 14001 series is available an international standard for ecological management systems, which today emphasises a process orientation, contain many references to the implementation of ecological management systems. For this reason is Implementation of ISO 14001:2004 frequently compared with the development of the quality management and the standard series ISO 9000 ff.

Monitoring is also essential for successful ecological impact auditing. And can to be one of most effective guarantees of commitment to undertakings and to mitigation measures.

The following individual measures can be differentiated during the introduction of ecological monitoring and Auditing:

- Development of an ecological goal catalog;
- Development of ecological enterprise guidelines;
- Development and definition of ecological company targets;
- Definition of ecological valuation criterion;
- Development and/or improvement of an ecological cost accounting procedure;

- Periodic collection, documentation and evaluation of the material and energy flows in all parts of the enterprise;
- Regular evaluation of all operational activities under ecological aspects of risk;
- Regular evaluation more again and continuing monitoring of old means of production, production procedures and products regarding their ecological characteristics;
- Elaboration and documentation of ecological product guidelines.
- Evaluation and documentation of incidents and elaboration of measures for incident reduction and/or minimization of incident damages;
- Current control of the ecological measure catalogs as well as constant development and improvement of ecology-oriented control indicators;
- Open communication and documentation of all control results in the enterprise

During investigation of the SMA Agency in Bulgarian is determined that the enterprises in Bulgaria have a positive attitude on the ecological monitoring and legislative framework in relation with their competitive abilities. 76,8% consider that the legislation is strict but useful for Bulgarian enterprises and have ecological program. On other hand only 15,5% think that the legislation is too hard and it negatively affects the firm's activity. In addition, these enterprises look take care for their results regarding process effectiveness auditing ecological pollution.

III. CONCLUSION

The relationship between a project and its environment is needed throughout the life of a project. Environmental assessment is meant to establish the terms and conditions for project implementation. Such ecological monitoring can improve project management and contribute to the auditing.

In the paper aims and instruments of the ecological monitoring and their possibilities for application in small and medium enterprises in Bulgaria are discussed.

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