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Sustainability indicators in the context of environmental auditing

Environmental auditing procedure development is connected with strengthening of environmental legislation, trade standards, credit and financial policies within united environmental space. Environmental audit as a ownership rights providing element is very important for sustainable economy. It allows to reduce information and commercial risks, which are connected with decision making procedures oriented to drawing up the recommendation for efficient practices in natural resources uses and environmental protection [1].

In order to elaborate the recommendation and forecast audit provides the assessment of large informational massive, including economic, environmental and social data. Approach based on the system of sustainable development indicators for firms as "decision-making unit" [2] within environmental audit framework seems to be productive from theoretic and practical point of view. In this paper we consider sustainable development as a "development that meets the needs of present generation without compromising the ability of future generations to meet their own needs"[5]. Approach, which considers the economic growth achievement as priority rather than environmental safety and conservation, turned out that unfair. Low-income population brings the main pressure connected with pollution and nature resources degradation. Even if pollution is reversible, we cannot be sure that human welfare is reversible as well. Idea that healthy environment is a subject of luxury is frequent founded opinion of decision makers and this opinion makes a difficulty for environmental improvement. However developed countries experience shows that health restoration costs caused by late pollution prevention significantly exceed expenses, which needed for avert such pollution on the early stage. Moreover, if financial resources for pollution prevention are available immediately, we can obtain positive effect in other areas of activity. This approach provides the greatest advantage to enterprises, which try to attract international investment capital. Moreover improved health can create more favorable conditions for human capital accumulation (to reduce "brain drain", to safe skilled specialists) and can assist sustainable development goals [4].

Callens and Tyteca (2) propose number of possible factors required in framework of efficiency (table 1).

Table 1. Sample of information required in the development of sustainability indicators at the firm level (2).

	Short term
Economic aspect	Turnover, Value added, Output production, Resources used as inputs (including recycle products and energy)
Social aspect	Employment, Salaries, Labor intensiveness of productivity, injury risk noise, odour.
Ecological aspect	Natural resources, wastes pollution, Transportation modes and distances

Existing statistic Russian Federation sources analysis shows that universal method for information gathering for all country regions does not exist. On one hand, Russian legislation supposes that environmental audit is voluntary procedure. If enterprise is interested in environmental documentation improvement, it is also interested to present the correct information. However, if the target of auditing attraction of investment or promotion of products into environmentally sensitive markets (for import as a rule), then the danger of the primary information distortion really exists. Environmental audit objectivity significantly depends on data availability from open statistic sources. Information collection provided by Goskomstat (Governance statistic committee), which analyses it and publishes some results.

Unfortunately, information about decision making unit, for example, one factory or one plant now is not really available for community. Access to information about the economic sector is possible by special inquiry for Goscomstat local departments, but this procedure depends on 'environmental consciousness' of officials.

Situation can be studied on the base of indirect informational sources. There are near 100 one-company towns or mono-profile town now in Russian Federation. The term 'mono-profile town' is further understood as a municipal unit set up on the basic of town forming enterprise [3]. If enterprise situated in this town is a sole, that basic numerous social and environmental, and part of economic indicators definition stay possible by Goscomstat open sources. In 2000 mono-profile towns database create in the framework of World Bank Project. It includes the index town value added.

Town value added (per capita) = $\{(TTS_i - CER_i) - P_i(SIC_i - SCC_i)\} / P_i$,
TTS_i - the total volume of production made and sold outside by the enterprises of the i-town (town total sales), CER_i - the cost of external production resources purchased by the town enterprises to organize the production activity (cost of external resources), P_i - the population of the town (population), SIC_i - the value of the consumption (living) minimum for the region, where i-town is situated (standard individual consumption), SCC_i - the value of the normative budgetary expenses for supporting the infrastructure of i-town (support of social infrastructure). This indicator and some parts of it are proposed to use as data representative assessment criterion.

The notion 'mono-profile town' means, certainly, much more than the term 'enterprise'. It is worth to take into account that this model is just approximation, since the town live more diverse and multifunctional. Town life cycle does not coincide with enterprise cycle. However it might be an appropriate model for short-term study and environmental audit might use it.

We explore the number of economic, environmental and social factors, which is representative for transition conditions and take into account Russia data collection informational system. Some of these factors cover more than one category of assessment aspects. The use of nature resources clearly has economic impact, ecological impact, but also social impact, related to resource availability for future generation. As an example, one may think of the CFCs, once considered a useful, inert auxiliary in various productions, but now identified as one of the major pollutants contributing to ozone layer depletion.

Contradictory influences depending on the aspects considered are the most important. They reflect the local communities peculiarities and might be different for countries and territories. For each of the three classes of aspects, i.e. economic, social, environmental we reveal factors whose value should be minimized then all other things being equal, and those whose value should be maximized in order to reach efficiency, or more generally, in perspective of sustainability.

It must be taken into account that some kinds of indicators are not representative, for example, statistic indicator of salary essential differs from real salary, this fact might be explained by desire to avoid taxes. The 'willingness to pay' estimation sometimes lead to more effective result in such case.

Callens and Tyteca [2] offer to use the comprehensive indicators based on cost-benefit analysis:

$$\text{Indicator } I_0 = \frac{\sum_{i=1}^{I1} a_i ECON_{\max.i} + \sum_{i=1}^{I3} g_i SOC_{\max.i} + \sum_{i=1}^{I5} e_i ENV_{\max.i}}{\sum_{i=1}^{I2} b_i ECON_{\min.i} + \sum_{i=1}^{I4} d_i SOC_{\min.i} + \sum_{i=1}^{I6} z_i ENV_{\min.i}} \quad (1)$$

in which coefficients where $\alpha, \beta, \gamma, \delta, \epsilon$ and ξ represent a priori weights given to the economical, social and environmental factors from cost-benefit stands.

Model analysis shows that it is possible to construct three separate indicators which reflect different aspects of sustainability. This approach allows to improve the processes of mathematical analysis of data. In this way, we obtain the possibility of incorporating various different kinds of quantities, with different measurement units (i.e. physical, economic, etc.) and meanings that have to be aggregated to reflect their distance

5th International Conference on Ethics and Environmental Policies
BUSINESS STYLES AND SUSTAINABLE DEVELOPMENT
Kyiv, April 2-6, 2003

to efficiency. The weights are calculated as the solution of a mathematical program and will be computed in such a way that the distance to the efficiency frontier is minimized.

This method has preferences for decision making units comparison if primary factors are comparable. It is possible that it furthers to develop spatial decision making units classification, and it will provide legal improvement and managerial practices (for watershed or other territory), that will contribute to overall sustainability.

References

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