

ENVIRONMENTAL DATA EXCHANGING – THE NEED FOR MANAGEMENT

*Drago Vuk**

Received: 01. 08. 1999.
Accepted: 05. 01. 2000.

Preliminary communication
UDC: 659.2:504

In this paper, the author analyses the beginning of the application of measures imposed by the Slovenian Law on the Environmental Protection and the Environmental Information System. On the basis of his knowledge of the actual state, he proposes a model by means of which it would be possible to systematically assure with EDI environmental balances and environmental accounting, thus providing the basis for the implementation of an applicable environmental information system.

1. INTRODUCTION

Following the definition that the datum is a scalar and the information is a vector (Vuk, 1997), it is possible to draw the conclusion that the present paper will be involved with the theoretical area.

With the next definition, which claims that the information is the "basic means" in decision making (Vuk, 1997), it can be expected that the content of the paper will have quite an applicative development. Speaking from the theoretical point of view, the relation data-information and information-data will be left aside as at the time being we are interested in:

- what data are we dealing with,
- why are we dealing with them and
- when should we deal with them so as to enable the setting up of relevant information.

* Drago Vuk, PhD, University of Maribor, Faculty of Organizational Sciences, Kidričeva 55a, 4 000 Kranj, Slovenia, Tel: + 386 64 374 232 or + 386 64 374 256, Fax: + 386 64 374 299, E-mail: marjan.senegacnik@fov.uni-mb.si

It should, herewith, be particularly noted that a special emphasis is also laid on:

- how the data were acquired and
- where should they be directed, after they have been reformatted into information, to assure that they obtain a useful value and become a constituent part of the basic means in decision making.

2. ENVIRONMENTAL PROTECTION INFORMATION SYSTEM

Here, we refer to the definition that an adequately characterized information system is one of the main bases for the decision making processes (Wiener, 1967). In other words, the information system could be defined as information that has been systematically arranged in accordance with a particular principle or criterion. In such case, it is very important that the information from such a system is made accessible, understandable and timely accessible for the user. Various companies have set up their information systems in a more or less complete, applicable and friendly way as far as the user is concerned.

In practice and in various user areas, the achievement of the above basic requirements may be accompanied with considerable difficulties. The first are envisaged as early as in the very conception phases, then in the design phase and finally, and most frequently, in the implementation phase. The law enforced in 1993 introduced the application of the following principle regarding the setting up of the information system about the environmental state (The Law on Environmental Protection, 1993; Vuk, Senegačnik, 1996).

The Environmental Protection Information System encompasses primarily the databases on:

1. Natural elements, phenomena, factors and environmental systems
2. Natural goods
3. Stressing the environment and the rate of environmental stress
4. Consumption of substances and energy
5. Harmful substances
6. Occurrence and expansion of wastes
7. Emissions over sources
8. Sources causing environmental stress
9. Parts of the environment with the status of exposure and protection
10. Damages to the environment, environmental accidents and abuse of the environment
11. Health-environmental conditions of the population

12. Facilities and equipment foreseen for environmental protection
13. Funds or cost of environmental protection
14. Public services and organizations and establishments having involvement with the environmental protection and their competence
15. Laws and regulations, standards and normatives regarding environmental protection
16. State-of-the-art technology in the area of environmental protection.

Setting up databases is our most important reference point. It would be helpful, if this document would have also determined the organizational form that would have enabled the databases to be set up. The question that should be solved first is the question of the local, regional and state competences. When there are three elements available, in our case levels, and when there is no clearly cut sequence defined, the number of the possible combinations is considerable; thus, facing the decision maker with quite a lot of uncertainty. Any such uncertainty or ambiguity should be removed by means of a more accurate act, directive or instructive. In our case, we have to deal with the area of environmental accounting that has been enforced by the same law (The Law on Environmental Protection, 1993). It is a novelty for us, though in the developed economies it has been for quite a while a constituent part of their operations.

3. ENVIRONMENTAL ACCOUNTING

According to the adopted law (The Law on Environmental Protection, 1993), persons performing an economic or noneconomic activity are bound to maintain, within their activity, the environmental accounting that displays their general and energy balances. In this way, their accounting data, that have to be presented in a specific way, allow an insight into the type and characteristics of their environmental stressing. This measure is in fact a modification of the transcript of the 42nd article of the Environmental Protection Law (The Law on Environmental Protection, 1993), prepared in a way that makes the application and commenting on this law possible. Here, commenting does not mean legal, but rather professional commenting.

The basis of the accounting for the purpose of the business operations monitoring are records (evidences). They represent unique and complete units, i.e. databases, provided they are set up for this purpose. As the global legal act has so far not defined neither their structure, nor their form, we shall, in our continuation, follow the measures that have so far been practiced for individual types of databases in information technology.

To assure that a particular foreseen system will be feasible, it is necessary to define which are its basic parameters. This particularly applies for:

- basic scope
- type of operations and
- method of presentation.

It turns out to be helpful to add to the above general criteria the following specific ones, too:

- assessment of importance in space and time
- relevance with regard to an observed situation
- assessment of a given situation.

These are the criteria, in particular the latter, that play an important role in environmental protection. They enable the implementation of the discussed information system model presented in Figure 1.

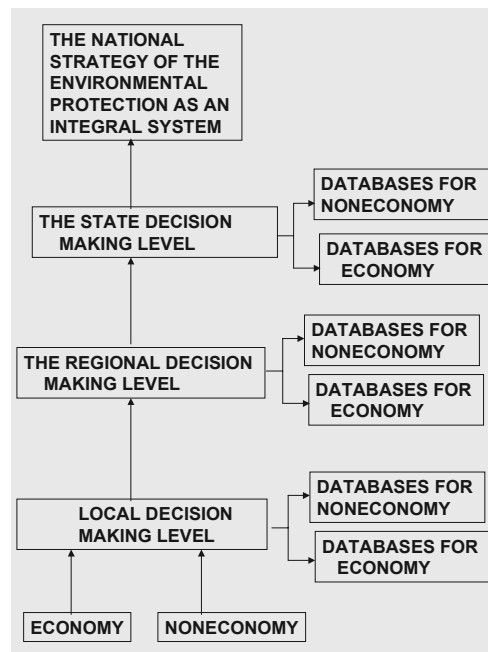


Figure 1. Information system in the state - from the operative (local) to the strategic (national) level

We are, thus, interested in particular groups of data that enter as an INPUT into some defined process, and in the OUTPUT that exits such a process. Generally speaking, this can be depicted by the following scheme:



If the above simplification of the relation between the input and output is made, it is nevertheless necessary to add a condition at which the input is converted into the output. The narrow understanding of the production can be explained as it is shown in Figure 2.

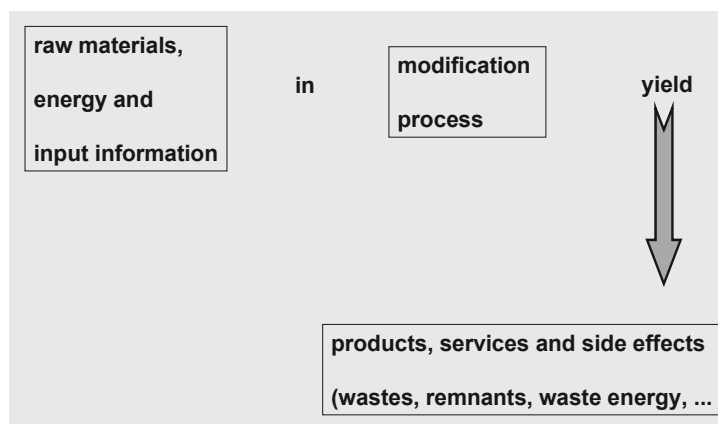


Figure 2. The narrow understanding of the production

Individual relations must be analyzed for each case separately. There is a large number of cases differentiated among themselves as far as the following are concerned:

- principles according to which production processes are run;
- substance groups of materials entering into them;
- forms and types of energy that take part in them or occur in them;
- form and level of completeness of the input or output information.

The basic principle of the environmental accounting can be presented as shown in Figure 3.

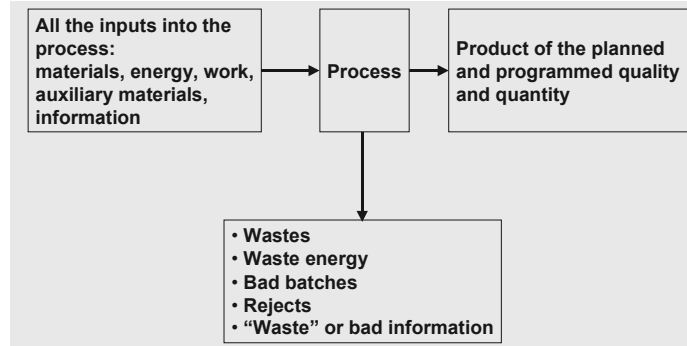


Figure 3. Relation between the input quantities (inputs), process and products, and the remaining part of the process

If one wishes to achieve profitability, the output quantities should cover or exceed the input quantities as far as costs and quantities are concerned. Because of this reason, it is important that all the data are collected exactly and arranged and displayed systematically. What applies for the main part of the process, also applies for the environmental part of the process. This is the reason for the implementation of the so-called environmental balances which enable a detailed description and presentation of the state of processes in terms of the environment and environmental services. As can be seen from the scheme presented in Figure 4, environmental balances, too, can be systematized (Lehmann, 1991).

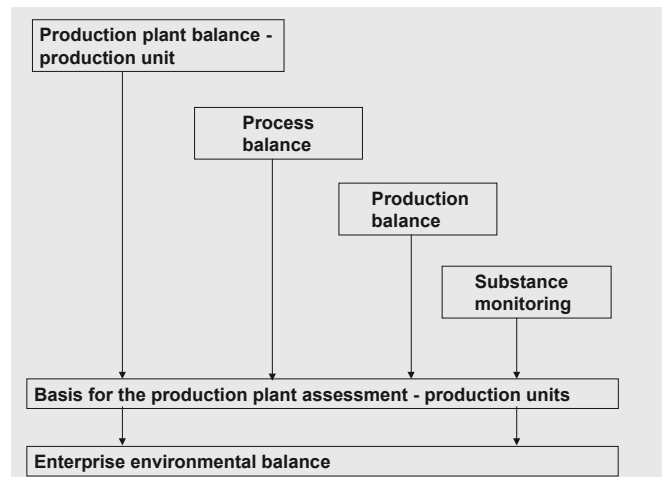


Figure 4. Systematics of environmental balances (Lehmann, 1991)

As an example, let us have a look at the environmental balance of the Mohndruck printing enterprise, presented in Figure 5 (Tischler, 1996).

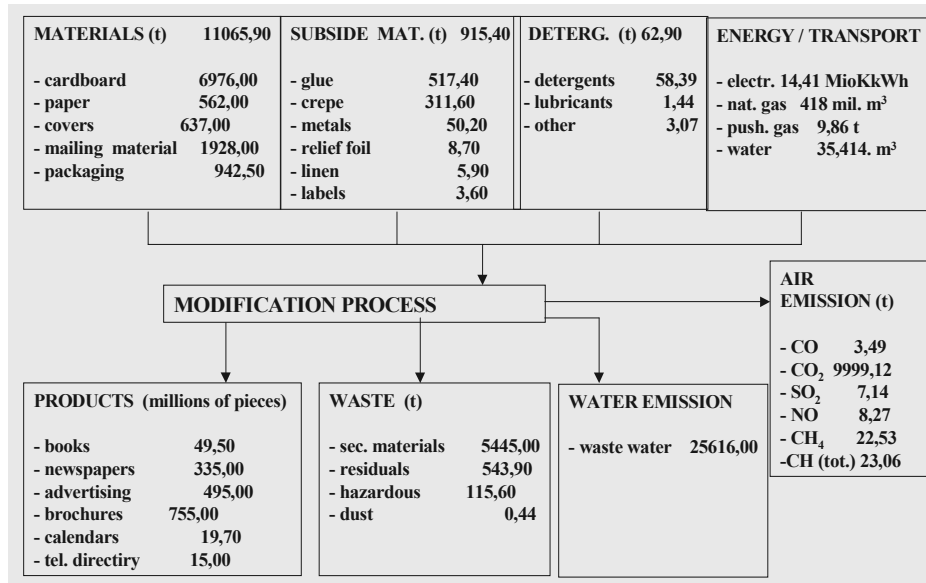


Figure 5. Environmental balance of the production plant

On the first level, the scheme represents some sort of material energy flow. The difference between it and the classical material energy flow lies in the fact that it also involves all the three basic emission types, which are: solid (waste), liquid (waste waters) and gaseous (waste air, gas and steam).

The datum that is missing in this balance is the datum about environmental noise. Assuming that such a production plant is located in an industrial zone, it is difficult to define its disturbing level, as the disturbing effect might also originate from the neighboring plants and particularly from the nearby traffic. In spite of careful planning and selection of the equipment, vibrations and eventual radiation can nevertheless be expected.

4. DATA

From the above presentation of the environmental balance, it is consequently clear that Slovenian enterprises and institutions shall have to acquire one more type of data, i.e. the relevant environmental data that will, when compared with other data and the quality of an observed environment,

assure a direct or indirect contribution of a particular economy or noneconomy subject to the state of a direct or broader environment. The number of data that should be monitored, filed and made available - as foreseen by the Slovenian and foreign legislation - is constantly increasing as a result of the fact that in each case it is necessary to analyze quite a number of parameters.

Waste waters are in the law dealt with in a summarized form. It is herewith important to note that, depending on their nature, their quality or rate of stressing are represented by a series of parameters that are again expressed with numerical data. If we add to the above just harmful substances - for which it is necessary to define or determine as much as more than 10 parameters - we can soon realize that this means quite an enormous set of data. In some cases, this involves some 50 or even 100 individual pieces of information. Being topped also by data monitoring, filing, submitting and exchanging, it can soon be comprehended that in such a case, the classical method of collections, tables, post and telephone no longer suffice or is of no great use. This particularly applies to cases when on-line data acquisition necessitates the undertaking of emergency or simultaneous measures on the managerial or organizational level, and last but not least - decision making.

When there are important requirements to be dealt with, accompanied with an alarming environmental state on one side and restricted technical possibilities on the other, it is reasonable to determine how and to what extent for this purpose we can use EDI (RIP), located within the Center for the Study of Electronic Business Operations, managed by the Faculty of Organizational Sciences as a member of the University of Maribor.

5. THE POSSIBILITY FOR THE EXCHANGE OF DATA ON THE ENVIRONMENTAL STATE

Assuming that we dispose of the needed data, we can show the EDI case for the area of a local community - governmental institution - as one of the broadly set up levels in Figure 6, i.e. the scheme depicting levels of the data exchange in the environment.

1. CASE: HMZ (Organization, structure, equipment technology)
2. CASE: WASTE (Organization, structure, equipment technology).

The structure of this model is topped with Republic of Slovenia → EU (organization, structure, equipment, technology).

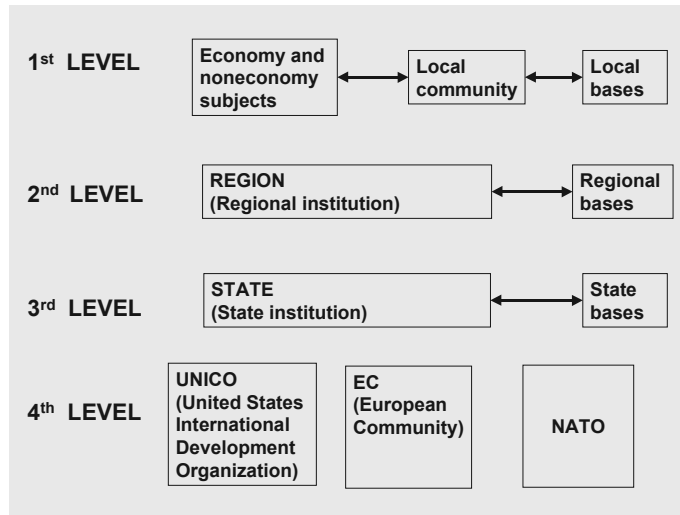


Figure 6. Levels in the hierarchy of the environmental data exchange

6. CONCLUSIONS

The field this paper deals with is relatively new, but at the same time, topical in our state. Data collection and data interchange is current from two points of view - national and the European Union. It is important to start working in this field because it will bring about unification with the EU. Some tasks, like information system design and computer support are of great importance and must be carried out professionally. There will be some additional education necessary for people who are working within this field.

REFERENCES:

1. Vuk, D. (1997): Tehnološki sistemi z varstvom okolja, Moderna organizacija, Kranj
2. Wiener, N. (1967): Cybernetics, McGraw Hill, New York
3. xxx (1993): The Law on the Environmental Protection, The Official Gazette of the Republic of Slovenia, No. 32/93, Ljubljana
4. Vuk, D., Senegačnik, M. (1996): Eco-information system – the case of the Republic of Slovenia, in: Wrycza, S., Zupančič, J. (Eds.): Methods & tools, Theory & practice, Fundacja Rozwoju Uniwersytetu Gdanskiego, Sopot
5. Lehmann, S. (1991): Ökobilanz and Öko - Controlling, IÖW - Informationsblatt No 2.
6. Tischler, K. (1996): Ökologische Betriebswirtschaftslehre, Oldenbourg Verlag, München, Wien

**POTREBA ZA UPRAVLJANJEM RAZMJENOM PODATAKA
O ZAŠTITI OKOLIŠA**

Sažetak

U ovom se radu analizira početak primjene mjera koje propisuje slovenski Zakon o zaštiti okoliša i informacijskom sustavu zaštite okoliša. Na temelju trenutnog stanja, predlaže se model koji bi, uporabom EDI-ja, omogućio sistematsko praćenje ravnoteže okoliša i “računovodstvo okoliša” i na taj način predstavljao temelj za primjenu informacijskog sustava zaštite okoliša.