APPLICATION OF ENVIRONMENT MONITORING SYSTEM IN CREATION OF FLEXIBLE ENTERPRISE

Dr Dorota Jelonek, jelonek@zim.pcz.czest.pl
Czestochowa Technical University, Management Department

Abstract: *The environment of contemporary enterprises is complex, changeable, and unpredictable so far. The response for growing turbulence of environment should be growing flexibility of enterprise. There was defined notion of flexibility and characterized chosen types of flexibility.*
In the article there was also presented solution of environment monitoring system, which supplies managerial staff of enterprise with indispensable information concerning changes in the environment. Application of information resources of the system ensures flexibility of the enterprise both ion the area of strategic decisions and operational ones. The measurable effect is optimal reactions of the enterprise for environment changes.

1. The relationship between enterprise and environment

The pervasive and complex interaction between enterprises and their environments has been widely acknowledged. The main argument is that enterprises control and are controlled by, the environment, in a continuous interactive process. Enterprises behave as complex open systems, and engage actively in exchanging input and output with the environment, as is shown in Figure l.

The functioning of the enterprise should be seen from the angle of the enterprise-environment relationship, therefore information of both the interior and the surroundings of the enterprise should be collected. The relationships of the enterprise with its environment are still undergoing considerable transformations. The role of the environment in shaping the environment changed in time. Its importance evolved from the environment as constituting the enterprise's resource to the environment that might be a threat to the enterprise's functioning.

The following features outline clearly the all-round roles of the business environment [13], [14]:

1. Environment defines the input markets of a firm (labor, capital, raw material, and energy),
2. Environment defines the output markets of a firm (demands),
3. Environment offers incentives to and exerts constraints on a firm,
4. Environment provides information for the strategy process;
5. Environment acts as a source and activator of organizational learning and innovation.

Enterprises depend on the environment for resources and for the justification of their continued existence. An enterprise can be seen as composed of activities and processes that transform the raw materials, labor, capital, energy, and information taken in from the environment into goods and services of economic or social worth.

The major features of the contemporary environment of enterprises are uncertainties and complexities. Uncertainty makes planning and predicting the effects of any actions undertaken

difficult. Complexity makes the carrying out of observation processes complicated, due to the large number and high diversity of elements. Changes in the environment occur faster and are more extensive. At the same time, we observe an increasingly great interdependency between processes and phenomena in the environment.

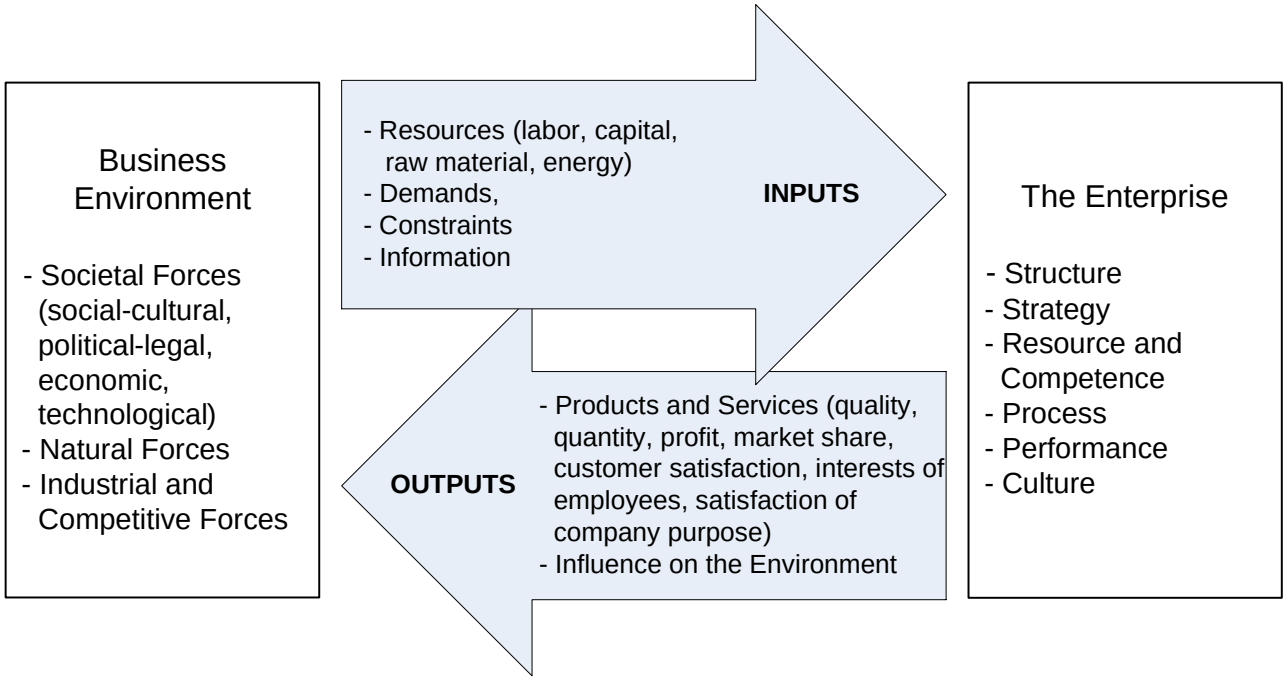

Figure 1. Enterprise and Environment
Source: The own study.

The most important factors generating changes happening in the environment of enterprises were presented in the shape of „ten mega-trends". The most important forces determining changeability, complexity and unpredictability of contemporary environment is [15]:

- Appearance of strong impulses of economic growth and recessions phenomena,
- Liberalization of economies,
- Accelerated internationalization and globalization,
- Bigger competitiveness,
- Dynamic technological progress,
- More and more shorter product lifecycles,
- Virtualization of economic processes (virtual revolution),
- Significant demographical changes,
- Change of value in the society,
- The growth of awareness and meaning of ecology.

Changes happening in the environment cause changes of current rules of enterprise's functionality. The basic condition of enterprise's surviving on the market is the speed of reaction and flexibility of adaptation processes to changeability of environment. The flexibility is crucial both in strategic decision making and in operational activities.

2. Definition of flexibility

There is not, in the literature, a definition of flexibility that is widely accepted. From a general point of view, flexibility can be understood:

- as characteristic of the interface between a system and its external environment. In this case, flexibility acts as a filter, buffering the system from external perturbations. Flexibility thus functions as an absorber for uncertainty. The external perturbations are characterized by: extent, frequency, novelty, certainty [5].
- as capability of adaptation/change [6].

Flexibility is therefore defined as the ability to change or react with little penalty in time, effort, cost or performance.

Dixon et al. consider flexibility as associated to [7]:

- quality
  - material flexibility (the ability to deal with variations in the purchased materials),
  - output flexibility (the ability to make products with different quality requirements),
- product
  - new product flexibility (the ability to introduce new products rapidly and at relatively low costs),
  - modification flexibility (the ability to modify existing products),
- service
  - delivery flexibility (the ability to change the content of the order or the delivery date),
  - volume flexibility (the ability to vary the quantity of the aggregate production),
  - mix flexibility (the ability to modify the variety of products in a given period of time with limited added costs),
- cost
  - factor flexibility (the ability to change the mix of materials, labour, and capital used in the production process).

In this view the notion of flexibility refers to so called manufacturing flexibility as opposed to strategic flexibility. There is worth to explain those two notions.

Zelenovich defines manufacturing flexibility as the ability of a manufacturing system to adopt to changes in the environmental conditions and, in the process, requirements[19]. This definition underlines exogenous and the endogenous nature of manufacturing flexibilty: the former as a consequence of the market's demand, the latter as the exploitation of the opportunities offered by technological innovations.

Very interesting classification of manufacturing flexibility was presented by Browne et. al.[3]. Eight different types of dimensions of flexibility were considered: machine flexibility, product flexibility, process flexibility, operation flexibility, routering flexibility, volume flexibility, expansion flexibility, production flexibility.

Now, flexibility is considered sa an instrument of competition, so it's very important to understand strategic flexibility [12].

For Aaker and Mascarenhas [1] strategic flexibility derives from the firm's ability to adopt to large environmental changes, witch have an important impact on the firm's performance. Such a flexibility can be achieved by: diversification of businesses; investment in under-utilized resources, reduction of undertaking in specialized sectors (all approaches witch involve the different functions of the firm in varying ways – research and development, production, marketing, etc.).

Types of strategic flexibility are illustrated in Table 1. In conclusion, as far as the contents are concerned, strategic flexibility can be understood in the following ways [17]:

1. the speed at which the competitive priorities can be varied within a business, it is directly related to the operational flexibility, understood as the capacity for variation of the practices in the time- the strategic level of reference is the business one [8],
2. amplitude and positioning of the strategic options at a certain instance within a business, the amplitude is an index of the numerousness of the possible options, while the positioning is an index of their place in the multi-dimensional space of the strategic choices [4],
3. rapidity of movement from one business to another, it is directly related to the operational flexibility, understood as the capacity for variation of the competences in the time - the strategic level of reference is the corporate one [17],
4. amplitude of the potential businesses that can be reached at a certain instance, a function of the available competences [18].

Table 1. Types of strategic flexibility

	Object of the variation	
	Competitive priorities	***Businesses***
Scope of the variation	Strategic flexibility as the scope of the strategic options within a business [4].	Strategic flexibility as the variety of the possible new businesses [18].
Rapidity of the variation	Strategic flexibility as the speed of variation of the competitive priorities within a business [8].	Strategic flexibility as the rapidity of movement from one business to another [17].

Source: De Toni A., Tonchia S., *Definitions and linkages between operational and strategic flexibilities.* Omega – The International Journal of Management Science, 2005, 33, p. 532.

3. Enterprise Environment Monitoring System

Environmental scanning is defined as the systematic collection and monitoring of information describing changes in the environment in order to identify and assess emerging developments, trends, and precursor events that may affect the strategic and tactical objectives of an enterprise [9], [10]. Aguilar refers to environmental scanning as: scanning for information about events and relationships in a company's outside environment, the knowledge of which would assist top management in its task of charting the company's future course of action [2].

Enterprises should scan and monitor their business environment and assess the impact of environmental trends on the organization by reviewing corporate strategy on a continuous basis. Scanning improves an organization's abilities to deal with a rapidly changing environment in various ways:

- it helps an enterprise capitalize early on opportunities,
- it provides an early signal of impending problems,
- it sensitizes an organization to the changing needs and wishes of its customers,

- it provides a base of objective qualitative information about the environment,
- it provides intellectual stimulation to strategists in their decision making,
- it improves the image of the organization with its publics by showing that it is sensitive to its environment and responsive to it.

The Enterprise Environment Monitoring System (EEMS) is institutionalized business environment observation system, which main task is to monitor essential environment indexes [11].

In every enterprise there exists more or less efficient system of environment monitoring of the enterprise. These systems differ between themselves in the degree of formalization of undertaken operations and in level of IT technology application. Every IT system so Enterprise Environment Monitoring System then can be viewed in organizational, informational, functional and technical-technological area. In organizational area there is crucial to set the roles of observers of chosen parts of environment, definition of activities frequency, definition of the way of gathering and process of collected information. Information structure defines what kind of data is gathered and processed in system. Advancement of technological solutions decides about functional possibilities.

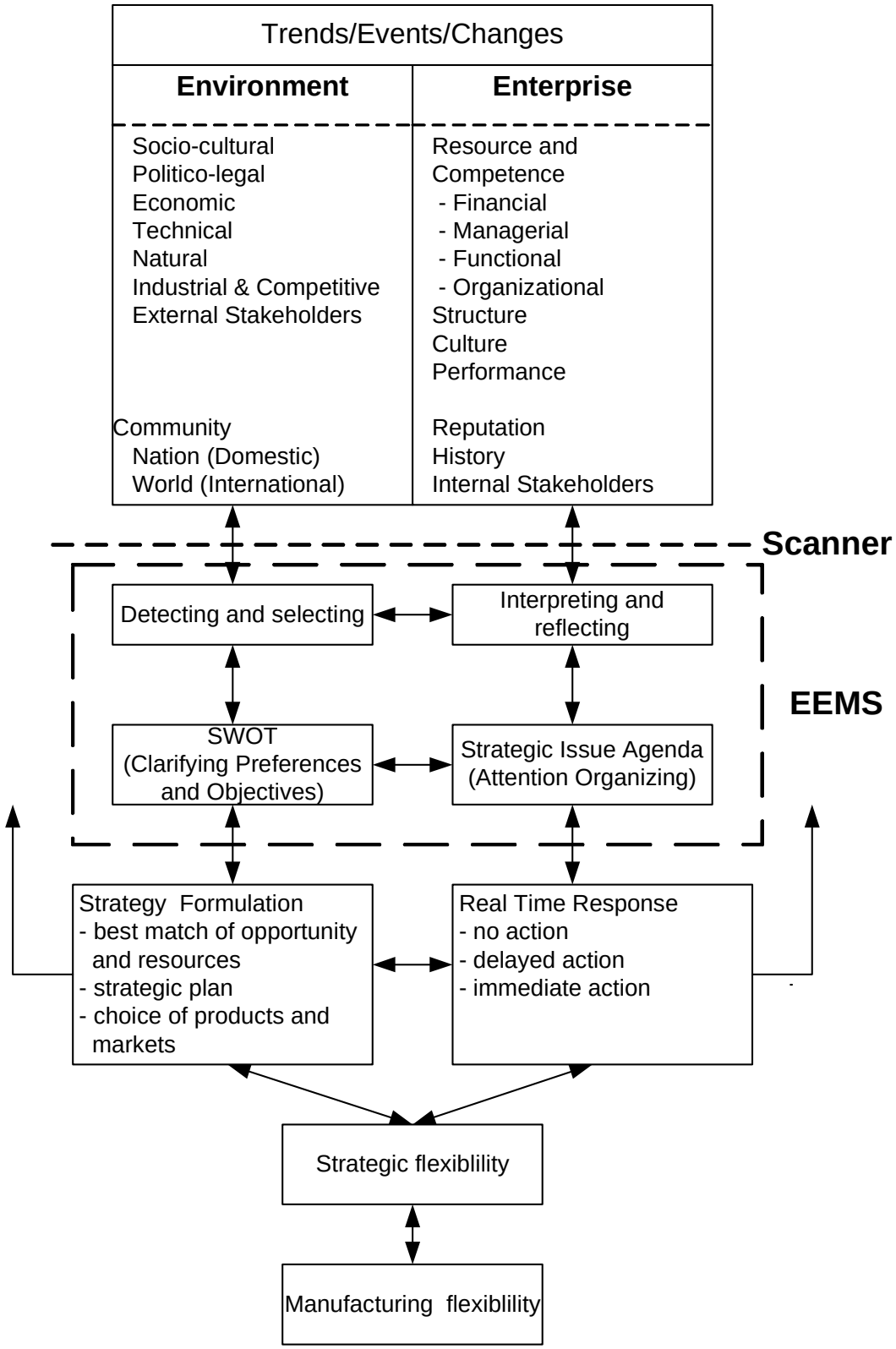

Figure 2. The role of Enterprise Environment Monitoring System in the creation of flexible enterprise

Source: The own study based on Shuhua L., *Strategic scanning and interpretation revisiting: foundations for a softwere agent support system.* Industrial Management & Data Systems 1998, 7.

The other possibilities are offered by transactional system with a simple data base, and others system together with knowledge database and for example Business Intelligence tools. For people using information resources of the system it is very important the content of knowledge and methods data base, especially simulation and prognostic ones. Technical-technological structure of the system is defined by application of solutions: hardware, network, software.

The resources of the system decide about its efficient functioning. Among system's resources there can be distinguished: human resources, technical, information and procedural ones. Human resources of the system are constituted by system's users, specialists who manage, program and maintain the system. Technical resources are computers and all devices which work with them. The most significant are information resources and procedural of the system, especially its adjust to the information needs of managerial staff. The resources of Enterprise Environment Monitoring System may be used by management of all levels from operational, tactical to strategic level. The management of lower levels use gathered information concerning e.g. the lowest process of materials, the best customers, price lists of competitive companies etc. For management of strategic level very important are information concerning so called weak signals.

The System helps to attain enterprise flexibility, because having the "weak signals" information available, the enterprise enhances its sensitivity to changes.

The implementation of the Enterprise Environment Monitoring System contributes to the increase in the adaptation capabilities of the enterprise, as the awareness of the changes foreseen in the environment enables the adaptation of the enterprise's potential so that those changes can be accepted.

In Figure 2 is shown the role of Enterprise Environment Monitoring System in creation of flexible enterprise.

The enterprise's environment is increasingly complex, and from that huge number of subjects that are or may be in competitive or cooperative relationships with the enterprise, those should be chosen, whose behaviour is of the greatest importance to the enterprise's future, and the searching process should be conducted. Attention should be focused primarily on the so caller critical (key) factors of success. Searching for opportunities is the hardest plane of adaptation activities. Having full information of the enterprise's internal and external environments available, the adaptation capabilities of the enterprise, or its internal and external flexibility, can be readily assessed.

Summary

The functioning of an enterprise, its development and achieving a success are always conditioned by its ability to adjust itself to the requirements of the environment.

In summing up the above discussion it can be recognized that the Enterprise Environment Monitoring System, which has been tailored to the individual information needs of a given enterprise, may be an efficient tool aiding the enterprise's activities of adaptation to the changes in the environment. The benefits from using the Enterprise Environment Monitoring System in the process of the enterprise's adaptation to the environment include:

- Reducing the effect of specific events, e.g. by the diversification of the enterprise's profile of activity;
- Shortening the time of response to the changes in the environment;
- Reducing the response costs, as it has been possible to design the proper structure of resources, e.g. the alternative use of machinery/equipment.

A continuous monitoring and scanning mechanism for market, competitor, and customer information should be established to help the executives. The significance of technological, economic and regulatory sectors differs from industry to industry, the scanning mechanism should be industry-specific, and be selective to detect only strategic important signals.

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