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VARIABLE MANAGEMENT PARADIGMS ECOCENTRIC MANAGEMENT IN INDUSTRIAL ECOSYSTEMS

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Abstract. *If organizations are to be intensively adjusted to the ecological degradation characteristic of the society of risk, then they must employ a new management paradigm, or orientation. They need an orientation focused on technological and ecological risks which does not treat risks as external, but as an essential management problem.*

The placement of risk in the central opus of organizational theory and practice may be implemented in several ways. Our approach in this matter is the need for adoption of the shareholders' perspective, because it is they who take most of the risk of industrial activity. Nature! Why? Because nature is the source of all life, and because the certainty of human welfare is dependent on it. By placing nature (human health, and not wealth) in the centre of management, the concern of the organization becomes a warranty of the alternative management paradigm.

In our further text we shall stress the description of ecocentric management paradigm. The intention is to help in the creation of ecologically viable and organizationally acceptable relationships. This paradigm is the right place for management researchers to be, from which to start and, consequentially, it is a test, transition and incompleteness. In the parts that follow, two major concepts are suggested – industrial ecosystems and ecocentric management, which look into the future of interorganizational relations and internal organizational elements. Industrial ecosystems provide the vision of organizational population and the inter-organizational relations compatible with the bioregional systems of nature. The ecocentric management, on the other hand, seeks ecological viability of economic design and practice.

THE IMPORTANCE OF TECHNOLOGY IN THE CHANGING ECOSYSTEM

If we start from the basic premises of the Marshall Plan (1947), initially called the European Recovery Programme (ERP), and its comprehensiveness regarding the

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development of the European continent, we come to the knowledge that a similar programme would be essential for today's ecosystem and environment development. We stress this necessity for reasons of growing needs and pollution of environment, but also because of a realization that organized measures need to be taken in order to prevent the possible ecological catastrophe of this civilization. According to the plan, which in the US has already been captioned The Second Marshall Plan, the rich countries will have to allocate funds for the transfer of ecologically-friendly technologies to the "third world", as well as to aid the poor countries to achieve the stability of population and find a way toward a viable economic development. In order for such a programme to succeed, the rich nations will have to undergo changes which will be considerably more difficult than those occurring in the "third world", for the simple reason that the existing power relations and patterns that have taken root will have to be changed. The resistance to these changes will be considerable, but they must take place in the developed and underdeveloped countries.

By taking as basis the contents of the new Marshall Plan as a model and inspiration, we have in mind the fact that the world environment-preservation programmes must be organized around the *strategic objectives*, which at the same time represent the most important changes and allow us to recognize, measure and assess our progress in the implementation of these changes. Each objective must be supported by a series of measures which will enable the entire civilization to achieve it as expeditiously, effectively and equitably as possible.

It is our opinion that it is possible to set five objectives which must be oriented and fashioned with the aim of salvaging the global environment. These aims include the following:¹

1. The first strategic objective should be the *stabilization* of the world population. This includes the stimulation of nations to minimize their mortality rates and increase their birth rates, thus bringing them to comply with the development of their national economies and technologies.

2. The second strategic objective should be a *swift development of ecologically suitable technologies*, particularly in the fields of energy resources, transportation, agriculture, construction and manufacture - which could support a viable economic development without the accompanying destruction of environment. Such new technologies should speedily be transferred to all nations - especially the "third world" countries.

3. The third strategic objective would be the *comprehensiveness and completeness of changes in the economic rules by which we measure the effect of our decisions on the environment*. In this sense, we consider it necessary to introduce a method of bookkeeping and accounting as will take into account and calculate the adequate value of the ecological consequences of routine decisions taken by individuals and companies in the market, as well as of the more extensive national and governmental macroeconomic decisions.

4. The fourth strategic objective would be the *making and adoption of new-generation international agreements* containing the regulations, concrete prohibitions, joint plans,

¹ Al Gore: *Earth in the Balance*, Mladost, Zagreb, 1994., p.235.

implementation mechanisms, incentives, investment agreements, fines and mutual obligations, in order to make the plan work. These agreements must minimize the vast differences of possibilities, capacities and needs existing between the developed and underdeveloped nations.

5. The fifth strategic objective is determined by the establishment of a *world population global environmental education plan*. This would include a comprehensive programme of spreading information on the local, regional and strategic threats to environment. The ultimate objective of such endeavours is to give an incentive for new ways of thinking with relation to the attitude of our civilization to the global environment.

The integral part of this plan is found in the creation, particularly in developing countries, of social and political conditions most favourable to new, viable societies, such as social justice, dedication to human rights, adequate nutrition, medical care and housing, high literacy rates, greater political freedoms, etc.

With relation to the above objectives, we shall particularly dwell on the importance of technology and its transfer, with the aim of assuaging or totally avoiding environmental disturbances. This phenomenon is the cause of a unanimous opinion, because, *per se*, the crucial part of all of the human population endeavors consists of giving a meaning to life on earth in a way appropriate to the civilization we belong to.

This programme, or aim, primarily requires the development of ecologically appropriate technologies to support a viable economic growth and supplement the ecologically disastrous technologies now in use. Such new technologies *must be* efficaciously transferred to those nations which cannot develop or purchase them by themselves. On the other hand, however insistent one may be in this, it is dangerous to consider technology the sole culprit for the ecological crisis. On the contrary, to take that a new technology may be a panacea which will cure all the difficulties is wrong, and such belief has led to the present environmental crisis.

If in the future we are unable to comprehend in a more objective manner the potential and dangers technology brings with it, the new technological power may additionally contribute to the destruction of environment. Failure to create new technologies, however, would mean that the society would fall into a "slumber", which could in no way be taken as an intrinsic struggle for a better environment. We consider the development of new technologies an imperative for the survival of mankind, but in a way and under the type of control that would secure its proper use and advantages. After a new technology - ecologically destructive or not - is established, it is very hard to do away with. It should be stated that individuals, corporations, social institutions, as well as nations, adapt themselves to the demands of their technologies, investing considerable capital, effort and time, so that the very thought of change becomes impractical and inconceivable.

New technologies should not be too readily adopted. An in-depth study of their effect on the environment is a *conditio sine qua non*. An example for this may be found in the case of the use of CFC (chlorinefluorohydrogen). This substance was developed as substitution for earlier chemicals harmful on contact. It had been found not to be poisonous before it was put into production. It sounds ironic that this chemical does not react chemically to human contact due to the stability of its molecules, and that is precisely what enables its molecules to float upward without interference in the lower parts of the atmosphere - until they come to the stratosphere, where they disintegrate under the sun's ultraviolet light, causing the destruction of the ozone layer. Although no

research can be expected to determine all the possible effects of a technology, the experience with CFC inspires caution as we admire the power of a new device or technology². Regardless of the fact that humanity is working hard on the substitution of this chemical, it is not yet in a position to abandon it, particularly as used in refrigerating equipment. Regardless of this, it is an obligation and duty of all nations of the world to develop a comprehensive programme of cooperation, strategic in its scope and aggressive in its approach.

In this sense a strategic initiative concerning the environment should be defined - a programme which would discourage and do away with old technologies and develop a new generation of sophisticated technologies harmless to the environment. Such a programme, or initiative, should include the following determinants³:

1. Tax facilities for new technologies and heavier taxes for old ones
2. Funding of new technology-related research and an expedient ban on old ones
3. National purchase programmes for applicable versions of new technologies
4. Promises of large profits in the market, which will come with certainty once old technologies have been discarded.
5. Establishment of detailed, stringent technology assessment procedures, with particular attention paid to all expenses and advantages, both financial and ecological - newly-proposed replaceable technologies.
6. Establishment of a network of training centres around the world, whereby a core of trained planners and technicians would be created in order to ensure that the developing countries be prepared to accept ecologically attractive technologies and practices.
7. Imposition of export controls in developed countries to assess the ecological effects of a technology.
8. Thorough clarification of the present legislative confusion, particularly in those countries which do not protect the inventor rights, improvement of licence agreements.
9. Better protection of patent and copyrights, improvement of licence and joint-venture agreements, franchises, distribution and other legal regulations.

In quoting these items, the following paradigm should be kept in mind: it is not *'only'* the high technology that is to be taken as technology. Very often, the most appropriate and safest approach includes "low technologies", or an uncomplicated, mostly passive approach.

INDUSTRIAL ECOSYSTEMS

The ecocentric concept of organizational population and inter-organizational relations are based on ecological independence and ecological performances of the organizational community (community where the organization is located). Thus the industrial system concept is parallel to the natural ecosystem, which represents a network of associated, independent organisms and their environment, which give to and take from one another the survival resources. By way of an example, in the ecosystem of the sea, large fish feed

²Al Gore, *Ibidem*, p. 244

³Al Gore, *Ibidem*, p. 245

on small fry; small fish feed on insects, and insects feed on corals and planktons. The products of natural photosynthesis and extermination of fish and insects provide food for planktons and schools of fish. This rule creates a self-sufficient, dynamic, and balanced ecosystem.

The industrial ecosystems require the concurrence of these ideas between the natural ecosystems. Conceptually, these consist of a network of organizations jointly seeking to minimize the ecological degradation by the need for their useless waste products and by-products, as well as to divide and minimise the use of natural resources.⁴

Implicit in such circumstances is the belief that it is possible to minimize the ecological effects of industrial activity and put the ecological resources to a better use through cooperative strategies. This cooperation may be realized at several levels:

a) The simplest network ecosystem may include the pointlessness of changes between several closely located organizations, and

b) Extensive industrial ecosystems may establish cooperative relations at local, regional and national levels. Ideally, the bioregional ecosystem limitations are desirable, because they create the most natural bioregional capacities for the resources: energy, market and waste disposal sewers.⁵

A network of companies at Kalundborg, Denmark, is an example of an industrial ecosystem. It consists of a thermoelectric power station, a refinery, a chemical factory, a cement plant, a brick kiln and several farms. All of these plants use each other's waste and by-products as raw material for their production processes. They coordinate the use of raw material, energy, water and know-how in the management of waste. The following is a flowchart showing their mutual relations (Fig. 1).

Instead of condensing and storing it, the Asneas coal-burning power plant sells its used steam to the Novo Nordisk Plant for the production of enzymes and to the Statoil Refinery. The electric power station also sells its airborne ashes (smoke) to the cement plant, and uses the remaining surplus steam to heat the town. In return, the Statoil Refinery supplies the power station with treated water and heat. It also sells the desulfurised burning (heating) gas to the power station, thus saving 30,000 tons of coal annually.

The high-sulfurous gas plant sends it to the sulfuric acid plant. Asneas process the waste in their smoke towers and sell it to the limestone processing plant in Cyprus, or the limestone plants for the production of wall linings. This factory gets the low-grade cement from the cement plant, thus reducing or totally eliminating gas imports. The Asneas power-plant heats the fishery, which has an output of 200 tons of fish and waste annually, and this very waste is used by the local firms (from the fishery and the Novo plants, producing enzymes as fertilisers).

The preservation of this industrial ecosystem's effect on the environment is impressive. The ecosystem saves the water pumped out from the Tiso Lake (some 7 kilometres away). The quantity of fallout has been minimised. In this way waste, which

⁴ Allenby, B.R.(1993), *Industrial Ecology*, New York; Prentice Hall

⁵ Frosch, R.A., and Gallapoulos, N.E.(1992). *Towards an Industrial Ecology*. In A.D.Bradshaw(ed). *The Treatment and Handling of Waste*, London: Chapman Hall. Tibbs, H.(1991), *Industrial Ecology: An Environmental Agenda for Industry*, Boston: Technology and Product Development Directorate, Arthur D.Little.

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**PROMENLJIVE PARADIGME MENADŽMENTA
- EKOCENTRIČNI MENADŽMENT
U INDUSTRIJSKIM EKOSISTEMIMA**

Branislav Djordjević

Ako organizacije treba snažno usmeriti ka ekološkim degradacijama svojstvenim rizičnom društvu, tada one moraju koristiti novu menadžment paradigmu, odnosno orijentaciju. One trebaju takvu orijentaciju koja se fokusira na tehnološke i ekološke rizike koji ne tretiraju rizike kao eksternalije, nego kao bitan problem menadžmenta.

Stavljanje rizika u centralni opus organizacije teorije i prakse, može se ostvariti na više načina. Naš prilaz u ovome je potreba usvajanja perspektive akcionara koji nose najveći rizik industrijske aktivnosti. Priroda! Zašto? Zato što je priroda osnova ukupnog života i zato što izvesnost ljudskog bogatstva zavisi od nje. Stavljajući prirodu (izvedeno ljudsko zdravlje, a ne bogatstvo) u centar menadžmenta, briga organizacije postaje jemstvo alternativne menadžment paradigme.

U daljem izlaganju naglasićemo opis ekocentrične menadžment paradigme. Htenje je da se pomogne u kreiranju ekološki održivih i organizaciono-zajedničkih odnosa. Ova paradigma je pravo mesto za menadžment istraživače, odakle treba da počnu (startuju), i sledstveno tome, to je proba, privremenost i nepotpunost. U sledećim delovima, odnosno izlaganju, sugeriraju se dva osnovna koncepta - industrijski ekosistemi i ekocentrični menadžment, koji gleda na budućnost interorganizacionih odnosa i unutrašnjih organizacionih elemenata. Industrijski ekosistemi obezbeđuju viziju organizacione populacije i interorganizacione odnose koji su kompatibilni sa bioregionalnim sistemima prirode. Ekocentrični menadžment na suprot tome, traži ekološku održivost ekonomskog dizajna i prakse.