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USING BUSINESS GAMES TO TEACH ENVIRONMENTAL AWARENESS AND GREEN MANAGEMENT: THE INTERNATIONAL EXPERIENCE WITH THE ENSIM GAME

Kostas Agorastos, The University of Macedonia, Greece
Pandelis Ipsilandis, Technical Education Institute, Greece
Asterios G. Kefalas, University of Georgia Georgia

ABSTRACT

The purpose of this game is to sensitize participants in thinking responsibly with respect to the Physical Environment or Ecology. Traditionally, the objectives of profitability and environmental quality were considered antithetical. Conventional wisdom asserts that expenditures for environmental quality are funds that could add to the value of the enterprise by being distributed to the stockholders or reinvested. The session will open up with a position paper. Subsequently the experiences with three attempts to teach students and executives environmental awareness and green management via the Environmental Simulation Game (ENSIM) in the USA, Latin America and Greece will be presented.

INTRODUCTION

Today, between 75 % and 95% of U.S. citizens consider themselves to be green. Yet dues-paying members of the five most influential environmental groups peaked in 1990 at 2.4 million. By 1995, membership had declined to 2.1 million. Total membership of Greenpeace alone dropped by a million. Network news coverage of environmental issues has dropped dramatically since its 1989 peak of 774 minutes (the year of the Exxon Valdez disaster). By 1996 the number had declined to 161 minutes. (Roberts, 1997, p. 56) One may wonder as to the reasons for this development. Could it, for example, be possibly that the entire environmental movement has been a fad of the youth of the sixties and seventies? In other words, could one possibly attribute this

decline to the fact that the <<flower children>> of the sixties have now become responsible men and women with gray suits that prefer greenbacks to greenlands? Finally, could it, perhaps, be because the government and business have done an excellent job to protect the environment to the point that most concerned citizens see no reason to be active? The answer is, of course, very complex. And it must be complex since this is an indeed exceedingly complex issue.

This session focuses on the private-for-profit corporation as the primary agent in the process of satisfying the human struggle for survival. The paper first traces the evolution of the environmental revolution, starting with the Romantic 1960s and ending with the Sobering 1990s. Subsequently the experiences with three attempts to teach students and executives environmental awareness and green management via a simulation exercise the Environmental Simulation Game (ENSIM) in the USA, Latin America and Greece will be presented.

THE EVOLUTION OF THE ENVIRONMENTAL REVOLUTION

Concern for the physical world that surrounds humans went through four interrelated phases. Starting with a mere awareness and sensitivity of the impact of human activity upon the other non-human inhabitants of the planet earth, humans translated this awareness into living styles and incorporated it into their laws and habits that govern their behavior and their every day lives.

These stages are:

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The Age of Environmental Awareness: The Romantic Sixties

The Age of Institutionalization: The Legislative Seventies

The Age of Contemplation and Analysis: The Sobering Eighties

The Age of Market Action: The Ecopreneuring Nineties

The Age of Environmental Awareness: The Romantic Sixties

This age is characterized by the human recognition of its dependence on its physical surroundings, i.e., nature. In the beginning of the sixties, Rachel Carson, moved by Albert Schweitzer's aphorism that "Man has lost the capacity to foresee and forestall. He will end by destroying the earth," embarked on an attempt to "explain what has silenced the voices of spring in countless towns in America." Her Silent Spring became the handbook for enlightened young and young thinking" intellectuals. In the opening paragraph of the second chapter of her instant bestseller, Carson declared that "The history of life on earth has been a history of interaction between living things and their surroundings. To a large extent, the physical form and the habits of the earth's vegetation and its animal life have been molded by the environment. Considering the whole span of earthly time, the opposite effect, in which life actually modifies its surroundings, has been relatively slight. Only within the moment of time represented by the present century has one species -- man -- acquired significant power to alter the nature of his world." (Carson, 1962, p.2)

Following Carson's steps, numerous scientists, both in the U.S. and around the globe, offered their own explanations of the "silencing of the voices of spring." Paul Ehrlich (1974) put human reproduction at the center of his conceptual framework in his famous The Population Bomb. Barry Commoner (1971) identified the industrial development as the culprit in his The Closing Cycle. Finally, the MIT and the Club of Rome (Meadows, et. al, 1972) put it all together in a

computerized simulation model under the leadership of Jay Forester. After numerous "runs" under different conditions, The Limits to Growth "proved" that if current -- 1970's-- conditions were to continue, the world will experience limits to its economic growth. These limits were associated with earth's carrying capacities, both as a resources provider and as pollution absorber. This modern computer-assisted intellectual exercise confirmed Ehrlich's earlier predictions and repackaged in his The End of Affluence. (Ehrlich, 1974)

The Age of Institutionalization: The Legislative Seventies

Despite the immediate convincing rebuttals by the renown futurist Herman Khan (1976) and his Hudson Institute, Julian Simon (1981) and numerous other personalities denouncing categorically the methodology and the "findings" of the Club of Rome, society seemed to be convinced of the necessity to "do something about the environment." Thus, in 1972, the U.S. Congress passed the National Environmental Policy Act (NEPA) that aimed at harmonizing environmental laws across the entire United States. To assure the public that this time the State means business, NEPA created its own policing body, the Environmental Protection Agency (EPA), that was giving wide powers to detect, prosecute, and punish offenders.

In a short time, the entire country began to experience the fruits of its environmental concern. The early seventies were rocked by a series of suits and counter suits where the American corporate establishment was pitting its top legal brass (the so-called Superlawyers) against the government's judicial machinery. Social activists, under the leadership of Ralph Nader and his Nader's Raiders, were "snooping" around corporate backyards looking for wrong doings. Corporate lobbying bodies estimated the cost of compliance with the NEPA in the hundreds of billions of dollars. The liberals accused the

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corporate resources incorporate investment and land reclamation corporate establishment that it was fleeing the U.S. in search of “pollution heavens” overseas in the so-called Less Developed Countries or LDCs. The establishment accused the “greens” of trying to “kill the Golden Goose that lay the golden eggs.”

The Age of Contemplation and Analysis: The Sobering Eighties

Toward the end of the seventies, corporations seemed to have begun to show signs of battle fatigue. While some of them gave the impression of a true acceptance of the law, which they were praising on every occasion, others started serious Research & Development (R&D) efforts aimed at solving their environmental problems once and for all. During the entire decade, there seemed to be a tacit agreement between the corporate establishment and the public that indicated that society was willing to give corporations the time needed to make an honest effort to solve “their” environmental problems. At the same time, the state under the Reagan regime managed to avoid taking any drastic moves that will hinder corporate efforts. Some observers even thought that the administration was considerably more lenient and more tolerant than the previous ones.

While society was contemplating the numerous environmental issues ranging from some isolated ecological disasters such as oil spills or an unfortunate gigantic accident like the Bhopal incident, industry had incorporated the entire environmental issue into its traditional corporate *modi operandi*. One by one, corporations begun “restructuring” their bureaucracies and rewriting their strategic plans and tactical policies to incorporate their own version of “how to deal with the environment.” The eighties witnessed the dawn of the institutionalization of the environmental concern by corporate America. Motivated by the fear of more external regulation or by an honest “change of heart,” the institutionalization of the environmental concern by U.S. industry took the form of the following

three corporate strategies:

- (1) Adding the environmental concern into the corporate code of ethics.
- (2) Restructuring the corporate hierarchy by adding a new unit that was charged with the development and execution of plans to minimize the environmental impact of the firm’s activities.
- (3) Restructuring the allocation model to for antipollution purposes.

The Age of Market Action: The Ecopreneuring Nineties

The management steps taken during the eighties by U.S. corporations have paid handsome dividends both for the society at large and the environment but also for the innovative corporations that took appropriate initiatives. Corporate change of heart is manifested by the changes in management decisions pertaining to corporate policies and practices. These changes in management decision making are translated into actual allocations of resources which, in turn, are translated in new products and processes. If this process of transformation of ideas into actions and into products and processes does not occur, then whatever management says in top brass speeches and image ads is false.

(Bennett, 1991).

THE ENVIRONMENTAL SIMULATION GAME (ENSIM)

The Purpose of the Exercise

The exercise has the following four objectives:

- (1) to instill in your mind an environmental consciousness,
- (2) to instill in your mind a team-building **and team-managing** consciousness,
- (3) to instill in your mind a **respect for information as the basic ingredient for good and wise decision-making consciousness, and**

- (4) to instill in your mind **the importance of using Information Technology as a DM's tool.**

In one sentence the objective is to learn how to run a

*****PROFITABLE AND ENVIRONMENTALLY SOUND COMPANY*****

Hundreds of students and managers all over the world have accomplished this mission. After a few runs of disappointing results, participants learned to set and accomplish objectives both in the area of environmental and people quality and profitability and growth.

A Brief on the Structure of ENSIM: The Basic Elements of ENSIM: Inputs, Process, and Outputs.

Figure 1 gives a panoramic picture of the basic elements of ENS IM. [A detail slide presentation can be found in www.cba.uga.edu/~akefalas]

The Inputs. The inputs to the system are the decisions made by the participants. These decisions are made on a monthly basis and cover all the major functional areas, such as Production, Marketing, Sales, and Finance and of course Environmental Quality.

The Process. The inputs to the model are processed by any PC with a minimum technical configurations. A front end program in BASIC allows the administrator to enter all the decisions and run the program. Processing time is a few seconds.

The Outputs. The program creates a series of reports. The traditional financial statements (P&L and Balance sheet) are supplemented by a set of operational information. Finally, an Excel spreadsheet uses the output reports to create a series of ratios and graphical presentations for the administrator. An Excel spreadsheet provides tabular and graphic presentation of the results by month as well as cumulative summaries and rates of change.

THE INTERNATIONAL EXPERIENCES

This portion of the session will focus on the experience we've had in using ENSIM to teach executives and students the art and science of managing an environmentally responsible and profitable company.

The Management Development Program Experience

In 1995 twenty-five managers of a Mexican pharmaceutical company took part in a two-days workshop on management. ENSIM was used as a vehicle for accomplishing two goals. The first goal was to familiarize participants with the "numbers." The basic idea is that people tend to appreciate the numbers contained in the Profit and Loss Statement, the Balance Sheet and the various reports on the operating information if they had a hand in their creation. The second goal was sensitize participants on the importance of environmental quality. Mexico, as any other developing country, is confronted with a serious problem of air and water pollution. The overall objective of the workshop was to learn it is possible to run an environmentally responsible and profitable company.

Table 1 presents the performance of the five teams of managers over the duration of the workshop. The workshop simulated a five months period. Starting with the initial condition for the month of April participants ran their respective firm from May to September. The lectures and the manual pointed out that air and water pollution is byproduct of the production process. Pollution is a function of the production volume. The more one produces the more one pollutes. Pollution can be abated by spending money on pollution abatement. Funds designated for pollution abatement are expenses that are deducted from the revenue of the month in which they occur. Thus pollution expenses impact the bottom line, i.e., net income with the known implications for all the metrics used by management. Failure to spend funds for pollution abatement will increase the

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probability that the firm will be fined (\$100,000 per violation) and/or be shut down for three working days. Participants were given the initial state of the simulated firms. Decisions of the previous management led to a \$100,000 fine for water pollution which stands in April at about 98% from the closing limit.

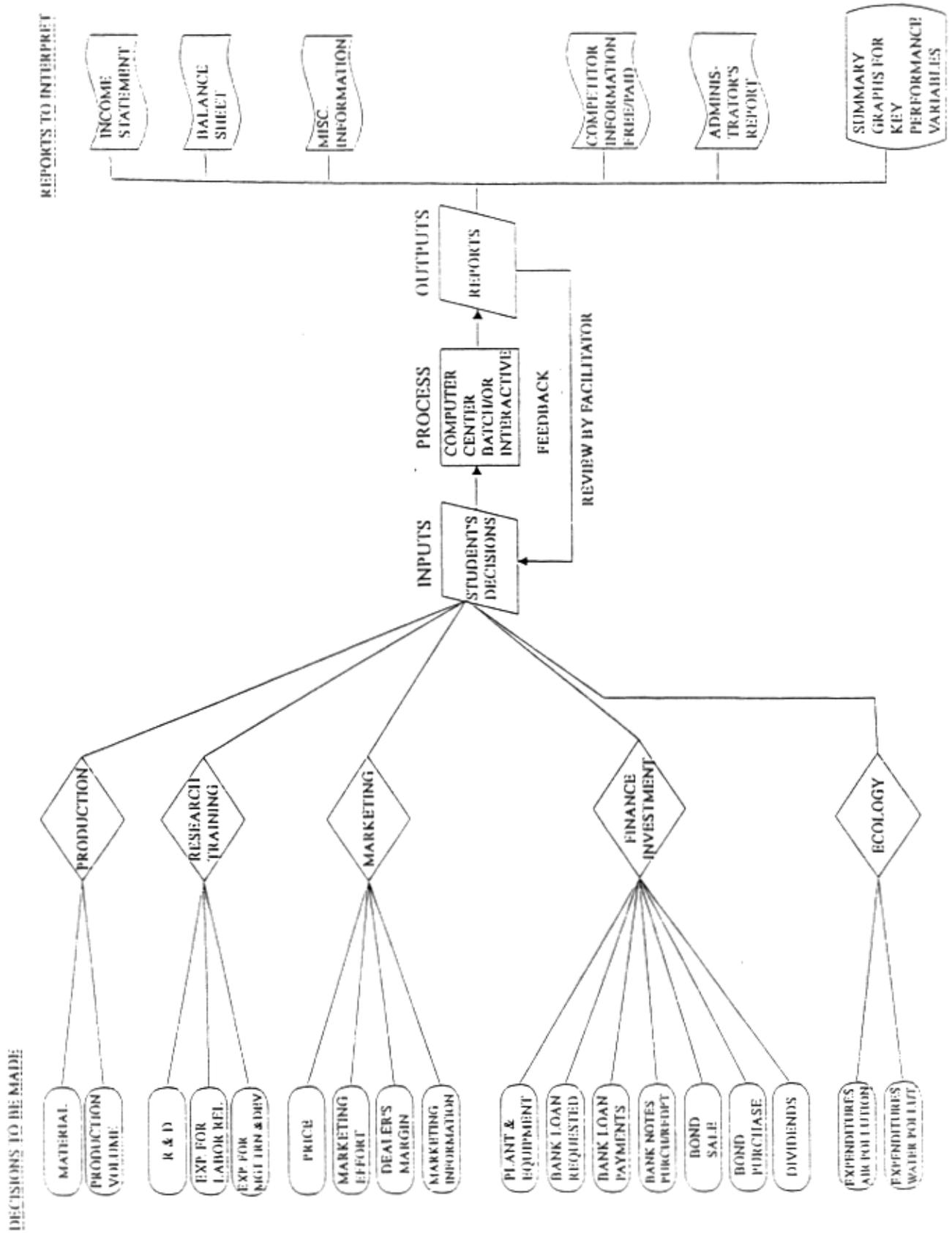
Table 1 shows the relationships between (1) the volume of production, (2) the amount of pollution, pollution fines, shut downs, and (3) the bottom line for all firms for the entire duration of the workshop. As the table shows the objective of minimizing pollution fines and shutdowns has been accomplished. At the end of the sixth month pollution abatement expenditures almost doubled while pollution levels were cut in half. Up to the third month profitability was keeping up fairly well. In July firms 3 and 4 experienced a three day shut down that affected their production and profitability negatively. In addition firm 5 decided to produce at 38% of capacity thereby incurring a heavy loss of production and revenue with horrible effects on profitability. Finally, by September the “end-plying the game” mentality settled in causing heavy losses.

The lessons learned from this exercise became clear at the stockholder meeting. After having the opportunity to see the entire picture of their decisions over the six months they were able to ascertain the basic relationships between production, pollution generation, pollution abatement efforts and profitability. As one participant put it “we’ve learned that when it comes to pollution, it doesn’t pay to be penny-wise and pound-foolish. We’ve tried to save money by not spending for pollution abatement and we got burned. We cut \$50,000 in our air pollution abatement and it costs us \$200,000 in fines and a three days shutdown. If I were the boss, I’d fire me!”

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ENSIM: AN OVERVIEW



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**TABLE 1: ENVIRONMENTAL SIMULATION (ENSIM)
MANAGEMENT DEVELOPMENT WORKSHOP, MEXICO CITY 1995**

DECISIONS RESULTS	APRIL	MAY	JUNE	JULY	AUGUST	SEPT	SEPT-APR
	(INITIAL STATE)	AVERAGE	AVERAGE	AVERAGE	AVERAGE	AVERAGE	RATE OF CHANGE
SALES	1801413	2076761	2292584	2208151	2082622	2043728	13.45%
PRODUCTION PLANNED	270000	243000	271050	293400	298131	307522	13.90%
ACTUAL	270000	243000	240744	234300	280131	272279	0.84%
MISSED	0	0	30306	59100	18000	35243	#DIV/0!
CAPACITY CAP.UTILIZATION	307675 87.75%	310367 78.29%	318039 75.70%	315654 74.23%	313287 89.42%	321380 84.62%	4.45% -3.57%
POLL.ABATEMENT AIR	60000	58000	60000	90000	200000	154000	156.67%
WATER	80000	108000	118000	140000	126000	134000	67.50%
POL.ABT%SALES	7.77%	7.99%	7.56%	11.46%	15.25%	14.82%	90.76%
POLLUTION							
AIR WATER	25 23672	33 8638.4	43.8 9468.2	47.8 4840.2	36.2 10072.6	19.2 12609.2	-23.20% -46.73%
FINES AIR	0	0	40000	80000	60000	20000	#DIV/0!
WATER	100000	20000	40000	0	0	60000	-40.00%
SHUTDOWNS	0	0	0.6	1.2	0.6	0.6	#DIV/0!
NET INCOME	57656	230021	131538	-19821	-253885.8	-249185.4	-532.19%
NET INCOME %	3.20%	11.20%	5.79%	-4.56%	-17.84%	-25.47%	-895.94%