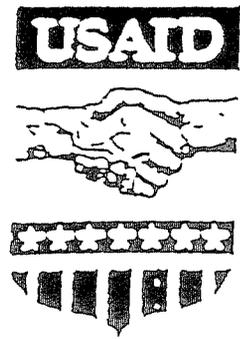
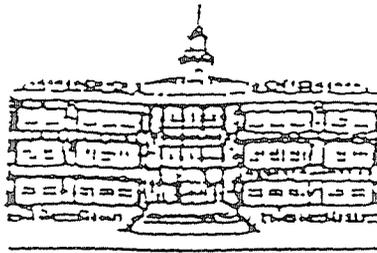
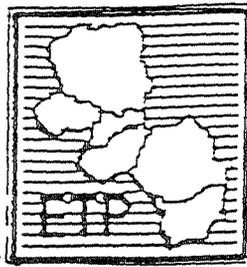


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**ASSESSING IMPACTS
OF POST-DIPLOMA STUDIES
ON ENVIRONMENTAL BUSINESS MANAGEMENT**

University of Minnesota
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Prepared by:
Ekaterina Dimova and Stoyan Hadjivelichkov
Varna University of Economics

copy

VARNA, 1997

**Postgraduate Center
Varna University of Economics
and
Center for Nations in Transition
Hubert H. Humphrey Institute of Public Affairs
University of Minnesota**

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**Program funded by
Environmental Training Project for Central and Eastern Europe
from sources of the US Agency for International Development
and from Bulgarian funding sources**

VARNA, 1997

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(Corrected copy)

FOREWORD

Environmental Training Project (ETP), a collaborative agreement with the United States Agency for International Development (USAID) for Central and Eastern Europe (CEE) has completed one of the most successful programs last year -- Post-Diploma Study in Environmentally Friendly Restructuring of Heavy Industry (PDS) in four CEE countries -- Bulgaria, Hungary, Poland and Slovakia. Varna Economic University (VEU) was the selected Bulgarian university to introduce the PDS

The first offering of PDS focusing on environmentally friendly restructuring of different branches of industry located mostly around Varna region. gathered 19 participants from 16 large and middle size companies. They represented mostly a middle level of management. All of them prepared a final thesis oriented on practical problems of their companies. They prepared, among others, 12 environmental protection proposals, four business plans, two marketing plans and one strategic plan. Most of participants prepared also environmental audits (17) and environmental impact assessments (15) for their companies. Before the end of 1996, five of the projects have been already implemented. Taking into account the economic and environmental impacts of the proposed investment projects, such as significant pollution reduction and improvements in energy efficiency, one could say that the PDS fulfilled its mission -- contribution to environmentally friendly restructuring of CEE.

These accomplishments are a joint result of several types of partnership relationships developed over the last few years. First, a partnership has been established between VEU and the University of Minnesota -- the leader of the consortium managing ETP. Another partnership was developed in the collaborative process of designing and delivering PDS curricula between American and Bulgarian faculty members. It should also be emphasized that an effective partnership for matching funds between the USAID and Bulgarian businesses was demonstrated. Finally, a fruitful partnership was developed between PDS faculty members and participants in conducting classes and preparing their dissertations. This way, the VEU developed a form of environmental extension service for restructuring industries in Bulgaria

Having this opportunity, I would like to thank all our partners participating in this successful program, particularly the leaders from both universities, faculties and PDS and ETP coordinators.

Now, with the verified by Bulgarian businesses PDS curricula and with the gained managerial experience of running such a program, the VEU has a chance to continue this program by themselves. Also, our graduates possess more than the joint American -Bulgarian PDS Diploma. They have new knowledge, skills and ready to apply field projects from their dissertation. So they have also chance to change their businesses and environment For these reasons, I wish all my Bulgarian academic partners and PDS graduates to take that chance and to succeed!

Dr. Zbigniew Bochniarz
ETP Project Director

2. INTRODUCTION

The goal of American-Bulgarian Post Diploma Studies (PDS) was to improve the managerial skills and the environmental awareness of management teams from many key industries of Varna. The participants of PDS had an opportunity to become familiar with the experience of both American and Bulgarian specialists and were able to exchange ideas with representatives of other companies. This kind of collaboration, can create a strong basis for environmentally friendly restructuring of the many businesses in the Varna region.

After finishing the first offering of PDS, there is a need for assessing the impact which the Post-diploma studies had on environmental business management. The quality of the theses presented by the participants is an important criteria for assessing the impact which PDS had on specific companies. The assessment of the usefulness of delivered lectures, classes, discussions and literature was achieved through special questionnaires, which were filled out individually by the participants.

The Participants

The analysis of Table 1 shows that the participants came from middle and large size companies. In that way the management's decisions and knowledge will have impacts not only on themselves, but also on the firm's employees, their family and the whole region.

Table 1 Institutions represented in the PDS

POS.	NAME OF INSTITUTION	# of Inhabitants/employees
1	Municipality of General Toshevo / Scitia, OOD	40000/300
2	Eco-group, OOD	18
3	Khan Asparuch, AD	700
4	Geosol, OOD	400
5	Sodi EAD	4000
6	Antibiotic, AD	1500
7	Toplostrov EOOD, Varna	350
8	Grand Hotel Varna	400
9	Marzianopol AD, Devnya	450
10	Varna Shipyard AD	3000
11	ET Virgitua, Varna	4
12	Agropolichim Ad, Devnya	1400
13	National Electricity Company EAD, branch Razgrad	600
14	United Bulgarian Company, PLC	120
15	Osnovi PLC Varna	70
16	University of Economics, Varna	12000

3 .ASSESSING THE IMPACT OF P.D.S. ON SPECIFIC COMPANIES

3.1. Scitia -General Toshevo

This firm was represented in PDS by the Deputy Mayor of municipality General Toshevo. He is responsible for the economic development of the region. The thesis presented by him is a good example of using knowledge acquired during Post- Diploma Studies. The thesis includes some general information on the company, including information about the firm's history and establishment, its products and activities, and its resources.

Scitia is a producer of different kinds of home electrical appliances and repair parts. The main part of the production technologies are old and this has led to many ecological and health problems. As of now, there is no marketing department or expert in their firm, nevertheless Scitia has a strong position in the Bulgarian market of home appliances. The lack of marketing orientation and clear innovation policy is currently the cause of a market share's decline for some of the firm's products.

According to the opinion of the student participant in PDS, lectures and classes were of fundamental importance to his work as a vice-mayor. The lectures enabled the participant to gain a new perspective on what the company's environmental strategy should be. In his diploma thesis, the student presented the company's mission, its main goals and future objectives. The marketing plan presented in the thesis is of a preliminary nature. It will be used by the firm's managers to develop a more long-term plan. The strategic analysis of the company made it possible to determine strong and weak points of the company with respect to marketing, production, personnel and financial resources. The author indicated opportunities and threats for Scitia, taking into consideration the trends of the market, economy, and competitors. The student presented a clear program for implementation of the main promotional, pricing, and production activities. He indicated the most interesting and prospective market segments for each product of Scitia. From this research, he was able to recommend that the firm concentrate especially on the segment of families with middle and low income. After implementing the Life Cycle Analysis, the student suggested curbing the investments on two of the products and to begin quality improvements on the remainder of the items.

3.2. Eco-group ..

The economical development of each country is closely related to its technical and technological improvement and modernization. The technical and technological activities are closely related to the environmental problems. From the one side the innovation could cause environmental problems. From the other side, they could play a role as a new way to solve current problems.

The subject of this participant's thesis is very topical and current. The efforts of Bulgaria to join to the European structures could not be successful without harmonizing of the national ecological standards and international standards. The main goal expressed by this thesis is investigation of the environmental patent activity in Bulgaria during 1988-1996. The student presented the trends of inventor's activities, especially in the area of ecology. He included in the thesis some general information concerning inventions and their legal defense and indicated the main specifics of patent activities in ecology.

For his thesis, the author investigated a lot of publications on the patent defense in the following areas:

- environmental protection
- natural resource protection
- reducing air, water and soil pollution
- vegetable and animal world protection
- environmental impacts on human's health
- wastes- the possibilities to recycling them
- energy consumption reduction
- reducing dust and gas emissions
- reducing the volume of wastes
- reducing the accumulation of wastes from packing

From this research, the student was able to forecast the main future business partners of Bulgaria and the expected patents in the area of ecology.

3.3. Khan Asparuch Ad..

Khan Asparuch is one of the main producers of sanitary faience in Bulgaria. The plant was started in 1979. The technical equipment it uses was imported by the Italian firm, Sacmi, the machine building plant Prerov, formerly of Czechoslovakia, and the building firm Magdeburg, of East Germany. The production capacity of the plant was 4.7 millions sq m per year. In 1989, the firm started to work on a new production installation with an expected capacity from 500,000 sq m per year. Currently the firm uses only one -half of that capacity.

The firm was represented in PDS by the Head of Investment Department. In his thesis the student presented a detailed business plan for the firm's development. He included some general information on the firm and its history. The diploma thesis also included information about the production processes and technologies. It also outlined, the firm's environmental requirements, its organizational structure, location, and forms of employment. In his thesis, the author presented a detailed analysis of the financial resources and condition of Khan Asparuch and discussed some alternative ways of obtaining financial resources.

In the thesis, the student investigated the trends of the market, economy, competition and environmental activities. From this information, he was able to present information on technical

and technological level of production and indicated the main technological opportunities for increasing the production in the different utilities. The student also included information on the production structure, market opportunities and product's quality. He depicted ways of improving the firm's position on domestic and foreign markets. It is the participant's expectations, that this analysis will enable the firm to improve its financial condition, through an increase in the sales of products. On the basis of this analysis, the PDS participant developed his financial-economical forecast for 1996 and 1997. Paying particular attention to net sales incomes and the relative share of the production costs.

3.4. Geosol OOD..

Geosol OOD is a producer of brine. This firm was represented in PDS by the municipality's Senior Expert in Ecology. In her thesis, the student presented detailed information on the salt field of Mirovo, its size, location, configuration and specifics. She investigated the three main methods of reaching brine and their strengths and weaknesses.

- extraction of underground water near by the surface
- underground mining method
- salt extraction through dissolving

The study paid special attention to the environmental problems caused by the L~XI's production. The largest environmentally unfriendly impacts of Geosol OOD were indicated by the student. These are:

1 Increasing the content of salt in the soil. The reason given for this is in the use of brine during installation of sounding machines and during sounding. Some quantities of the salt water run off have had to be collected, cleaned up, and returned into the sounding well. The student presented information about the negative ecological and economical consequences from the lack of hermetically in sounding wells No 3,17,21,23. The losses were about 10000 m³ petroleum. Because of these circumstances, the firm is faced with two environmental problems. The first of these is an abundance of petrol emissions because the lack of hermetically of the sounding wells. The second problem seen is petrol emissions which leak around the sounding machines during repair activities.

2 Swamp territory which surrounds the plant's regions. These areas have to be dried to become useable for sounding.

3 Seismic activities. The salt field of Mirovo is located in a region with a high level of seismicity. Because of the past sounding activities and the many earthquakes which have struck the Mirovo region, the salt field is currently deformed and endangers the sounding machines and buildings.

In this thesis, the participant strived to find a remedy for these serious problems. The recommended actions include:

- developing a control and monitoring system of salt content of underground water •
- petrol pollution prevention through improving sounding technologies and machines

- developing a local station for seismological control
- future using of the empty salt mines as containers for storing natural gas, liquid or solid wastes.

The diploma thesis was met with enthusiasm by the local government and some businessmen and provoked a discussion about the ecological concerns expressed by the participant's thesis

3.5. Sodi EAD..

Sodi EAD is the biggest sodium producer in Bulgaria and in the Balkans and among the biggest worldwide. It has a 10% market share of the world market of sodium. It currently exports 2/3 of its production with its main markets being the ex Soviet republics, Middle Eastern nations, West Europe and Africa. At present, the company employs about 4000 people. Above 95% of its production is contracted in advance. Sodi is one of the biggest polluters in the region because of vast technological weaknesses which it faces. This problem can be solved only through big investments and restructuring.

The company was represented in PDS by the Head of the Ecology Department. The participant's diploma thesis is a good example of use of the knowledge acquired during the Post Diploma Study. In the thesis, the student developed a business plan for Sodi EAD. She presented the mission of the company and its products, markets and competitors. The author paid attention to the problems of production, technologies and operation and prepared a financial forecast for 1996. In her actual thesis, she proposed implementation of a detailed marketing situation analysis. The author indicated the strengths and weaknesses of the firm's products, taking into consideration the quality of the competitors' products. She investigated the current product structure and recommended some ways for future diversification, including restructuring and improvements in the current pricing, promotional and distribution policy.

According to the opinion of the student participate in PDS, lectures helped her to gain a new perspective on the company's environmental strategy. The prepared business plan will serve as a preliminary document to help the firm's management to determine strategic priorities of development and ways in which to focus the firm's efforts and resources on these priorities. The presented business plan is expected to be used by planning, marketing and financial experts to prepare a detailed program for future successful business development.

3.6. Antibiotic AD..

Antibiotic AD is the only producer of antibiotics for human medicine in Bulgaria and the main producer of the animal medicine named Tilosin. This firm produces about 150 different products. The firm was represented in PDS by the Senior Technologist, who was interested in studying the firm's environmental needs and negative effect of production on the environment. He concluded his study by preparing a project that attempted to improve the interaction between the environment and the firm. The author provided an analysis of biosynthesis's technology, including its intermediate stages and the final production of medicines.

In her thesis, the student described the negative ecological impact caused by the firm. In her opinion the main environmental issues are

- Air pollution, including high levels of antibiotics and wastes found in the air. The plant is also a source of emissions, such as dust, gases, and other chemicals,

- Soil pollution,

- Underground water pollution;

- Animal and vegetable world pollution,

- Water pollution. The author presented information on the estimated level of pollution produced by the firm on the Beli Lom river

- Micelle wastes,

- Perlite wastes,

- Aluminum wastes,

According to the student the main sources of pollution are

- the department for micelle production,

- production of sewage from rain and industrial water,

- the waste water collector,

- the local equipment for water regeneration,

- non-adherence to the technological requirements,

- chemical emissions which cause the building's destruction

As a result of PDS the participant had a chance to improve her knowledge on environmental and economic issues. This enabled her to analyze the environmental problems of the firm. She realized that it is more important and beneficial to prevent the environmental problems from appearing rather than dealing with the consequences of these problems. The student showed an ability to identify the main pollution sources and to develop a project for improving the situation. She prepared a proposal for using the waste micelle in ceramic production as an addition to the usual fuel. The student recommended to develop a special container for waste micelle and also discussed some ways for recycling aluminum wastes. The student also

pointed to the unsatisfactory level of technical equipment in the firm and prepared a forecast for the future environmental changes

It is important to notice that the participant took into consideration the issues of self financing and return of investments. She paid attention to the costs needed for changing the old technology and equipment, which made her future plans even more realistic

3.7. Region of Bourgas

Due to large economic growth, urbanization and an increase in the population, treating different kinds of solid wastes has become a greater problem. There are about 700 plants in the world which can produce compost for the needs of agriculture. In Bulgaria, compost is the most popular and traditional method for treating solid wastes. Currently, they are collected in special containers and are transported to special storage regions. Recently, there has been some trials for processing the wastes and producing compost from them, but, unfortunately they were stopped for a variety of different reasons

The main goal of this participant's thesis was to present the specifics of solid wastes and alternative ways of processing them. The student provided detailed information on the factors which have impacted the wastes' quantity /climate, population size, urbanization level, culture of consumption, culture of production, and the culture of collecting the wastes. The author also indicated the current issues surrounding solid waste treatment in Bulgaria. In his opinion they are

- declining the capacity of the current dump hills,
- difficulties seen in building new dump hills because of the land restitution and economic crisis,
- high content of useful natural resources in the solid wastes, that have to be separated,
- economic, technological and legal conditions in Bulgaria are unfavorable for developing wastes processing activities

The author proposes to combine the different methods of wastes treating

- minimizing the quantity of the solid waste,
- recycling the solid wastes,
- producing compost,
- thermal treating of the wastes and using the generated energy and materials,
- environmentally friendly collection and storage of the solid wastes

In his thesis, the student took into consideration the economic problems of these methods. He provided an analysis of their strengths and weaknesses in several important areas, including financing and return of investment, choosing appropriate equipment, and personnel time required

for implementation of the projects. The final result of the student's project was his preparation of a detailed action plan for implementing a restructuring of solid waste treatment.

3.8. Varna seacoast

The Varna seacoast region is one of the most productive eco-systems in the world and one of the most important sources of natural resources for many human activities. This situation caused the student to examine the environmental problems of the seacoast in her thesis and to attempt to find a solution. The goal of the student was to present alternative ways for environmentally friendly use of the seacoast's resources, as well as additional developmental and protectional activities.

The main subject of the thesis was the Blue Flag campaign which places the greatest importance on tourism and recreation in the seacoast region. The thesis provided a complex analysis of the Blue Flag campaign and its results in Bulgaria. The PDS participant then offered a proposal for improving the campaign's positive impact. In his analysis, the PDS participant included information on the main goals of the Blue Flag movement in Bulgaria, including

- information on environmental problems and conditions,
- developing a system for monitoring environmental conditions,
- environmental training at different levels,
- environmental publications,
- Blue Flag competition among the Black sea resorts. In 1996, 8 Bulgarian resorts received the Blue Flag reward.

The student succeeded in providing a comparative analysis between the Blue Flag environmental criteria and legal requirements in Bulgaria concerning environmental protection. She identified the main parallels between them and showed some of the negative results. Another important point in the diploma thesis was an analysis of the Blue Flag organizational structures. The student presented her opinion about the problems in coordinating the different levels and their activities and proposed some ways for improving this relation. She pointed to the issues of motivating the different areas to take a part in Flag activities and proposed some ways for increasing the businessmen's interest in developing environmentally friendly products, technologies and industries. According to the student, the main goal for future activities is to make closer contacts with business people and to raise their interest in ecological investments.

3.9. Varna seacoast and Varna lakes

The author of the thesis provided detailed information on the importance of water pollution protection and prevention in the Varna region. More specifically, he looked at the environmental issues concerning the Varna seacoast and Varna lakes.

He indicated the main sources of water pollution as

- industrial waste water,
- municipal waste water,
- transport activities,
- different kinds of pesticides used in agriculture production,
- wastes from livestock-breeding

The PDS lectures helped the student to provide a detailed analysis of the environmental conditions of the Varna seacoast and Varna lakes in which he estimated the level of their pollution, the relative share of the different kinds of wastes and prioritized the regions which needed solving. Specifically, the student paid attention to pollution with metals. The author identified the most important factors which impacted water pollution: the sea size, the level of water circulation, the river flows, the level of industrial development on the seacoast, the level of urbanization and tourist services, and the level of chemical use in agriculture production. One of the most important points in the diploma thesis was the project presented for reducing water pollution in Varna region.

According to the student, the main objectives for future activities should be

- building new local stations for water cleaning,
- modernization of the sewerage system,
- developing an appropriate social base for implementing environmental programs,
- improving the motivation level and the economic interest in pollution prevention,
- developing and implementing environmental training programs at different levels,
- developing effective systems for environmental control and monitoring,
- reduction of the sources of wastes,
- preventing wastes and losses due to transport and storage

The thesis was met with great interest by local government members. They decided to take into consideration the suggested solutions when making future environmental decisions. The student also pointed out that the PDS studies helped him to understand how to solve environmental problems in relation to their economic aspects. 0

3.10. Toplostroi EOOD..

Toplostroi EOOD is the leading company in the eastern part of Bulgaria in designing, building and reconstructing of internal heating devices. The company was represented in the PDS program by a Senior Expert. The student provided in her thesis a strategic analysis of the company. She determined both the strong and weak points of the company with respect to

employment, building location, marketing, production, financial resources and overall performance. The student indicated that the main opportunities and threats for Toplostroi EOOD by taking into consideration the market, economic, competition and environmental trends.

In her thesis, the author stressed the company's environmental issues, including

- The pollution generated by the heating plant
- The low efficiency of the steam - boilers which cause environmentally unfriendly use of natural resources (especially the fuel consumed by the heating plant)
- Big energy losses because of damages to the heating pipe net
- The lack of measurement equipment in the mine energy-consumers

The student was careful to assess the economic aspects of these losses (the penalties, production cost increase, the expenses for repairing etc.) A detailed financial analysis was provided. The participant described that PDS enabled her to complete her knowledge particularly on the environmental issues and to relate them to the company's financial sources.

On the basis of her analysis the student prepared a proposal which included alternative ways for environmentally friendly development of Toplostroi, including

- Building of a new main pipe in the area of Pochivka
- Repairing of the existing pipe
- Repairing, prophylactic and replacement of the steam-boilers
- Installing of steam-boiler with reduced capacity as an alternative source
- Improvement of the energy production and transportation
- Switching from the currently used fuel (heavy petrol), to the much more environmentally- friendly natural gas

3.11. Environmentally Friendly Farming in Bulgaria

Big changes in different directions /positive and negative/ could be seen in Bulgarian economy during the last several years, especially in agriculture and farming. The lack of financial resources of the land owners, their lack of equipment and experience caused a rapid decline in production. Some farming activities formerly profitable, are now stopped for different reasons. One of these activities is beef-farming. The author is in the opinion that the beef-farming is very prospective in Bulgaria if it is developed environmentally-friendly as a closed cycle. That is why

the student chose as a subject of her thesis to develop a detailed business plan for establishing a more environmentally friendly beef-farm

In her thesis, the student pointed to the factors which impacted future business. She indicated the appropriate location of the firm on the basis of soil and water supply analysis. The author also presented alternative technologies for farming and agriculture production. From this, she was able to choose the best ones taking into consideration environmental issues.

Her recommendations included

- Soil processing- the need for regular replacement of planted agriculture to help soil- quality the soil processing- the used chemicals for improving its quality and rising the production quantities
- Beef feeding in accordance to their needs and taking into consideration their impact on the final customer's health
- Waste underground water from the beef- farming, which pollutes the Danube River. The author presented alternative mechanical, chemical and biological methods for cleaning up the waste waters

An important point in the diploma thesis was the financial/ economic part of the business plan. The student not only presented the appropriate production technologies, the time schedules, needed buildings, personnel and equipment, but also worked on the financial aspects of the future business. The main stress in the diploma thesis was the preparation of a project for building a waste water's cleaning station. The author's idea was to combine the mechanical and the biological methods of cleaning. The student also presented the appropriate technological design, the needed equipment and financial resources.

3.12. The Grand Hotel Varna

The Grand Hotel Varna is one of the biggest and luxurious hotels on the Bulgarian Black Sea coast. The main part of its clients are tourists from Germany, France, Russia etc. The hotel was represented in PDS by the Head of the Ecology Department. The goal of his diploma thesis was to make an environmental audit of the Black Sea coast and to develop the main directions of improving the current situation of the environment. He stressed the relations between the tourism and the business of the Grand Hotel and outside environmental protection.

The author presented the new trends in the tourist's preferences concerning the environment. He made a detailed analysis of the natural resources of the Bulgarian Black Sea coast and the major tourist companies. In his thesis, he indicated and measured the main Black Sea's shelf pollution sources: industry, agriculture, shipping, liquid and solid urban waste. The student also presented and analyzed detailed information on the basic environmental characteristics of the main competitors, such as Roussalka AD, Albena EAD, Golden Sands AD, Riviera Holiday Club AD etc. These characteristics included, physico-chemical and microbiological sea water's characteristics, the air-content of dust, SO₂, NO₂, H₂S, as well as the radiological characteristics of the beach line.

3.13. The Marzianopol EAD..

The Marzianopol EAD is the second biggest sugar-producing plant in Bulgaria (and the biggest producer of cane-sugar) The plant is processing 2000 tons sugar-beet and 320 tons sugar-cane daily The company was represented in PDS by two persons, the Head of the Technology Department and the head of the Investment Department

3.13.1 Environmental Issues of Sugar Production

The author indicated the main kinds of sugar production wastes were

- waste-water,
- saturation dregs,
- grass beet leaps and stems;
- beet slices,
- molasses

The student presented a technological scheme of generating the waste-water and analyzed the content of the three flows of waste-water

- barometric, condense and cooling wate,
- water flows for beet transportation and washing,
- water for transportation of saturation dregs,

On the base of the presented analysis, the student developed a new technological scheme of cleaning installation- The student gave some recommendations for future use of the waste

- to substitute the hydraulic method of transportation of the saturation dregs with semi-dry method of transportation This will reduce 50% of the water pollution,
- to introduce a cyclic use of the first and second water-flows This will contribute between 47000000 and 52500000 BGL of annual costs reduction,
- to press the sugar-less beet slices and to use two kinds of fodder which would contribute 240000000 BGL annually,
- the sugar-less beet slices to be processed for pectin-production purposed for textile industry, moulding industry and food industry,
- the molasses to be processed into a raw-material for production of fodder, spirit and citric-acid

The thesis was officially discussed by the company's Directory Board and the student was promoted to lead a project team for finalizing the project

3.13.2. Agroport "TOPOLITE"

The main goal of this thesis is to solve the problem with using the Martcianopol's port's capacity in an environmentally friendly manner. The sugar producer has its own port for receiving and storage of molasses. Currently, it uses only a small part of the port's capacity- the producer's needs of molasses are only 150,000 tons per year. The author's idea was to develop a special Corn- terminal, that will cause a better using of the port's capacity. The student proposed some improvements in the loading and unloading technology and equipment. He illustrated that the main areas where it is possible to save resources are

- loading and unloading equipment
- transport equipment
- the local infrastructure
- sanitary control on the corn

The improvements in these areas will cause

- shortening of idle time
- it will be possible to service bigger ships
- lower material losses, because of the better technologies
- lower working time losses
- the special construction of the stocks will cause quicker loading and unloading of the ships at /8000 tons per 24 hours/
- the direct connection with the railways will make easier the corn transportation and the access to clients from countries like Romania
- the labor costs for loading and unloading will decrease dramatically

The student developed a realistic forecast for the capacity use of Agroport /loading and unloading of 1970000 tons per year/ and for the expected cash flows till 2004. The author's proposal will ensure a rising profit between 5010000 and 6151000 USD during 2003 year/, ROI between 10.5 and 11% for the same year. The student proposed his project be implemented in two steps, which will take roughly 48 months.

The main focus of the diploma thesis was on the environmental problems connected with the implementation of the project. The main problems of Varna lake are

- dissolved oxygen /10,05- 14,61 mg/dm/
- dissolved phosphorus- its concentration is 4.2 times higher than the norm
- high concentration of copper. It varies between 1 and 32,21 mg/dm/
- dissolved lead, zinc, cadmium, arsenic
- higher concentration of strontium
- higher concentration of mercury

The author made an interesting comparison between the Varna lake's pollution and some important international pollution criteria and showed some ways of more effective waste's management

3.14. Varna Shipyard

3.14.1. Varna Shipyard's bay

Varna Shipyard is one of the biggest companies in the Varna region. It uses a part of the Varna bay and in this way determines its pollution level. The shipyard's bay is almost closed. Thus, the negative environmental impacts continue longer and can cause big problems for some related industries and activities, the tourism industry for example. Currently, the Varna shipyard is an applicant for receiving a ISO 9000 certificate. This means that the company needs to solve its environmental problems as soon as possible.

The thesis shows the main pollution sources for Varna bay and the main activities for pollution prevention. An interesting decision of the student is to show the alternative risky situations causing water pollution and the alternative ways for managing them.

In the first part of the thesis the student presented some important hydrophysical data, including, location of the shipyard, wind regime, water surface flows during the different seasons, water temperature, and sea swell.

The student presented detailed data about petroleum pollution of Varna bay and its main sources.

- After finishing the ship construction activities, the water in the construction camera have to be pump out. Often that water is highly polluted with petroleum products, which return to the Varna bay,
- Accumulation of mixture from water and petroleum during the construction activities in the engine-room. This accumulation has to be pump out by special equipment. During the pumping out there is a high risk for floods. If the ship is bigger than 10000 tons the waters in the engine room are more than 50 tons. Such ships need different equipment for pumping out the polluted water,
- Pollution risk during fuel use

The author discussed the current technical equipment of the shipyard, critiqued the currently used methods of pollution prevention and proposed some improvements. He proposed that the shipyard use the equipment owned by the Varna plant for ship-repairing. The student also analyzed the expected trajectories of the polluted flows in Varna aquathory during the different seasons and determined alternative methods and needed equipment for managing them.

3.14.2 Varna shipyard: air pollution during preparation of the copper slag

In ship-building, one of the most popular methods for cleaning the metal surfaces of rust, old paints, primer is the so called blasting technique, which requires cleaning of the surfaces by copper slag. This method has been used in the Varna shipyard since 1980. To begin the process, the copper slag is delivered by a company from Montana and has to be prepared for blasting in the shipyard. The process of preparing the slag for blasting is a source of serious environmental problems.

The student presented the main environmental problems caused by the current techniques of copper preparation:

- The currently used technologies for transporting, loading and unloading of the slag cause high level of air pollution
- The slag drying and separating installations are too old with ineffective air-conditioning systems. That's why the dust accumulations are much higher than the standard.

These weaknesses also have a negative impact on the human's health. The author presented interesting data on the urine's content of arsenic, cobalt, lead, as well as the blood's content of cadmium and lead, and the toe-nails' content of arsenic and manganese. This data helped to demonstrate the toxic impact of the copper slag preparation on human's health. The main problem now is the high content of arsenic in the toe-nails.

The student presented materials about the new copper slag's drying and separating installation /its location, technical characteristics, used technology and capacity. He developed a detailed assessment of its environmental impact. He showed some data on the expected emissions of dust /manganese oxide, lead, arsenic, cadmium/, nitric oxide, sulfur dioxide and compared them with the Bulgarian and international standards.

The student assessed the new installation's environmental impact on the soil, water, fauna and flora, and landscape. From his research, the student was able to propose some improvements in the methods of transporting, loading and unloading of the slag.

3.15. Agropolichim AD..

The firm was represented in PDS by the Head of the Ecology Department. Her thesis included an original project for reconstruction of an ammonium nitrate -production installation. The student presented a detailed analysis of the technologies presently used in Bulgaria for ammonium nitrate - production and analyzed the domestic and foreign fertilizers markets and especially, the markets of ammonium nitrate. In the thesis, the author analyzed the financial parameters of fertilizer production and sales. The student stressed the environmental problems related to the ammonium nitrate production and did an audit of the emissions of

- ammorlia,
- nitrous acid,
- sulfuric acid,
- phosphorus acid,
- carbolic acid,
- ammonium nitrate

The student also gave a description of technological scheme of production and proposed some technological reconstruction. She analyzed the main environmental, financial and technological results which would be gained by reconstruction efforts. As a result of her research, she presented a project proposal which used with appliance of the Kaltenbach- Turing method.

3.16 National Electric Company..

The company was represented by the Head of the Technology Department. He presented an acute analysis of different energy sources. The diploma thesis included an description of environmental problems caused by energy production. The student stressed four directions of energy production impact on the environment.

- the natural resources used in energy production
- the changes in landscape
- the changes in water balance
- wastes from the energy production

The student proposed 5 direction for pollution prevention in his business.

- de-localization of pollution sources
- conservation of pollution sources
- isolation of pollution sources
- neutralization of pollution sources
- pollution prevention

He made a comparison between the costs and the environmental impacts for different methods of energy production. The participant analyzed the presently used technologies for energy production and proposed some changes in them. The thesis also included a project for using environmentally friendly sources of energy: wind resources and solar resources. One of the

main results of the thesis is a proposal for energy pricing. The student proposed a pricing system which could cause more efficient energy consumption.

3.17 United Bulgarian Company

The United Bulgarian Company develops the following main activities:

- ice cream production and sales
- beer production
- marketing and advertising
- guarding activities

The student who was representing that company, developed an actual marketing plan for the ice cream business. She defined the company's mission and goals and determined the main sustainable competitive advantages and disadvantages of the business. She also stressed environmental factors for business success. The student annualized the environmental problems in the following areas:

- raw materials: The participant analyzed the main suppliers of the company and determined as a weakness the large number of smaller suppliers, which results in lower possibilities for quality control.
- the content of microorganisms in the waste water from milk processing
- the packaging materials: The student proposed some changes in the packaging process, specifically replacing the plastic packs with paper ones and using recycled and recyclable materials.
- the refrigerators: The student proposed some changes in the company technique as a way to prevent freon emissions.

The student proposed several changes in the presently used marketing mix and made a forecast for the expected changes of the sales after undertaking the proposed actions.

4. INDICATORS OF P.D.S. INFLUENCE ON RESTRUCTURING PROCESS AND ENVIRONMENTAL BUSINESS MANAGEMENT

This paper uses the indicators which were developed for purposes of the Environmental Training Project after they have been appropriately adjusted to the specific

needs of PDS in Bulgaria

We used two groups of indicators to determine PDS influence on the environmental business management

4.1 Quantitative indicators

- the number of prepared theses
- the number of provided analyses and evaluations
- the number of environmental projects and programs
- the number of strategic, business and marketing plans
- the number of environmental audits
- the number of environmental impact assessments
- the number of textbooks for PDS
- the number of undertaken environmental projects
- the changes of economic indicators, such as profit, sales, export, size of funds for environmental projects and quality improvement
- the number of institutional changes
- the number of structural changes

4.2 Qualitative indicators

- changes in attitudes
- dissemination of knowledge and experience
- building a network for cooperation
- disseminating new teaching methods
- popularization of ETP courses and stabilizing the recruitment base
- involving the representatives of the Bulgarian national, regional and local government as well as other Bulgarian and international institutions and organizations in the implementation of PDS
- other benefits of PDS
- accomplishment of PDS mission

5. THE INFLUENCE OF P.D.S. ON THE ENVIRONMENTAL BUSINESS MANAGEMENT FROM THE QUANTITATIVE POINT OF VIEW

• the number of prepared theses

There were 19 theses prepared concerning important aspects of the companies' environmental performance

• the number of provided analyses and evaluations

19 analyses and evaluations were presented

• the number of environmental projects and programs

12 environmental projects and programs were presented

- *the number of strategic, business and marketing plans*

- 1 strategic plan
- 4 business plans
- 2 marketing plans

- *the number of environmental audits*

- 17 environmental audits

- *the number of environmental impact assessments*

- 15 environmental impact assessments

- *the number of textbooks for PDS*

- 15 textbooks

- *the number of undertaken environmental projects*

- 5 undertaken environmental projects

- the changes of the economic indicators as profit, sales, export, size of funds for environmental projects, quality improvement

- Several companies recorded an increase of their profit

- Several companies recorded decline in their losses

- Several companies recorded stable level of their profits

- Several companies recorded stable level of their losses

- The sales figures increased in several companies as a result of product quality improvements and increased competitive advantages

- *the number of institutional changes*

- Environmental extension service offered by university teachers has been instituted by PDS as the first one in Bulgaria

- A library for environmental business management was established

- Personal relations made during PDS have been instituted in the form of a PDS Graduate Club

- *the number of structural changes*

- Several PDS students proposed to establish new departments, including environmental department, logistics department, marketing department
- One student prepared an initial version of his Ph D thesis, based on his research and contacts within PDS

6. THE QUALITATIVE IMPACT OF P.D.S. ON ENVIRONMENTAL BUSINESS MANAGEMENT

• *changes in attitudes*- During the seminars and the final exams, the participants showed a visible change in their way of thinking. The students with technological education showed that they are able to think not only in a narrow technical way, but as managers, too. They could be able to solve managerial problems assessing not only the technological, but the economic and environmental aspects, too. The students with economic education determined PDS resulted in an increase in their knowledge concerning technological aspects of their businesses.

• *dissemination of knowledge and experience*-The participants were obligated to write theses on subjects which were approved by the companies' executive directors. The directors also had to review the theses and to assess their usefulness. In approving the thesis, the director also had to make himself acquainted with a given environmental problem, to expand his/her knowledge, to assess the economic importance of environmental projects. The students also engaged their colleagues in their thesis writing and increased the range of impact of environmental issues.

• *building a network for cooperation*-The PDS started the process of experience exchange among the participants. All the students joined the newly formed PDS Graduate Club.

• *disseminating new teaching methods*- The American lectures introduced new interactive methods of teaching. They were met with enthusiasm by the students and helped to make the education more practically orientated.

• *popularization of ETP courses and stabilization of the recruitment base*- PDS aroused the students' interest in increasing their own qualifications, as well as the qualifications of their personnel. Some of the managers decided to reserve places in PDS for other representatives of their company for the next courses.

• *involving the representatives of the Bulgarian national, regional and local government, as well as other Bulgarian and international institutions and organizations in the implementation of PDS*.- Some of the lecturers invited to take a part in PDS represented the Regional Authorities and Bulgarian Government.

7. RECOMMENDATIONS

Participants showed a great interest in the following subjects

- patent defense
- marketing planning
- environmental regulations

The next PDS studies could be continued with emphasis on these subjects

- The final analysis showed a strong correlation between the quality of the thesis and the participant's position in the company That is why the PDS studies should be concentrated on the executive managers and their deputies
- The monitoring of the studies' effectiveness and impacts should be started from the beginning of PDS in order to determine the initial basis in the companies
- Contact with PDS graduates should be kept on a regular basis The graduates should be provided regular information on new environmental publications, meetings and lectures
- The country's financial support of PDS should be expanded
- The Bulgarian- American cooperation in preparing the PDS study should be continued

8. APPENDIX

A LIST OF SUBJECTS OF PDS STUDENTS' THESES

- 1 Eng. Tanya Dimanova
"Environmentally- friendly Reconstruction of the Equipment for Production of NH₄ NO₃ in Agropolichim PLC- Devnya"
2. Eng Nadka Dimitrova
"Business Plan of Sodi PLC- Devnya"
- 3 Peitcho Kolev
"Environmental Problems of Varna Shipyard"
- 4 Micaïl Chernev
"Environmental Problems of Varna Aquathory"
- 5 Margarita Kamburova
"Environmental Problems of Geosol- Provadia"
- 6 Plamen Petrov
"Environmental problems of National Electricity Company- Razgrad"
7. Borislava Zlateva
"Environmental Problems of Antibiotic PCL"
- 8 Nikola Rachev
"Environmental problems of Agroport- Terrninal"
- 9 Eng Lilyana Zlateva
"Environmental Problems of Sugar Production"
- 10 Valentin Angelov
"Business Plan of Khan Asparuch PLC"
11. Eng Georgi Georgiev
"Marketing Plan of Skitia PSL"
- 12 Milena Angelova
"Environmental Business Plan for developing a farm"
- 13 Verginia Stefanova
"The Blue Flag Campaign- the Environmental Problems of Northern Black Sea Coast"

14 Anelia Nenova
"Business Plan of Toplostroi PCL"

15 Anatoli Dimitrov
"Environmental Problems of Bulgarian Black Sea Coast- a Way to Improve the Quality of Tourist Service"

16 Boryana Filcheva
" Environmental Marketing of United Bulgarian Company"

17 Plamen Pavlov
" The Environmental Patent Activity in Bulgaria"

18 Kalin Jeinov
" Environmental Problems of Varna Sea Coast and Varna Lakes"

19 Vasil Yanakiev
" Processing the Solid Wastes in Bourgas Region"