

Environmental Entrepreneurship: Technology Transfer and Sustainability in Global Markets

Berrin Tansel

Florida International University, College of Engineering and Computing
Miami, Florida, USA, Tanselb@fiu.edu

ABSTRACT

According to the U.S. Department of Labor predictions the job market for environmental engineers will increase much faster than the average for all occupations through 2012. In the recent years, the advancements in telecommunication and information technologies have increased globalization and made it possible to address the environmental issues at larger scales than before. In addition, the major events that have affected the global environment (i.e., earthquakes, volcanic eruptions, fires, floods, hurricanes, land slides) have increased the need for new technologies as well as transfer of existing technologies to other regions of the worlds to address the emerging environmental challenges. Need for improved water and sanitation, government recognition of the legitimacy of the needs of unserved groups, increasing health costs due to inadequate sanitation, increasing rate of loss of natural habitats have brought environmental concerns to forefront as one of the most needed professional disciplines at the Global scale. Environmental entrepreneurship involves innovation and application of technologies for bringing solutions to problems associated with land-human interactions, ecosystem management and other environmental concerns. This paper provides examples of appropriate technologies which can be transferred to enhance the environmental quality and provide solutions for the existing needs. Critical aspects of competitive analysis, target environmental applications and market, appropriate business models for commercialization, market-plan will be presented with an in-depth example for establishment of an infrastructure for efficient waste management. Emerging needs, increasing demands on the exiting infrastructure, and roles of governments in view of the increasing urbanization are presented.

Keywords: Entrepreneurial engineers, sustainable growth, environment, environmental entrepreneurship.

1. INTRODUCTION

The growing needs to address the environmental problems have expanded the job opportunities for environmental engineers both locally and globally. Occupational Outlook Handbook (2005) by U.S. Department of Labor, Bureau of Labor Statistics, reported that employment of environmental engineers is expected to increase much faster than the average for all occupations through 2012. Fortune Magazine (March 21, 2005) ranked environmental engineering as the number one profession among the "Fastest Growing Professional Jobs" with 54% projected increase in demand.

Green buildings, sustainability, energy efficient systems, and innovative utilization of resources are some examples of environmental entrepreneurship efforts. Engineering systems that can be used in environmental applications, natural resources, and land-human interactions have created vast opportunities for developing innovative approaches that can save money, reduce environmental impacts, reduce risk for humans and ecosystem, improve human health and productivity, create jobs, and reduce costs.

This paper will provide examples of appropriate technologies which can be transferred to enhance the environmental quality and provide solutions for the existing needs. Critical aspects of competitive analysis, target environmental applications and market, appropriate business models for commercialization, market-plan will be presented with an in-depth example for establishment of an infrastructure for efficient waste management. Emerging needs, increasing demands on the existing infrastructure, and roles of governments in view of the increasing urbanization will be presented.

2. INCREASING NEED FOR ENVIRONMENTAL ENTREPRENEURS

The social and cultural links between environmental quality and economic vitality have been long recognized by humans since the early settlements. Major centers of industrial growth have been located along the coast lines and rivers for easy access to transportation routes. The population density in coastal areas in vulnerable tropical zones of the globe has been increasing significantly in the recent decades. The population increase and poverty in many tropical regions have forced and continue to force the people to clear and cultivate the land in environmentally sensitive areas such as flood plains or on hill slopes. The increase in the rate of deforestation has led to significant increases in run-off, soil erosion, mudslides, and flash flooding (UNEP, 1999). It is anticipated that by 2007, half of world's population will be urban areas (about 3.2 billion people). The vulnerability of rural and urban areas to natural disasters is increasingly growing, due to population increase, inadequately planned urbanization, and the increasing stress on the existing fragile ecosystems.

The urbanization and increased human activities have created significant stress in global proportions on coastal areas, watercourses, native species, and contributes to altering the global climate. Need for improved water and sanitation, government recognition of the legitimacy of the needs of unserved groups, increasing health costs due to inadequate sanitation, increased rate of loss of natural habitats have brought environmental engineering to forefront as one of the most needed professional disciplines at the Global scale. In 1970, there were 200 million cars in the world, but by 2006 this has increased to more than 850 million and it anticipated that it will double by 2030 (World Watch Institute, 2007). During the last 5 decades, cities have been transformed from dense areas of settlement with defined areas to sprawling suburbs. With increasing demand energy and availability of fossils have enabled cities to become areas which are being saturated in terms of infrastructure demands. Natural disasters which were thought as rare and unexpected events have been occurring more frequently, affecting more people, and causing economic damages of large proportions which have not been experienced before. Climate change has affected the frequency of natural hazards and has been causing sea-level rise.

These changes create new challenges and needs for:

- 1) Protection, restoration, and managing coastal and ocean resources through ecosystem management;
- 2) Products and services that would enable local communities to plan and respond to climate variability and change;
- 3) Improving weather and water information, products and services to advance the capabilities for understanding, observation, forecasting and warning of environmental events; and,
- 4) Support for the existing infrastructure with information, products and services for safe, efficient, and environmentally sound products and management tools.

Changes in development of entrepreneurial activities require changes in organization, habits, mindsets. Some of the obstacles and strategies for success include the following:

- Obstacles:
 - Implementation requires commitment, effort, training, time, expense.
 - Benefits may be not clear and slow in coming
 - Lack of knowledge of environmental issues

- Strategies for success:
 - Integration of DfE into existing company structure
 - Interaction and commitment between product designers & environmental staff
 - Training in DfE techniques/tools
 - Access to environmental data & expertise
 - Setting clear goals for DfE; quantitatively measure progress
 - Internal measures to recognize successes and benefits

Environmental entrepreneurship program areas

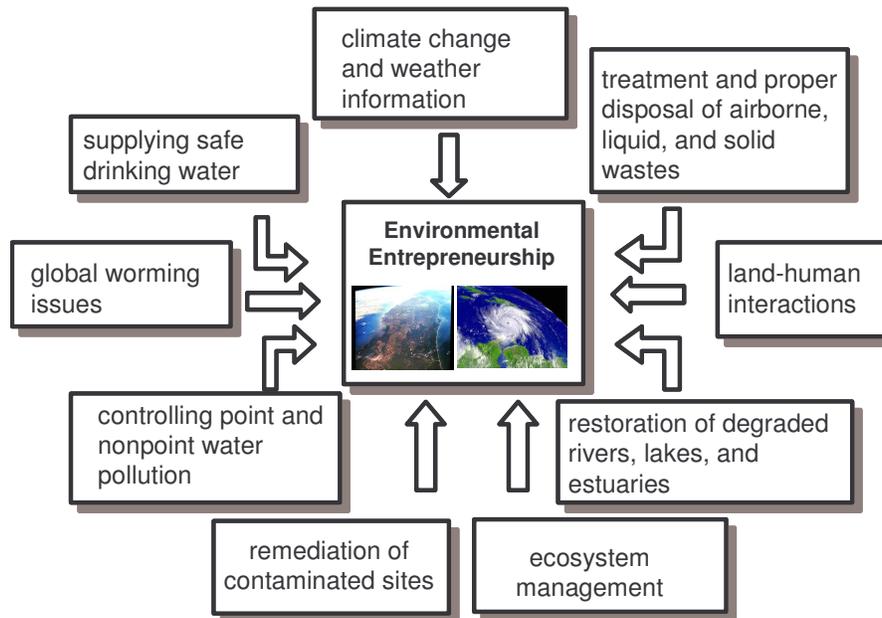


Figure 1. Areas for environmental entrepreneurship.

Table 1. Environmental entrepreneurial markets.

Life cycle stage Aspect →	Material Supply	Manufacturing	Marketing/ Image	Packaging & Distribution	Customer Use	End-of-life
Energy use	✓	✓	✓	✓	✓	✓
Material consumption	✓	✓	✓	✓	✓	✓
Toxic/hazardous materials	✓	✓	✓	✓	✓	✓
Air/water pollution	✓	✓	✓	✓	✓	✓
Reused/recycled materials	✓	✓	✓	✓	✓	✓
Reuseability/ recyclability	✓	✓	✓	✓	✓	✓
Other	✓	✓	✓	✓	✓	✓

3. CONCLUSIONS

Urban environmental problems, such as air pollution, water contamination, improper waste management and disposal, and subsequent environmental stresses are already causing significant health impacts as well as stresses on the existing infrastructure in densely populated urban areas. In addition, the increasing frequency and intensity of natural disasters in the recent years have resulted into high social, financial, environmental costs with long lasting effects. The growing environmental problems have expanded the job opportunities for environmental engineers both locally and globally.

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REFERENCES

United National Environmental Programme (UNEP) (1999) “*Global environment outlook 2000 (GEO-2000)*.” Ed. R. Clarke. UNEP GEO, Division of Environmental Information, Assessment and Early Warning (DEIA&EW) United Nations Environment Programme.