

## ENVIRONMENTAL ECONOMICS AND ECOBUSINESS

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**Keywords:** Ecobusiness, social welfare, materials/energy balances, SNA (System of National Accounts), SEEA (System of Integrated Environmental and Economic Accounting), satellite accounting system, monetary and physical data, environmental depletion and degradation, sustainable development, environmental protection activities, external economy and diseconomy, produced and non-produced natural assets, optimal resource allocation, market price and imputed price, natural productivity, externalization of pollutants disposal, regulation and taxation, LCA (life-cycle assessment)

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## **Summary**

Macroeconomics and microeconomics formerly focused their attention only on social phenomena or social systems, including markets as one of the social sciences. Recently, however, this has changed. Economic and technological development has brought about many environmental problems evidenced by environmental depletion and degradation as well as people's luxurious lives. So, economics is being urged to change its viewpoint, and to internalize environmental elements previously externalized from the markets. Thus, accounting, part of economics in a broad sense, is being urged to adopt the new viewpoint.

In order to internalize environmental elements, an environmental accounting system sufficient to identify and assess environmental elements is necessary. The System of Integrated Environmental and Economic Accounting (SEEA), which is the environmental satellite accounting of the System of National Accounts (SNA), could function for that purpose to an extent. The SEEA has environmental physical data as well as monetary data. Its physical data could indicate virtually the conditions and extent of environmental depletion and degradation in volume. Administration could use the SEEA for economic policy framing, and specifically for regulations, taxation, subsidies, etc.

The objective of economic policy is to maximize social welfare, especially long-term one. Regulations and taxation must be made according to that maximization. Taxation is a motive for the valuation of environmental elements that have previously been externalized. Taxation could be made in imputation. Appropriate valuation is necessary for optimal allocation of resources, which is necessary for maximization of social welfare. In free and market economies, however, maximization of social welfare must finally be a commitment of private enterprise.

Recently, life-cycle assessment (LCA) has become popular. This aims at the development of products safe to the environment not only after use but also in the production and consumption processes. That will accelerate the development of ecobusiness.

## 1. Economics and the Environment

Macroeconomics and microeconomics formerly focused their attention only on social phenomena or social systems as one of the social sciences. More specifically, their objects of study were market systems and the behavior of individual enterprises and individuals in those systems, which were isolated from the environment. The general ideas of the economy and social welfare, which is the final aim of economics, seem to have been influenced and limited by this viewpoint of economics. So were economic policies.

World peace and happiness are deeply related to the concept of social welfare, which only economics among all the social sciences has made explicit by using a mathematical expression and method—the "social welfare function." There remain some controversies about the method to measure and decide it, however. Anyway, it is certain that economics has contributed to the elucidation of the concept of social welfare.

Recently, however, circumstances have changed, and it has become necessary to think of social welfare from a broader viewpoint. Economics itself is being urged to make its viewpoint broader than before. The development of science and technology enabled people to live a rich life, and brought about the growth and expansion of national and world economies. On the other hand, it has developed many kinds of chemical materials. Some are detrimental to and harm health directly or through environmental pollution, and some are difficult to resolve even though they are not detrimental, accumulating in the environment, which is a cause of environmental pollution and disruption. The expansion of the economy itself accelerates that tendency.

Environmental disruptions are also caused more directly. Deforestation is one of those causes. It has been accelerated by economic growth and expansion. Excessive deforestation means not only the decrease of natural assets or resources but also the increase of the atmospheric volume of carbon dioxide, which, along with methane, chlorofluorocarbons, etc., is one of the major causes of global warming.

Thus, the influence of economic actions on the environment and the reactions or repercussions of the latter have grown larger, which has aroused deep interest in the relation between the economy and the natural environment. That is the reason why economics itself is being urged to make its viewpoint broader than before, as mentioned above, which means that economics should extend its interests and objectives to the

environment, including natural assets or resources and the relations between the economy and the environment, and to propose a method and standard for us to behave for, not against, the environment.

Materials and energy flow and re-flow between the economy and the environment, and the volume of their stock changes. The materials consist of useful ones and waste ones or residuals. The first problem for economics to solve is how to obtain the flows and stocks and to evaluate them. Traditional economics is accustomed to evaluating materials and energy within the market economy, that is, to market price valuation, but not to evaluating them out of the market.

Public economics treats affairs out of the market in the form of external against internal economies and diseconomies, but does not refer to them more concretely. Accounting, which is part of economics in a broad sense, treats affairs not only within the market but also within the enterprise itself whose internal system is isolated from the market—for example, affairs in cost accounting—and even assumes a kind of imputed value or imputed cost (somewhat similar to the German *Zusatskosten*), but is not accustomed to treating environmental problems. In the end, a new method should be developed to evaluate environmental stocks and materials/energy flows between the economy and the environment.

## **2. The Limits of Conventional Accounting**

Considering environmental problems, importance must be attached to "sustainable" social welfare and its maximization from a long-term perspective, in view of sustainable use of the environment including natural assets or resources, and to sustainable economic growth and development. Here, it is necessary to take a bird's eye view of the economic mechanism ranging from society to nature, from the public and macroeconomic point of view, using accounting. To begin with the national accounts for the first approach, it seems appropriate to select the System of National Accounts (SNA) proposed by the United Nations (U.N.). The conventional SNA refers only to the economic valuations of goods and services that are formed each as a market price or can be analogically inferred in comparison with those of similar goods and services. And so, the goods and services are limited that are evaluated in the SNA.

In that context, if a part of the environment, including natural assets or resources, is used for an economic purpose, it is not evaluated as cost, though the product from the

environment is evaluated in market price. For example, the depletion of natural resources following mining is generally not sufficiently evaluated as cost, though generally speaking there are mining royalty or costs for mining rights and products from mining are, of course, evaluated in market price. Consequently, only the cost of mining itself is evaluated,—just as costs in the conventional SNA, and only the wages, the depreciation of machines, etc. for mining itself are recorded in the product flow accounts of the SNA. In the end, the valuation of depletion itself of natural assets or resources is not reflected in gross domestic product (GDP).

Those points that are thought to be at issue will be discussed. Another example is of the depletion of a natural or virgin forest. Deforestation is different from mining in that the natural forest restores by itself what was depleted with the lapse of time. There may be a justification for no entry of the depletion to the accounts, because of the restoration, but strictly speaking the lost utility of the depleted part during the time it takes for the restoration should not be neglected. The lost utility is to be evaluated and should be interpreted as rent or interest, for the depleted and not yet restored part is excluded from the present use for consumption, production, recreation, and so forth within the period of time taken for the restoration. In other words, the lost utility is an opportunity cost of the part used for timber, pulp, paper, etc. of the forest.

The restoring power of the forest is limited. If deforestation reaches the limit, the depletion will remain unrecovered. Moreover, if deforestation exceeds the limit, the excess may trigger and expand the ecological disruption of the forest to more depletion. This diverging point that is the limit can be explained as "bifurcation" in the catastrophe theory, which is part of modern topological mathematics, or may be said to be a critical point. This depletion in valuation is not entered into the accounts of the conventional SNA, either. By the way, a necessary condition for sustainability or sustainable development is thought to be that deforestation is within the restoring power of the forest, or should not exceed the limit, the catastrophic bifurcation.

The waste materials or residuals that are discharged or thrown away into the environment are increasing in volume. The environment has a certain power to resolve the residuals into harmless materials, but it will take some time for that. So, there will be more or less degradation of the environment during the period of time taken for the restoration from the degradation. More clearly, that degradation could be interpreted also as the depletion of the environment, which means loss of utility as much as in case of the forest. There is no essential deference between degradation and depletion, or

between quality and quantity, at least at the level of utility. The lost utility is also to be evaluated as rent or interest. The depletion can be interpreted, in other words, as a negative production, where residuals are also negative products. Negative production is, in the end, a cost. The cost, however, is not entered into the accounts of the conventional SNA. Moreover, there is a limit to the power of the environment to resolve residuals, as in case of the forest. If the volume of residuals that are discharged or dumped into the environment reaches the limit, the depletion will remain unrecovered. If it exceeds the limit, the excess will trigger and expand the ecological disruption to more depletion (in value) of the environment, as in case of the forest, which is not counted as cost in the conventional SNA either. Hence the necessity for some accounting system to complement the conventional SNA. That is why the System of Integrated Environmental and Economic Accounting (SEEA) has been and continues to be developed, though it could not be said to be sufficient or complete yet.

### **3. The Necessity for a System of Environmental Accounting**

Cost and profit or gain is in inverse but pair relation to each other. It is impossible to identify and obtain costs without an accounting system suitable and applicable for that. Profit free from cost means market failure and consequently failure in optimal resources allocation, which in turn means failure in maximization of social welfare.

In economics it has been demonstrated that the attainment of optimal resource allocation is a necessary condition for the maximization of social welfare in social welfare function. In economics the maximization of social welfare is expressed by the concept of realization of the Pareto optimum, which in plain language means the utmost possible conditions that the state of any member of society can not become better unless that of any other member becomes worse. This theorem represents a state of maximized social welfare. There are many possible states of maximized social welfare. Which state to choose depends on social decision making or social value judgment, which is deduced through a democratic procedure from each individual decision making or individual value judgment of the members of the society. The social decision making and the social state chosen by it are reflected in the form of the social welfare function. No matter which social state may be chosen, optimal resource allocation must be attained for maximization of social welfare.

Optimal resource allocation implies the equation among marginal value productivities of a resource in different industries or enterprises (the Lerner conditions) and the

equality among marginal productivities per monetary unit of different resources in the same industry or enterprise. It also implies the equality of marginal value productivity and cost or price per unit of each resource, the resources including natural resources or assets. That allocation is attained through the market. For the transactions in the market and the attainment of the above-mentioned equalities, resources must have prices or valuations, including cost valuations. That means the internalization of external economy and diseconomy or cost. The environmental accounting system could contribute to the development of those market valuations, and administration could use the accounting system for environmental policies and further for those market valuations from the viewpoint of sustainable development.

#### **4. The System of Integrated Environmental and Economic Accounting**

Where the polluted environment has done harm to health, the disutility caused by that is not counted in the conventional SNA. Payments for drugs consumed and doctors' services are entered into the accounts, but the pollution itself (i.e. the degradation of the environment) is not counted as cost in the SNA.

Thus, many important factors are missing that are necessary to evaluate the flows and stocks related to the economy or economic society and the environment, to explain the relations between them, and to contribute to sustainable development ranging from the present to the future. This is the reason for the satellite system of the conventional SNA. Motivated by the report of the World Commission on Environment and Development, 1987, the U.N. Conference on Environment and Development—the Earth Summit—was held in Rio de Janeiro, Brazil, in 1992. Its fundamental theme was "environmentally healthy and sustainable development," and Agenda 21 was agreed on as a plan for human activity and behavior for the twenty-first century. There, the necessity to develop a satellite accounting system of the SNA for environment was seen. Earlier, in 1991, such satellite accounting had already been proposed at the twenty-sixth conference of the U.N. Statistics Committee. In 1993 the revision of the SNA was adopted at the twenty-seventh conference of the Statistics Committee, and its adoption was recommended to each nation by the U.N. Economic and Social Council. In the 1993 SNA it was proposed to develop the satellite accounting, including the one for environment, to be combined and attached to the core system of the SNA itself. That accounting was the SEEA.

The SEEA has not been completed yet, but the concept of its system is becoming clearer.

Its present aspect is shown in the 1993 “Handbook of National Accounting: Integrated Environmental and Economic Accounting: (Interim Version)”, United Nations. Corresponding to these circumstances, each nation is making an effort to develop its own SEEA, the integrated environmental and economic accounting.

The SEEA is related to national accounts and environmental accounting, the latter being descriptive of physical and monetary flows and interactions between the economy and the environment through the flows. The SEEA consists of four parts in relation to its data sources. First, the SEEA gets the part of monetary data from the SNA, which is related to the impact or influence of economic activities upon the flows and stocks of the environment. Second, it gets data from physical flows between the economy and the environment that can be evaluated in monetary units either directly or in imputed market value, or indirectly in non-market value. The first and second parts are directly related to monetary data. Third, it gets physical data also from the physical flows between the economy and the environment, which are used only as physical data themselves at least for the first approach or at the first stage. Fourth, it gets physical data from the impacts or influences on the environment that are incurred by human use. The data are used also as physical data themselves, at least for the first approach.

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### **Biographical Sketch**

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