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Theoretical researches on the value of environment and the issues of resources price determination

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People are facing increasingly serious problems of environment, such as the warming-up of the earth, the depletion of the ozone layer as well as the acid rain. Superficially, they are problems between mankind and animals, or rather the relationship between human being and nature, but as a matter of fact, these problems reflect the relationship among human beings, or the problems of the society. The essence of the environmental problems is the advantages and disadvantages among people. The prerequisite of environmental problems is to reveal the economic root. The salvation of environmental problems relies on modulating the relations between nature and human beings by changing interpersonal relations. It is superficial to limit one's attention to the relation between mankind and nature.

Under market economy conditions, value is the most fundamental economic element, which decides all the economic activities. The problem of environment, as the result of economic activities, is no exception.

But environment is a very vague concept. People cannot calculate the loss even though it was destroyed. People are only used to looking on natural environment as "free", and their damage is growing much more serious. Therefore, in order to protect the environment, it is important to estimate precisely the value of environment, that is to say the loss of environment caused by development from the perspective of environmental value, it is necessary to reconsider the emission of CO₂ raised by COP3 (The Third session of the Conference of the Parties).

Additionally, the environmental factors, which are used in direct producing course, are resources, the prices of which are not given any convincing explanation by the traditional labor value. Especially, the explanation of the land prices is only theoretically limited to the monopoly of land property. There have been no explicit answers in perspective of labor value theory.

The paper aims to have a new research on the value of environment, the price determination problems of resources (especially the land) in perspective of labor value theory.

1.The classification and character of environment.

Environment is originally a sort of natural existence, which is independent of mankind, but it is affected by the development of human society and gradually changes. I am going to classify the real environment into two kinds, that is natural environment and artificial environment according to the specialty of the environment itself as well as people's influence upon the real environment.

Natural environment also consists of Wilderness and Secondary Nature. The Wilderness is the nature itself, namely the natural environment. On the earth, the Wilderness environment is disappearing. The Secondary Nature is the changed nature (such as man-made forest, the destroyed ozone layer), which comes into being by the interference of human beings.

Artificial environment is what human beings create (such as reservoir, streets, dikes bays, bridges and buildings), namely the social capital.

Then there are studies of the character of environment.

1.1 The indirect, historical and eternal characters.

Theoretically, the concepts of environment and resources must be made clear at first. The environment is not direct production material, but it is the basic condition of human production activities. In this sense, **resources belong to environment, which is made use of within economy activities. Resources are the subset of environment.** Pure environment is acquired if the resources are taken off from the extension of environment. But it is difficult to classify the two within the reality. For example, streets are not only the external conditions but also the internal environment for transportation. The classification of pure environment and resources is a conundrum in statistics.

In recent years, when people have increasing knowledge about environment, the concept of Natural Capital is raised like Social Capital, both having indirect influences on economic activities.

The environment is changing; the resources are gradually environmentalized (artificial environment). As the society develops, such interchange is increasing. Therefore the division of environment and resources is changing. Environment is the cumulus of human beings and the nature (such as the ancient cities or forests), thus it has the character of history.

The longevity of the earth is another case; things such as the land, the sea and the air, which are eternal, are the principal parts of the natural environment. Such eternity makes the environment relatively steady. Especially the eternity of land provides the steady location for social capital.

It is very common for lands to become resource. But the eternity of lands will never change. Permanent assets such as streets and reservoirs are merely what we fixed on land. Someone once considered that streets could not be split just like the machines, in fact, the streets themselves could be split, but the land where the streets stand could not disappear.

1.2 The scarcity and universality

In the extension of environment, some of the free goods, such as air, are universal, but the most are scarce. The universality is mainly demonstrated in non-excludability and non-rivalness. Non-excludability is a concept raised by P.A.Samulson (1945), which means that when one object is consumed, the provider of the object could not intentionally exclude other consumers. The repeatedly mentioned examples are signals of talons, the radio signals from broadcasting companies, parks and libraries. The non-excludability is understood as “equivalent consumption”, Sibatakobu, who is from Japan compared it vividly to “What belongs to you also belongs to me.” Non-rivalness is a conception raised by R.A.Musgrave (1959), which means that one more consumer will not lead to the decrease of the consumption of the goods. That is to say, when there is one more consumer who consumes the product, the margin cost is zero. The often-mentioned example is the “endless service” by Sibatakobu. Generally speaking, the scarcity of environment is the inverse ratio of universality (non-excludability or non-rivalness), and is the direct ratio of the relevance with economic activities.

1.3 The regional closeness

Some elements of environment are particular to a certain region, which is staid and confined to the place. They have the particular character of the region. Not only the artificial but also the natural environments are the same. For example, water differs when the systems are different; the air is consecutive, but they are not even. And it differs according to regions, or else there could not have been any weather changes.

The regional closeness of environment makes the differences of regional come into being., for example, the depletion of ozone layer influences the earth.

1.4 The limit of reproducibility of environment

Besides the harm of irreversibility, environment can clean itself or self-reproduce to some extent. But when the pollution or destruction is beyond the limit, the environment cannot reproduce any more. That is to say, the reproducibility is limited. Especially the environment elements such as the ancient trees and temples, they are not reproducible once destroyed. The irreversible objects are the most precious of the environment.

2.The value theory of environment

Value and use value are the two elements of goods. Does natural environment have such elements, which is not the product of labor?

Value is the coagulation of abstract human labor, from the perspective of labor value

theory; it reflects the social relations among people. Use value is a kind of objective existence, but it is decided by human knowledge. People have not realized the truth that use value is also a kind of objective existence, but it has no economic significance for human beings. Only when people get to know it, the use value becomes a resource for mankind. The use value comes into being because of people's knowledge. Namely, any use values, natural or artificial, are products of human knowledge. Use value is a historical word, which is discovered and expanded by the cumulus of human activities and experiences as well as the development of science. The development of scientific technology makes the originally useless objects useful. It extracts many use values from the single and original use value. Any technology could be concluded to the technology of use value, both the discovery and creation of use value included.

The beautiful environment is the same case. The original environment has no value since it is not the product of human labor. The natural landscape is not taken into consideration before human aesthetic consciousness is developed to a certain level. Therefore the reason for the use value of beautiful scenery and why the landscapes can bring profit as the destination of tourists could only be concluded by the development of human knowledge. Certainly the economic limits of profit are made up of the entire social surplus labor time.

The earth is made up of materials. There is no doubt about this. Natural materials have no value since they are not products of human labor. Furthermore, any natural materials (such as petrol) are meaningless before mankind realizes their use value.

From a wide sense, environment, including air, consists of anything in the universe. There is only a minority of them, which are the object of human knowledge and usage. This part is what we call resources.

What are different from the natural use values are artificial use values. The amount of artificial use values symbolizes the development of human society.

So far, the use value is considered as the material carrier of value, there is not a single object which has no use value but value, this is the traditional concept. The good that is deprived value is also deprived of use value simultaneously. Such view is correct but not sufficient.

It is necessary for us to consider the influences of the magnitude of value upon value. As the use value is partially lost, the value of goods is also partially lost, not completely. Such as withered vegetables or partially deteriorated fruits could also be sold in lower prices. They are not valueless garbage.

As an addition, we know that the price is high when the goods have high quality. Here we can find out that value is proportionate to use value. Though it is not because of labor that the use value is decreased or destroyed, the increase of use value could only be achieved by investing more labor force. That is to say, the source of magnitude of value for a higher quality could only be labor.

Accordingly, we can have the following proposition:

Proposition: the value of goods increases or decreases according to its carrier, the use value (but having no linear relations).

If the value lost is negative, we call it negative value¹. The absolute value of negative value has a maximum of the magnitude of the good.

Now let's have a look at the unpunctuated watch. We have mentioned that withered vegetables loss part of their value because they have lost some of their use value. On the opposite, watches could be repaired, namely the use value of watches is contradictory, which is different from vegetables. The negative value of the not repaired watches is equal to the repair fee.

From this aspect, let's reconsider the value of environment. The original natural environment is not the product of human labor. Therefore it is worthless according to the labor value theory. But there has to be labor spent for recovering the destroyed environment. The use value for restoring the environment should be turned into value. The formation of value has the meaning of negative value upon the destroyed environment. The negative value of the destroyed environment and the cost of recovery is the same. In a word, the polluted environment has negative values, and the absolute value of which is equal to the value needed for restoring it to the original state. Accordingly, we think that the value of the natural environment, which is not produced by human beings, is not zero.

1 The concept of negative value was first raised by W.S.Jevons in 1871.

Suppose that we can deduce the fee of environment recovery¹, international comparative standard could be made according to the negative value of environment in different countries. For example, the environment in a country where the negative environment is -100 per person is better than that where the data is -500.

The exchange rules of CO₂ emission raised by COP3 were once considered as an effective method to internalize the economy destruction by environment.

But the initial emission distribution ways are not beneficial for developing countries, which is based on the status quo of CO₂ emission. This is unfair. The economic damage (negative value) should be calculated according to the emission state (the emission of CO₂) in different countries. That is to say, different countries should be bestowed equal treatment before the assignment of initial emission. The responsibility should be assigned founding on the amount of CO₂ emission. In other words, the responsibility of environment destruction should be firstly taken into consideration. But the COP3 allows that the heavier the responsibility in those countries, the more emission of CO₂. The profit of developing countries is exploited. And this is also the same to protecting the acquired profit of earlier environment destroyers (developed countries). They are making multiple profits. By doing this they make the gap between the south and north hemisphere endless, which further stocks the economic development of developing countries.

3 .The issue of price determination of resources (land)

¹ According to Brown's estimate, the expense of restoring the earth is 93 billion dollars. See Lester. R. Brown: *B Plan B 2.0: Rescuing the Planet Under Stress and a Civilization in Trouble*, East Press, 2006, p186.

Resources are environment that is used by mankind as use value, such as the land. Use value is an eternal concept while value is a historical one. What is exchanged is use value and market is the market of use value. Exchange does not necessarily happen in markets. In ancient days when there were no markets, there were exchange activities already. And they still are in modern market. Value does not become the measurement of exchange. Namely, equivalent exchange is limited to markets; there are still other rules of exchange outside markets.

There are two types of labor, one is for natural use value, and the other is for creating artificial use value. The labor in order to acquire natural use value is not necessarily measurements of exchange.

In primitive communes, a certain person obtained the use value since he is in possession of some natural use value, for example fishing and hunting. We can think that exchange is already there in primitive communes, but we could not declare that the measurement of exchange is value or labor time.

As for the issue of measurement of exchange, Adam Smith (1723~1790) in Chapter 6 of his book, *The Wealth of Nations*, when he talked about “the primitive and uncivilized communes”, he did not take the historical character of value into consideration. He mistook that the measurement of exchange depends on the labor time ratio when the object is being obtained (Samuelson followed his point).

We can think that food is the first thing, which has use value that human have discovered. The earliest exchange was also between objects. Probably the original measurements of exchange are determined by the calories of food. William Petty (1623~87) who is 100 years earlier recognized the food of each laborer as unchangeable common measurement. There is a sharp difference of times between William and Smith.

It is science (human knowledge) that creates new artificial use value. Science is not direct labor, which interferes the direct production process. The effect of science and technology is not only discovering new use values (including development of current use value), but also taking effect in two aspects: reducing the labor amount of current use value (improving the labor efficiency) and providing some skills to create certain use value. The creating technology of use value is reflected in production materials. And the surplus value amount is based on the labor quantity of production materials. The technology to improve the producing efficiency of use value is based on the labor amount that is saved.

The use value of land originates from human knowledge.

As we all know, the land is a natural product, not the product of labor. People do cultivate unoccupied land, refit and amend the land, and this requires a lot of labor. This issue will be discussed later. The primitive land is not the product of labor therefore it is worthless. But under commodity economy condition, land could be sold as goods and it has

price. Petty had discovered that the price of land is equal to 21 years rental. Then how the price of land is decided which is worthless?

The price determination is similar to “intellectual property”.

The price of a new technology is equal to a sum of currency capital in market. The net income after the new technology is put in use each year should be proportionate to the interest if the sum is deposited in bank. Therefore the theoretical price p_b could be calculates as follows:

$$p_t = \frac{\pi}{r}$$

Here π is the net income each year after the technology is invested.

Excess profit could be obtained when it was just put into market. As the widespread of the technology, the excess profit will tend to be 0, but it is not lower than the interest of the bank. Or else this technology will be washed out. Irreplaceable technology will never be washed out, the profit of which equals the interest of bank. This is the economic basis of “intellectual property”. The land in use is irreplaceable for agriculture. Therefore the price of land will live long under commodity economy conditions.

However, knowledge or technology, as immaterial product, does not transfer its value, which is different from material products. Science and technology do not interfere directly with producing process, so it does not transfer its value; it only takes part in the distribution of surplus value. Science and technology take part in the distribution, the carrier of which is to make use of the product, which is made out of the technology. Therefore the products that the land could afford finally determine the price of agricultural land (in famine years the rental should be lowered down). The price of non-agricultural land is determined by the economic profits of the land.

As we know that every machine is related to certain technology. When we buy the machine, we also buy the in same case with land purchasing.

In agriculture, the land could become capital, which is because the land has its particular use value. Such value is exclusive to the land, but it has no significance of capital before it is realized and made use of by human beings.

Let's first consider the price determination issue of the coarse land that could provide absolute rental. Superficially, the price of land is capitalized rental, namely the price is equal to a sum of currency capital. The rental of the land is the same to the interest of the sum of currency capital. Therefore the theoretic price of the land D could be calculated as follows:

$$D = \frac{m_d h}{r}$$

m_d is absolute rental or surplus value, r is the interest rate, h is currency/ labor time coefficient, (e.g.: several rmb / hour). likewise, as Petty mentioned that the price of land is equal to the rental of 21 years. This means the interest rate is about 5%.

Furthermore, the theoretical price P_c of useful natural resources could be considered like this:

$$P_c = \frac{\omega}{r}$$

ω is the net profit of the natural resource after it was used.

It is the capitalization of land, which makes land, could be measured by price (the prerequisite is that there is land monopoly), that is to say, the land could take human labor, and this is particular to the land. The land could not be measured with price if it is not capitalized. But why could land be capitalized? It is because people realized the particular use value. Such knowledge is technology. From the three elements of labor process, (laborer, labor materials and labor objects), there must be a media between the laborer and labor materials and labor objects. It is technology in fact. The labor object depends on the discovery of technology; the labor materials are the material result of science. The immaterial result is skills. Technology is the product of human labor. But we find that the

formula $D = \frac{m}{r}$ could not reveal the relation between the land and the labor amount it could imbibe. Therefore we make some change:

$$D = \frac{m_d h}{i} = \frac{eh}{i(1+e)}(v_d + m_d) = f_0(v_d + m_d)$$

v is variable capital and e is surplus value rate.

Let's see the price determination of fertile land which could provide the differential rent:

$$D_1 = \frac{1+a}{i} m h = \frac{e(1+a)h}{i(1+e)}(v_d + m_d) = f_{0,1}(v_d + m_d)$$

amh is the capital form of the differential rent.

Then let's have a look at the price determination of fertile land which could provide the differential rent:

$$\begin{aligned}
D_2 = K_0 + D_1 &= \frac{p_K h}{i} + \frac{(1+a)mh}{i} = \frac{m_K h}{i} + \frac{(1+a)mh}{i} \\
&= \frac{(1+k)e_K}{1+e_K} (v_K + m_K)h + \frac{e(1+a)}{i(1+e)} (v_d + m_d)h \\
&= f_{0,1}(v_d + m_d) + f_2(v_K + m_K)
\end{aligned}$$

K_0

is the

capital form of the differential rent, $v_K + m_K$ is the labor amount invested for refitting and amending the land.

In a word, the labor force invested into the land determines the prices of various lands.

4.A brief conclusion.

The essence of environment is the relationship among human beings, namely social relations. The salvation of environment depends on the relations between human and nature by the amelioration of interpersonal connections. Under market economy conditions, the issue of environment relies on value, which is the most fundamental economic relation.

According to labor value theory, the value of original environment is 0. And the destroyed environment has negative value. Negative value is universal (non-exclusion and non-rivalness). It functions in a certain field. Destroyed environment has negative influence upon production activities. From the non-rivalness of negative value, the process of production admits the negative value of environment. But the negative value amount, which exists in the environment, does not change. From the perspective of non-exclusion, the harmers of the environment are also the victims of the environment. But they have different benefits: while the harmers benefit, the victims lose.

The concepts of negative value and 0 value have already been raised 130 years ago, but so far, there is no profound research on this. Researches on the relations between this concept and the environment, as well as the labor value theory, will be an important subject in environmental and economic studies. Recovery fees should be fined from the companies that destroyed the environment. Therefore all the prices of the lands rely on the labor force from human beings. It is the same case with the price determination of environment.

The emission of CO₂ should be treated differently in different countries. And this depends on the emission situation and the damage upon environment. This is the prerequisite of fair distribution of emission. Developed countries acquire unfair benefits by tempering the duty of compensation with the right of emission. The right of emission is also part of human rights. The classification of unexchangeable, exchangeable and negative emission rights could be helpful for the salvation of the problem.

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