

Kuznets Environment Curve and Sustainable Development in Vietnam

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Abstract. Sustainable development is one of the prime strategic orientations of most countries in the world, including Vietnam. Apart from significant socio-economic achievements, the country's development has been exerting considerable pressure on the environment quality in Vietnam. It is therefore imperative to clearly realize and properly assess the quality of growth as well as the importance of environmental issues so as to help enhance sustainable development in Vietnam.

Key words: Kuznets environment curve, sustainable development, effectiveness of environmental performance.

1. Introduction

Considering Vietnam's rapid development in the last 10 years, one of the generally agreed views is that Vietnam is able to maintain its fast growth rate in years to come. This not only reflects the aspiration and will of each Vietnamese but also the correctness of the policies on economic renovation initiated by the end of the 1980s. Holistically, a good future is visible to Vietnam economy. Thanks to rapid growth rates, possibly all difficulties in the economy will be solved, including environmental issues. Growth serves as the precondition which plays the key role in development, but this does not mean that any growth model can ensure quality and pay sufficient attention to environmental protection in a practical manner.

According to reports of the 3rd National Conference on Sustainable Development on 6th January 2011, after 6 years implementing the

orientations for sustainable development, Vietnam has recorded significant achievements in social, economic and environmental fields. Several activities in support of the preparation and implementation of sectoral and local sustainable development orientations, awareness raising and capacity building for management of sustainable development have been conducted. Nevertheless, the quality and effectiveness of the economy remain low, growth has occurred mostly in width rather than depth, and economic structural shift has been uneven. In addition, environmental issues such as pollution, biodiversity degradation, increasing extraction of minerals and problems in solid waste management, etc., all have been major threats to the national sustainable development.

2. Kuznets Environment Curve

The relationship between environmental quality and economic growth over time is normally represented in Kuznets environment curve, the logic of which is average income per

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capita and pollution level taking an inverted U shape (I), i.e. pollution level will increase in tandem with the increase of income to a certain extent, reaching its maximal value before declining while income continues on the rise. This means as long as its value is still below the maximum, economic growth will entail degradation of environmental quality, but beyond that maximal point, both will ascend. In other words, in the initial stage of the industrialization process, pollution rapidly augments due to the increased use of natural resources and increased emission of pollutants, causing serious environmental degradation. In the later stages of the industrialization process, when income elevates, people are better aware of environmental protection, environmental policies and legislation as well as enforcement agencies are stricter, more advanced technologies are applied, etc., then environmental quality will improve.

Studies by Grossman and Kruger (1991) and by other economists show 3 factors which exert influences on the relationship between economic growth and environmental quality.

First, economic structure. Economic development can be divided into 3 periods. Initially, when the economy comprises mostly agriculture and light industry, pollution level is low. In the second, amid the industrialization process, pollution level is very high. In the current period, when the economy is shifting to high-tech industries with services as the foundation, pollution level drops again.

Second, technology. The technological level of a country in particular, and of the world in general, is increasingly raised. Technological advances can indirectly reduce pollution level through more efficient use of inputs, while filter or waste cleaning devices directly decrease pollution level. The amounts of polluting waste from industries can drop while production goes up if such a rise is induced by clean and advanced technologies.

Third, environmental policies. Increased incomes cause incessant increase in social demands for improved environmental quality, and consequently policies on environmental management and restrictions on waste and pollution are stricter and stricter. Economic growth therefore can help restrain pollution level. However, this relationship largely relies on the Government's responses to social demands.

The recent research by Xiang Dong Qin (1998) clearly shows this relationship (Fig. 1). Each Kuznets environment curve represents a group of countries in the 1980s. SO₂ pollution level (the vertical axis) rises when countries become more affluent (the horizontal axis). Yet, as soon as countries arrive at the economic threshold (average income per capita approximately US\$8,000 in this case), the trend reverses and air pollution declines. In this analysis, the green curve shows the countries with good environment management systems, while the red indicates those with worse management systems.

However, there are at least two issues in Kuznets curve theory. First, it is being severely criticized, since there has not been much international research which asserts its existence, i.e. it is not yet certain that once the economy has reached some particular level of development, the environment will improve. In other words, this is merely a hypothesis which has not been supported with, or justified by, empirical evidence.

Secondly, it would be an illusion to believe that economic development will address all environmental issues. In deed, some risks will be irreversible once they occur, or will be extremely costly to handle. The explosion of Bhopal Chemical Plant (India) in 1984, the Chernobyl nuclear power plant disaster (Ukraine) in 1986, and the most recent accident in Fukushima nuclear power plant (Japan) have presented concrete evidence, and until now their aftermaths have not been totally eliminated (like cancer, water source pollution, etc.).

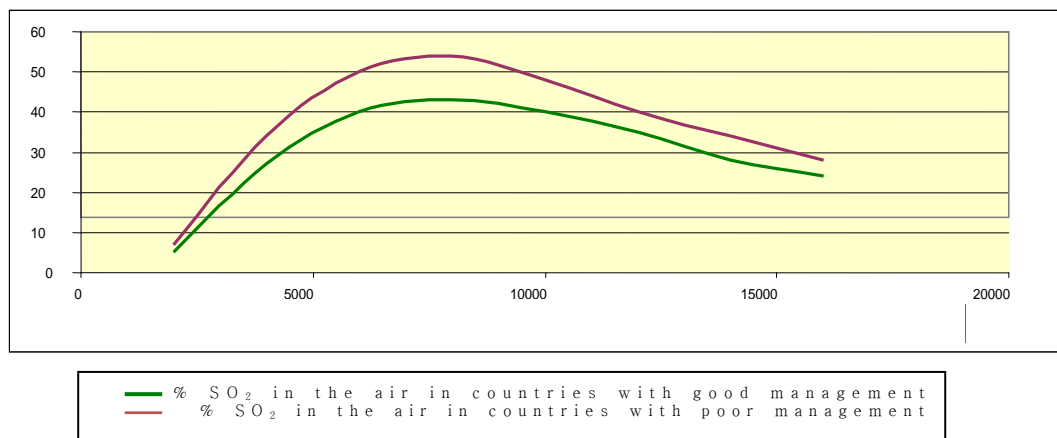


Fig. 1. Kuznets Environment.
Source: Xiang Dong Qin (1998)

Another important question to Vietnam is where the country is now on the Kuznets curve? Has Vietnam surpassed the turning point of the Kuznets curve to aim at a better environment and is the current quality of Vietnam's growth truly sustainable?

3. The Quality of Vietnam's Growth from Environmental Perspective

Vietnam has recorded enormous achievements in economic development in the last decade, and is one of the countries with high economic growth rates in the region and in the world, even amidst the global economic crisis. The annual average growth rate between 2001-2010 reached 7.25%. Growth rates are generally stable, with 2004-2007 witnessing high growth, and low growth in 2001 and 2008-2010. On the average, from 1991 to 2010, the economic growth rates reached approximately 7.4% p.a. Vietnam's economic growth rates in the last 20 years are high in comparison with those in other countries and territories in the world, only lower than China's annual average growth rates in the same period. Moreover, Vietnam's economy has been continuously growing for 25 years. Vietnam can be included in the list of 13 countries successful in

maintaining high and sustainable growth rates in the post-war period. GDP in 2010 calculated against actual prices reached US\$101.6 billion, 3.26 times higher than 2000, and average GDP p.c. reached US\$1,168. In 2010, Vietnam was acknowledged by the World Bank (WB) as a middle income country (MIC)⁽¹⁾. Poverty rates in Vietnam dropped sharply from nearly 60% in 1993 down to around 14% in 2008.

Along with vigorous economic growth, the intensity in the use of basic natural resources such as land, water and energy for the production of one unit of economic output in Vietnam demonstrated a downward trend in 1990-2007. In other words, Vietnam tends to use fewer natural resources to generate US\$1 of GDP (Fig. 2). This trend is partly determined by the economic structural shift from agriculture to industry and services.

Although the above figures reveal certain promising signs of efficiency in the use of resources, basically energy, fuel and raw material consumption in Vietnam's industries is very high. According to the World Bank's computation, energy consumption (kg of oil equivalent OE) per one unit of GDP (US\$ at 1995 prices) is 0.29 in

⁽¹⁾ According to WB classification in 2010, a country with average GNI p.c. at US\$975 and above is categorized as a middle income country (MIC).

the US, 0.10 in Japan, 0.58 in Hong Kong, 0.26 in Singapore, 0.27 in Australia, 1.43 in China and 1.43 in Vietnam. Industries like cement consume 1.3 - 1.4 times more energy, while steel uses 1.5 - 1.7 times more electricity than its counterpart in advanced countries. GDP generated by 1kg OE in Vietnam is US\$3.7, also lower than that in

most countries in the region (Fig. 3) such as Indonesia US\$4.1, Thailand and Malaysia US\$4.7, Japan US\$7.9, and Singapore US\$8.1. It is clear that the amount of US\$ of GDP generated by 1kg OE in Vietnam is only higher than China and other low-income countries, but lower than ASEAN-4 and middle-income countries.

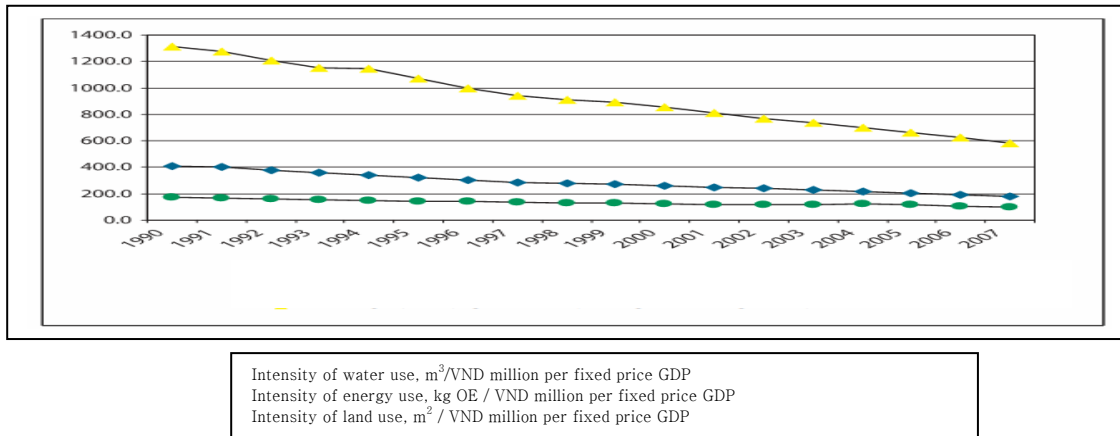


Fig. 2. Intensity of resource use in Vietnam in 1997-2007.

Source: World Bank (2010)

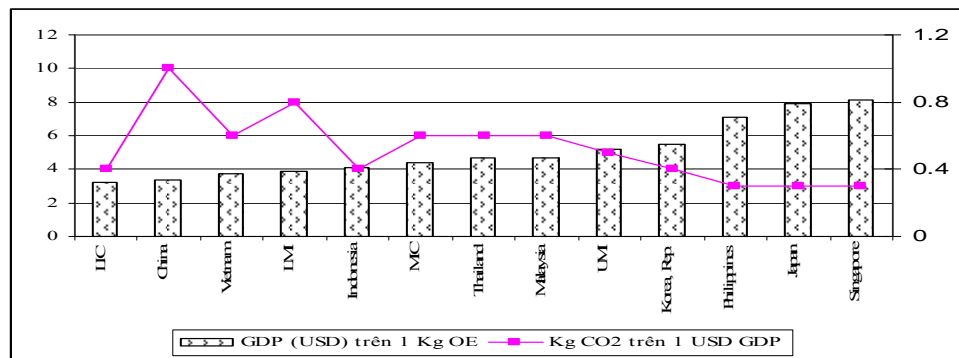


Fig. 3. Energy use efficiency in Vietnam and other countries.

Source: World Bank (2010)

In terms of environmental pollution level, reality in Vietnam shows that environmental pollution level increases in parallel with the growth process. In 2001 - 2010, the amount of CO₂ emitted to the environment grew at an average rate of nearly 15% p.a. Compared with similar levels in low-income countries, CO₂ emission rate per 1 dollar of GDP is 0.6kg, higher than that in most other countries in the region.

The rapid increase of CO₂ emission is directly attributed to growth in production and consumption. In 2001 - 2010, the average coal production climbs at 14.6% and power generation augments at 13.8% p.a. Compared with 1990, coal, gasoline (petroleum) and electricity consumption in 2007 was 4.6, 5.7 and 9.9 times higher respectively. In 2007, industry accounted for 34%, transport nearly 20% of the total energy consumption in the

whole country and were the main culprits of air pollution. Energy consumption in agriculture accounted for a very low percentage (under 2% of the total), demonstrating a low level of machinery use in this sector and thus air pollution is largely generated by industry, transport and civil sectors.

Most serious is pollution of water sources, especially in major industrial hubs and industrial zones in the estuaries of Dong Nai, Cau and Nhue rivers. The main polluting sources come from industrial production, rapid urbanization accompanied with high development density.

The common feature in the air and water pollution situation is that the polluting sectors are also the ones which considerably contribute to employment generation, economic and labor structural transformation and growth in industrial hubs, the driving engines of the country's growth.

Now allow us to get back to the question whether Vietnam's development is truly sustainable. According to the definition of the World Commission on Environment and Development in 1987, "*sustainable development means meeting the needs of the present without compromising the ability of future generations to meet their own needs*". More specifically, it is the balanced and harmonious development of the three economic, social and environmental pillars. The general definition above has been supplemented with details of measurements applicable to reality. A quite popular approach to measurement of environmental sustainability is the use of Environmental Performance Index (EPI) which measures the effectiveness of the implementation of environmental goals and policies in each country. National environmental policies normally aim at two major goals of environment-related community health and long-term viability of the ecosystems. In line with these core goals, EPI is identified based on weighted scores recorded by 10 policy objectives on the basis of such

fundamental indicators as disease burdens due to environmental problems, water resources and human health, air quality and human health, water resources and ecosystems and biodiversity, forestry, fishery, agriculture and climate change.

Scoring 59 points, Vietnam ranks the 85th among the 163 countries having their EPIs rated in 2010. Tops of the league include Iceland, Switzerland and Costa Rica with the highest score of 94. The countries with the poorest environmental performance effectiveness are Sierra Leone, Central African Republic and Mauritania with only 32 points in the ranking exercise. In the region, Vietnam's EPI score is higher than those in the Philippines (66), Laos PDR (60), China (49), Indonesia (45), Papua New Guinea (44), Mongolia (43), and Cambodia (42). However, compared to the world, Vietnam's score stands at the lower average. High scores in Vietnam are recorded in forestry and agriculture. In forestry, scoring points are given to variation in forest coverage and forest reserves, even though the area and quality of natural forests are seriously degrading. In agriculture, scores are calculated against the intensity of water use for agricultural production, support and regulations on pesticides. Vietnam scores low EPIs in fishery, climate change (CO₂ emission per kwh, intensity of GHG emission from industry) and influence of air pollution on ecosystems, and marine conservation. From these comparative results, it is possible to conclude that despite recognizable progress in environmental protection compared with the region, Vietnam's development is generally not yet sustainable.

4. Environmental Costs of Economic Growth

According to the World Bank's assessment (2010), Vietnam has been facing with several environmental problems which are inherent costs of economic development. A good number of natural resources are experiencing a

rapid depletion trend while several environmental components are polluted and degraded, which exerts direct impacts on the country's sustainable development. The World Bank estimates that Vietnam may suffer from a loss of up to 5.5% GDP p.a. as a result of environmental pollution. Thus, the economy lost approximately US\$3.9b out of the US\$71b GDP in 2007, and around US\$4.2b out of the US\$76b GDP in 2008. Following are some examples in water and air pollution in Vietnam.

The cost of air pollution

Air pollution lays enormous impacts on health, particularly the respiratory system. Studies in Vietnam reveal that due to air pollution, human health deteriorates with faster physical ageing process, deficiency in the functions of respiratory organs, which causes asthma, bronchitis, cardiovascular diseases, etc., and shortens human life expectancy. The levels of impacts on each individual vary, depending on their health conditions, the concentration and types of pollutants, and time of exposure to polluted environment. The Ministry of Health also reports that in recent years, nationally, respiratory diseases are the most common with the highest prevalence rates. Reality shows that many respiratory diseases are directly attributed to polluted air environment due to particulates, SO₂, NO_x, CO, lead, etc. These pathogens cause infection in the respiratory system, asthma, tuberculosis, allergy, chronic bronchitis and cancer.

Economic damages due to health impacts include such expenses as medical examination, treatment costs, production and economic losses as a result of working disruption. The project "*Investigation, Inventories and Assessment of Environmental Pollution Impacts on Community Health*" conducted by Vietnam Environmental Protection Agency (2007) in the two provinces of Phu Tho and Nam Dinh produced estimates of economic damages due to the impacts of air pollution on health p.c. at an average of VND295,000 p.a. Suppose that

this were also the case in Hanoi and Ho Chi Minh City (HCMC), the two cities with 6.5m and 7m population respectively would suffer from a daily loss of VND5.3b and VND5.7b. In fact, the air environment in the major cities of Hanoi, HCMC, Hai Phong and Da Nang is far more polluted than that in Phu Tho and Nam Dinh, actually resulting in much higher economic damages than the cited figures.

The cost of water pollution

Untreated waste water from production directly released to the environment causes considerable damage to agricultural and fishery production in the vicinity. On the other hand, water pollution has led to increases in disease burdens and prevalence of occupational health problems. These rates tend to increase at an alarming rate in recent years and incur substantial economic losses.

Water sources in the Mekong Delta are being polluted by contaminants from agricultural production due to the overuse of fertilizers, pesticides and other plant preservatives, domestic waste and industrial activities. The research by Vo Thanh Danh (2009) revealed that average economic losses due to water pollution in each household in the Mekong Delta stand at VND29,345 per month, i.e. approximately VND1,454b p.a.

Studies by the Ministry of Natural Resources and Environment (MONRE) in the polluted area of Thi Vai river based on the inventories of economic damages claimed by 1,181 affected citizens gave an estimate of up to VND567b loss p.a. due to water pollution from VEDAN company.

Also according to MONRE, currently, pollution of water sources is the culprit of several hard-to-cure diseases and common maladies such as diarrhea and dysentery, especially among densely populated and poor areas. In the last 4 years, 6 million Vietnamese have contracted water-borne diseases and epidemics, and treatment costs amounted up to VND400b, or US\$21m.

To sum up, the renovation in the last 10 years has been presenting us with enormous environmental challenges. Vietnam will enter a difficult period of development which require large inputs from environmental components. Impacts will be catastrophic and growth fails to be sustainable unless environmental damages are thoroughly considered in policies.

5. Conclusion

The study allows for some conclusions on sustainable development in Vietnam as follows.

First, in the last 10 years, Vietnam has recorded significant achievements in economic development and environmental protection compared to other countries in the region, yet development is generally not yet sustainable. Even though Vietnam is still in the initial stage of the development process, the country has already been facing with serious environmental problems such as depletion of forest resources, water resources, loss of biodiversity, water and air pollution from factories, households, abuse of chemical pesticides and fertilizers, etc. Environmental degradation occurs on a large scale, affecting various environmental components.

Second, environmental damages due to economic activities in Vietnam are substantial, accounting for approximately 5.5% GDP p.a. In the coming years, Vietnam is still in the middle of the industrialization process and will not have overcome the turning point of the Kuznets environment curve yet. Environmental damages therefore tend to increase unless timely prevention measures are applied.

Third, in the coming years, Vietnam will be able to maintain continuous high growth rates. With the current development models in

Vietnam, the higher the rate of GDP growth, the higher the increase of waste, and the larger the loss of social welfares. Environmental impacts not only depend on the scale of economic activities, but also on characteristics of economic structure, level of technology and management solutions. It is therefore vital for Vietnam to properly select the goals for economic growth, economic structural shift and apply solutions for environmental protection in subsequent stages so as to achieve sustainable development.

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