IOSR Journal Of Humanities And Social Science (IOSR-JHSS)
Volume 19, Issue 12, Ver. II (Dec. 2014), PP 29-34
e-ISSN: 2279-0837, p-ISSN: 2279-0845.
www.iosrjournals.org

Economics of sustainable development

Ms. Neha Gupta

Abstract: *A country's environment and its natural resources play a significant part in its economic growth and development. However, economic activity often uses environment as a dump for waste products. This rapid but polluting growth reduces social welfare and thus increases the cleanup cost. Therefore, ever since the economies have started growing at rapid pace, the issues of effects of such growth on environment have become very crucial. The following essay attempts to understand the concept of sustainable development, the origin and need of it, the problems and the trade off between economic growth and environmental protection.*

I. Introduction

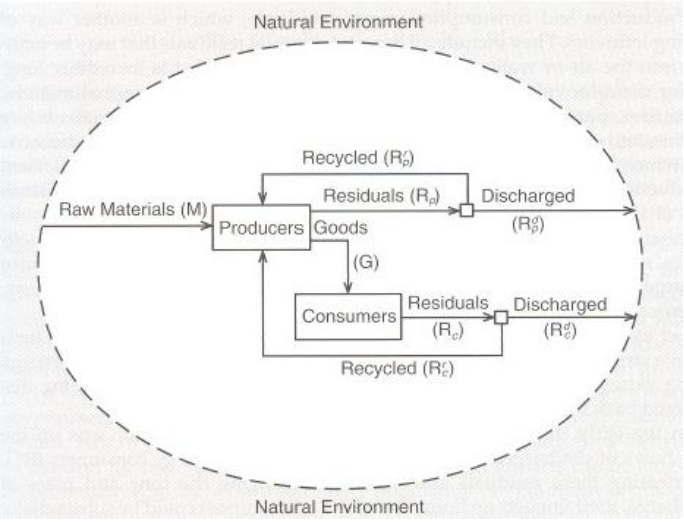
A crucial question that preoccupies the economies in the world is that how should the process of economic growth be continued so as to maximize the benefits for both the current as well as future generation, particularly for developing countries who have to manage their resources to use them most productively in short term and to convert natural wealth into sustainable development in the long term.

A country's environment and its natural resources play a significant part in its economic growth and development. However, economic activity often uses environment as a dump for waste products. This rapid but polluting growth reduces social welfare and thus increases the cleanup cost. Therefore, ever since the economies have started growing at rapid pace, the issues of effects of such growth on environment have become very crucial. The following essay attempts to understand the concept of sustainable development, the origin and need of it, the problems and the trade off between economic growth and environmental protection.

Interlinkage between economy and environment

Every economic action can have effect on environment and every environmental change can have impact on economy. The production sector extracts energy and material resources from the environment. These are transformed into outputs for further production and consumption. Environment also acts as waste sink, as a partial recycling factory for human waste from production and consumption. It is also the supplier of amenity, educational and spiritual values to society. People derive utility from consumption of goods and services and also from the state of environment. It is scarce resource with conflicting demands as being used for one purpose reduces its ability to supply with other services such as clean air. Therefore as economic growth occurs absolute scarcity of natural resources will increase. Then, it is imperative that economics has a role to play in efficient allocation of environmental resources. These interlinkages are dynamic and continuously changes.

Environmental degradation can have serious implication on the growth process of developing countries who have to bear the burnt of falling productivity and population pressure on their marginal lands. Poverty and environmental degradation are two forces that can force communities to destroy and exhaust resources on which they are dependent for survival. Their growing consumption requirements can have global implications for example, global warming and greenhouse effects.



Sustainability

Sustainability means existence of favorable ecological conditions for sustenance of human life through future generations. *Sustainable development* implies economy's capacity and ability to maintain human well being over a period of time. Sustainable economic growth means that the value of production can be continually increased without disruption from bio-physical or social impacts. The concept of sustainability rests on three fundamental pillars:

- Economic sustainability: the economy should grow on a sustainable rate and the benefits of economic growth should be evenly spread over a long period of time.
- Social sustainability: Social conflict may endanger intergenerational well being. It can also create environmental havoc. Societies continue to transform which may create risk for preservation of natural resources. For example, scheduled tribes are dependent on forests. However, in trying to move them away from forests, a condition of social tension may appear. Barbier (1987) defined social sustainability as "the ability to maintain desired social values, traditions, institutions, cultures or other social characteristics."
- Environmental sustainability: As discussed, environment is an important factor of growth, being the supplier and the sink. Some of the environmental degradation is irreversible and needs to be addressed with the growth process.

The last two decades have witnessed a shift towards concerns as how sustainable development can be achieved. It has gained support that earlier development concepts lacked.

The classical and neo classical models

Human welfare requires production and distribution of goods and services which in turn depends upon availability and supply of four major factors of production namely, human capital, man-made capital, renewable resources and non renewable resources. These factors are used to design the production processes and to attain the desired consumption levels. Neo-Classical economics focuses on prices, outputs, and income distributions in markets determined through supply and demand so as to achieve efficient allocation of scarce economic resources. Here, *Economic growth* is defined as an increase in the value of annual production of a country, usually measured by Gross Domestic Product (GDP). Economic growth will ensue as a result of capital accumulation and improvement in productivity.

However, the neo classical model is based on premise of **weak sustainability** that is, over all capital stock should be non-decreasing. It allows for natural resources to be depleted as long as other forms of capital compensate for this loss. According to Brekke (1997), "A development is said to be weakly sustainable if the development is non diminishing from generation to generation." It argues that investments in other forms of capital can fully substitute for depletion of natural resources and thus guaranteeing continued welfare of future generations.

- They argue that the overuse of natural resources results from lack of well defined property rights. Economic agents who undertake production and consumption activities completely disregard the liabilities imposed on the third parties in form of environmental pollution. The rapid extraction of resources and externalities will result in deviation from optimum allocation of resources and thus loss of efficiency. In microeconomics theory it is assumed negative externalities resulting from increased production activities can be internalized through the price mechanism and thus can solve our ecological problems. This can be done by balancing economic gains with environmental costs.

They offer two solutions to restore efficiency-

  - Introduction of well defined property rights which ensures efficient degree of economic activity.
  - Command and control approach through introduction of regulatory agency that can impose standards and quotas such as imposition of pollution taxes etc.

- The goal of mainstream macroeconomic theory is continuous and increasing rate of economic growth. It is assumed that economic growth can increase innovation and efficiency and lead to decoupling of economic growth from negative environmental impacts. **Environmental Kuznets curve** states the relationship between economic growth and environmental degradation. According to which as income increases, level of pollution initially rises and after reaching a particular level of income environmental damage decreases as nations can afford cleaner technologies to curb environmental degradation. Thus it is argued that there is no need for a new macroeconomic framework for sustainability.

Hartwick- Solow approach

In his paper, Hartwick (1977) showed that as long as stock of capital did not decline over time, non declining consumption was also possible. By investing all hotelling rents from non renewable resource extraction in manmade capital, the stock of capital could be held constant.

Criticism of Neoclassical school-

Market system works poorly in allocation of natural resources. These theories undervalue the role of environment where the ecosystem is treated as a supplier of resources and the free disposal of waste.

- **Problem of externalities**: Because of absence of market for environmental goods, it is difficult to value them accurately. Here the costs are borne by the population at large but not by individual producers or benefits accrue to the society but cannot be captured by the producers. Most severe externality is caused by depletion of natural resources which cannot be replenished.
- With regard to assignment of property rights, we can suspect **high transaction costs** of bargaining between the concerned parties and these costs can never be observed. An imperfect specification of property rights can send wrong signals to economic agents and that individual benefits of preserving environment understate the collective benefits of preservation. On the other hand one cannot neglect the possibility of government failure and existence of equity problem. The existing institutional setting directly and indirectly affects environmental policies.

It is important to differentiate between different types of natural capital – renewable and non renewable. Failure to account for natural capital can lead to serious misconceptions on how well the economy is progressing. Daly (1990) states that "Growth is destructive of natural capital and beyond some point will cost us more than it is worth-that is, sacrificed natural capital will be worth more that the extra man made capital whose productions necessitated the sacrifice. At this point growth has become anti-economic, impoverishing rather than enriching." He has argued that price system would be unable to solve the problem of absolute scarcity which can be solved through quantity limits on resource use and population.

Given these concerns, the ecological economist argue for rethinking of standard neoclassical theories in order to incorporate role of environment and its services to economic development. They reject the neo classical assumption that capital can substitute for environmental resources. Rather natural resources are 'Primary inputs' and manmade capital and labour are the 'agents of transformation'. According to the **strong sustainability** argument natural capital and human capital are complementary rather than substitutes. Sustainability in strong sense implies non diminishing life opportunities. Certain environmental functions cannot be duplicated by manmade capital. For example, Ozone layer which is essential for human existence cannot be duplicated. Environment is source of inputs as well as sink for the matter or energy transformation necessary for economic system to operate. Environmental constraints can cause limits to growth as supply of food and non renewable resources is finite while population and industrial output tend to grow exponentially. As a result, it is argued that dramatic change in technologies, investment and consumption patterns can lead to decoupling of economic growth from environmental impacts.

Economics of sustainable development- Policy framework for sustainable development

The neo classical theories that incorporated environmental constraints were primarily concerned with intergenerational efficiency rather than equity and modeled sustainable development as non-declining consumption. However the goal of sustainable development is achieving equity rather than efficiency, both within nations and across generations.

Objectives of sustainable development:

- Restoring and changing the quality of growth
- Satisfaction of basic human needs such as food, shelter, jobs, sanitation etc
- Ensuring sustainable rate of growth of population
- Conservation and enhancement of resource base
- Reorientation of technology and risk management
- Considering role of environment in economic decision making
- Reorientation of international relations among nations. (WCED, 1987)

Overall, Sustainable development requires that overall stock of manmade capital, human capital and environmental capital should not be decreasing. The correct measure of it will be an income that can be used without decreasing the capital stock.

$$NNP=GNP-Dm-Dn-R-A$$

Where,

NNP is sustainable national income, Dm s depreciation of manmade capital, Dn is depreciation of environmental capital, R is expenditure required to restore environmental capital and A is expenditure required to avert damage to environmental capital.

Another measure used to measure sustainable development is Index of Sustainable Economic Welfare (ISEW)

ISEW = personal consumption + public non-defensive expenditures - private defensive expenditures + capital formation + services from domestic labour - costs of environmental degradation - depreciation of natural capital

There are few things that need to be kept in mind while formulating a strategy for sustainable development.

1. Whether generations should employ constant consumption level.
2. Well being of individuals should not fall below a minimum level for any generation to come.
3. Well being should be non declining
4. Intergenerational equity should be maintained.

Daly (1990) identified **four operational principles** for sustainable development.

1. Renewable resource: Harvest rates should be set equal to population growth rate.
2. Pollution: For degradable pollutants waste emission rates should be equal to assimilative capacities of the ecosystem into which waste are disposed. He proposed that for cumulative pollutants discharge should be set equal to zero.
3. Non renewable resources: He suggests that non renewable resources can be exploited at the rate identical to the rate of creation of renewable substitutes. It aims to limit the resource throughputs. This would depend upon growth rates, rate of technical progress, discount rate and size of non renewable resources.
4. Controls on macroeconomic scale: He suggests quantitative controls on pollution emissions, energy use, resource use, population and consumption. He argues that economic growth will be anti economic growth if optimum scales of consumption are exceeded.

OECD has identified few elements of sustainable growth. They are-

- Long term pricing horizon- In long run manmade, human, social and natural capital should complement each other.
- Pricing- Prices should reflect costs and benefits to all.
- Effective delivery of public goods such as health, education etc.
- Cost and environmental effectiveness-Policies should aim minimization of effective costs and ensuring protection of environment.
- Integration of environmental, economic and social goals.
- International cooperation
- Transparency and accountability

UNCTAD's IPFSD (Investment policy framework for sustainable development) identifies several core principles. These are:

- Investment for sustainable development
- Policy coherence
- Public governance and institutions
- Dynamic Policymaking
- Balanced rights and obligations
- Right to regulate
- Openness to investment
- Investment protection and treatment
- Investment promotion and facilitation
- Corporate governance and responsibility
- International cooperation

Sustainable development thus seeks to ensure enhanced quality of life along with protection of environment. Efficient path can be attained through introduction of environment friendly products, green technologies, efficient allocation of natural resources, and reduction of waste etc. over the years. Such innovations are characterized in four broad levels- technological, Social, organizational and institutional. They require incorporation of environmental perspectives such as adoption of technologies that can prevent environmental damages, pollution prevention schemes, carbon taxes to reduce carbon footprint, increased awareness among consumers to adopt environment friendly products etc and favorable regulatory framework for implementation of such policies.

Cost of environmental protection technologies

Costs of using environment friendly technologies are significant and do not allow economies to follow sustainable route of development. For example, firms with motivation of higher profits do not take into account

the pollution cost while decision making. If these costs are internalized say through pollution taxes, profits would decline with rise in costs. As a result production will decline or more efficient mode of production will be adopted. This would force reallocation of resources. Environmental protection diverts the resources of regulated industries from their core business. Typically, it makes their production more capital intensive and more expensive, with a negative effect on the productivity of other production factors, and on demand. If competitors do not have to comply with similar policy constraints, this spending also worsens the competitiveness of the industries affected.

However, such innovations are often too costly especially for the developing countries. Environmental friendly technologies often require huge investment, low returns in case of renewable resources and high prices for the consumers. The third world and developing countries already facing structural bottlenecks and low per capita incomes find it difficult to adopt such technologies. They have limited capacity to pay and their energy requirement is also relatively less than their developed counterparts. Despite government subsidies and assistance from international agencies, firms and countries are reluctant to invest in sustainable energy. Supply side bottlenecks, high cost of setup makes them vulnerable to changes in cost of capital. Moreover, they cannot be fully substituted for traditional technologies. These limitations obstruct the efforts towards more sustainable development.

Eco-energy planning is presently confronting three **major obstacles:**

- Renewable energy options, prominently including hydroelectricity and now wind power, have environmental drawbacks.
- Renewable energy subsidies and mandatory energy conservation are proving to be incompatible with a competitive restructuring of the electricity industry because of unfavorable economics and surplus existing capacity.
- Economic and environmental advances in the fossil-fuels industry, particularly in the use of natural gas in electricity generation and reformulated gasoline in transportation, have reduced the environmental costs of fossil-fuel consumption necessary to justify subsidized alternatives to fossil fuels.

Key challenges:

1. These investments policies increasingly incorporate targeted objectives to channel investment to areas key for economic or industrial development and for the build-up, maintenance and improvement of productive capacity and international competitiveness.
2. A focus on sustainable development objectives also implies that investment policy puts increasing emphasis on the promotion of specific types of investment, e.g. ‘green investments’ and ‘low-carbon investment. This involves finding the right balance between regulatory and private sector initiatives.
3. Such investments also involve restrictions on the freedom of economic actors or outlays of public funds.
4. Investments in green technologies have found to be unduly constraining national economic development policymaking.

The PLUS side:

However, recently these arguments have started to gather dust as such costs are considered to be political, rather than economic or social. Such technologies over the years have becoming cost-competitive especially in developing countries where huge investment and trade is now based on renewable energy.

- Gradual but credible long-term tightening of environmental standards and ambitions can help to establish new markets for environmental technologies - both abatement and clean technologies. It is estimated that spending on environmental protection accounts for 2 million jobs in the EU15, or about 1.2 per cent of total employment. Supportive government policies and private sector investment can give required push for adoption of environment friendly measures.
- Even economic theory suggests that when firms are forced to take into account the cost of pollution, for example carbon emissions, then they would try to reduce their carbon footprints and thus would be instrumental in achieving social optimum. Even in case of consumption if consumers have to face pollution taxes, they would limit their activities such as limiting car use for essential purposes and adopting public mode of transport.
- As per latest estimates by 2030, nearly 20 million people will be employed in the renewable energy sector particularly in solar and wind energy related manufacturing and service sector. Other eco friendly sectors that present opportunities for growth are organic agriculture, timber goods, fisheries, eco tourism etc.
- As environmental policy directly or indirectly raises the price of polluting, firms who use less polluting resources or produce less polluting products benefit as demand shifts towards their output. Benefits also accrue to firms who use previously polluted resources as inputs for their production: reducing water pollution benefits activities that require clean water.

- Over the longer run, the positive impacts on human health will have wider economic benefits, both in the form of reduced health spending and more productive and efficient workforce.

This would require an appropriate socio, economic and political policy framework that-

- Involves local population and provides them with appropriate education and employment opportunities.
- Preserves functionality and diversity of ecosystem while promising inclusive development and strong economic governance.
- Promotes global development agenda that facilitates eco friendly production and consumption pattern and management of environmental resources.

The purpose of environmental policy is neither to slow growth, nor to reduce the output , it is important that it allows maximum scope for innovative technological solutions to environmental problems. The IPFSD has highlighted the policy options to address the investment challenges faced by the economies. The core principles stated above can be addressed at three levels:

- *Strategic* – this involves managing the interaction between investment agreements (IIAs) and national policies other international agreements. The objective is to ensure investments that promote sustainable development goals.
- *Designing provisions for sustainable development*– this concerns addressing the policy space and balancing rights and obligations between States and investors, and effective investment promotion.
- *Building multilateral consensus on investment policy* – this goes toward helping address the systemic challenges that emerge from overlaps and inconsistencies in the IIA regime.

A cost-effective environmental policy should aim to minimize the costs incurred in achieving an environmental objective by taking into account the cost benefit analysis, the dynamic character of adjustment needs, and the huge uncertainties surrounding cost and benefit estimates in the absence of well-functioning markets. In this way it could contribute to significantly balancing the trade-off between environmental protection and economic growth, and support welfare-enhancing structural adjustment.

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