

Bridging the Gap between Science and Policy through Higher Education

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Abstract

The progress of a nation has been often measured in terms of its 'economic development' but today it needs to be evaluated in terms of 'Sustainable Development', which is based on judicious consumption of earth's resources. We are in the process of adopting the seventeen Sustainable Development Goals (SDGs) and this can be achieved by integrating the scientific knowledge in policy and decision making. A systematic learning of the process of sustainable development in the context of environment will require a comprehensive approach that enables mainstreaming environment in the decision making. In this process the higher education institution has the responsibility of providing the science and policy interface by introducing the interdisciplinary approach in the curriculum for driving the sustainable development. These higher education institutions can develop new curricula for science-policy interfaces and enable research projects pertaining to specific Sustainable Development Goals (SDGs). There is a need to create linkages between science education, technology and policy. The policies and governance have only been the tools of the government to regulate activities and need to integrate science in the policies is essential to facilitate sustainable development. UNEP and the various governments have already initiated research towards achieving SDGs and the targets. The scientific data and empirical evidences can facilitate in planning the strategies according to the local, regional and national requirements.

The present paper is an attempt to use a scientific base by directly applying the scientific findings and empirical evidences to evolve policies and strategies. Thereby, connecting science and policy in the process of achieving the Sustainable Development Goals and their Targets. Attempts have been compare the higher education institutions for integrating sustainability concept in their curricula that includes scientific, technological, economic, social, cultural, ethical values, to include legal and policy perspectives in the higher education and research to address the environmental implications of sustainable development. The curriculum integrates the principles of Sustainable Development through interdisciplinary approach to include all elements of environment such as natural resources, energy, waste etc. The programme includes courses on Environmental Management Systems, Life cycle Thinking, Industrial Symbiosis, Circular Economy, Resource Efficiency, Newer Technologies, Policies and governance as apart of course curriculum. The research components require a strong and accurate data base to be generated and evolve the suitable models.

Key words: *Higher Education; Sustainable Development, SDGs; Agenda 2030.*

1.0 Introduction

There has been a divide between the Science and Policy and many research papers have discussed this issue and provided some thought on bridging the gap. Today the world is moving towards a 'Sustainable Development', by optimal use of earth's resources, enabling availability of these resources for our future generation. The mechanism of sustainable development is envisaged through the seventeen Sustainable Development Goals (SDGs) and would enable us to rationalize the resources between generations. This can be achieved by integrating the scientific knowledge in policy and decision-making process. A comprehensive approach along with systematic learning of the various entities in the process of sustainable development will enable the mainstreaming environment in the decision making. The higher education institutions have a major role in providing the interface between science and policy with the help of interdisciplinary approach in the curriculum. These higher

education institutions can develop new curricula for science-policy interfaces and enable research projects that facilitates in the decision-making process. In other words policy based scientific study and research to create linkages between science education, technology and policy. The policies and governance have only been the tools of the government to regulate activities and there is a need to integrate science in the policies to facilitate sustainable development. The scientific data and empirical evidences can facilitate in planning the strategies according to the local, regional and national requirements for achieving SDGs and the targets.

The global recognition for education on Sustainable Development was provided by the United Nation's initiative on Education for Sustainable Development (ESD) recognized the importance of education, training and awareness was included in Agenda 21 in the Rio Summit in 1992. However, the importance of education has been reemphasized Rio Plus 20 Summits in 2012 by including Education as one of the Sustainable Development Goals - SDG4 as the path leading to sustainability. The role of higher education in achieving some of the other SDGs was re-emphasized to bring change.

2.0 Background

There have been many studies on bridging the gap between science, policy and decision making some of them provide an insight into the system that need to be supported with scientific evidences and others that need more empirical evidences.

Some institutions of higher education were identified and entrusted with the responsibility to include sustainability in the curriculum and research. TERI University (TU) in 2012 has signed the "Rio+20 Declaration of Higher Educational Institutions (HEIs)." (Jain et al, 2013) The HEIs play a vital role in the training of teachers and reorientation of the curricula in addition to the promotion of ESD in formal, non-formal and informal learning environment on a lifelong basis. HEIs also play a significant role by producing "rational-citizens"

An international study (Choi et.,al., 2016) provided a comparative study between Canada and China confirmed that the concept and strategies of bridging the gap between science and policy are vary and are evolving over time. This study contributed to the evidence-based policy making by comparing the responses and previously reported priority strategies to bridge the gap between science and policy and ideal way for the future. The recommendations for the developing world include inclusive working relationships with government agencies and enhancing the involvement of professional associations in providing scientific input to the policy-decision-making process. (Dong et al,2017). An integrated sustainable rangeland management require a commitment to formulating adaptive, locally contextualized, scientifically grounded policies has been proposed. The study on bridging the gap between research and practice (Mohajezad, et al, 2021) examines whether information on research collaboration can influence the reception of research knowledge. While the field experts and scientists in a research team provide experimental results that are directly applicable, the survey from the field of education can influence research depending on the team and the information sought. The study states that overall results may be relevant and applicable this proving the importance of research collaborations and the need for more empirical research.

The UN system is dependent on world politics but the confidence dwindled and the WHO has faced political gridlock during international public health emergencies as was seen during COVID 19 pandemic. (Nay and Sinoussi, 2022). This calls for reforming the multilateral institutions with an interface with scientific communities to bridge the gap between science and governance. A new model of multilateral governance can be evolved on the basis of the experience gained in climate change and biodiversity.

The approaches to bridge the science-policy-gap invariably combines the efforts required relations between science and practice in the research process such as workshops etc. There is a need to define the mode of communication such as workshops, consulting, exchange

relationships and practitioner-based research. The policies and governance have only been the tools of the government to regulate activities. There is a need to evolve science-based policies to achieve the SDGs and the targets. The scientific data and empirical evidences can facilitate in planning the strategies according to the local, regional, national and international requirements. The resistance from the public to comply with the laws and regulations may be overcome through involvement of the stakeholders in the policy process.

3.0 Methodology

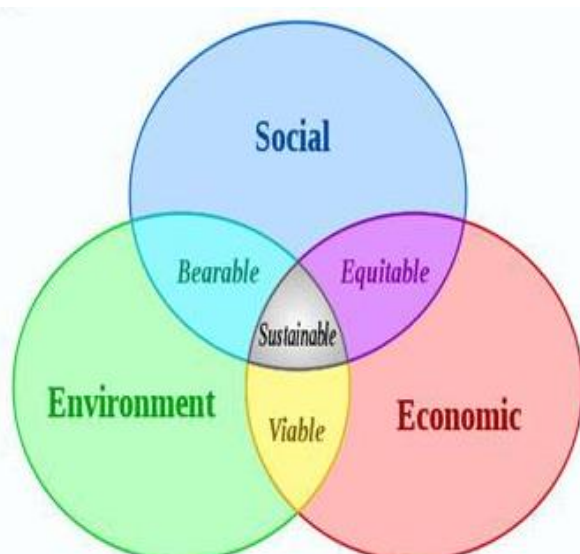
The methodology adopted for the study was basically on review of literature on the policies being adopted globally and in India for sustainable development. The policy frame work proposed by the international and intergovernmental organizations and various governments working towards achieving SDGs and the targets. Review of case studies and success stories in various countries implementing SD policies. Based on the information obtained the Process to build a scientific base by applying the experimental findings and empirical evidences to evolve policies and strategies. The Policy Cycle was reviewed to incorporate the science in sustainability.

4.0 Findings

There are different ways adopted in the formulation of a Policy in various countries. The environmental issues and Sustainable Development are global phenomenon there by requiring a global accountability. The evolution of the policy has to be according to the local needs and applicability to meet the global targets. One of the studies conducted in India in TERI University led to the understanding that Integrated approach for learning was absent in many Higher Education Institutes. The Institutes that have introduced Sustainable Development as a part of curriculum have been successful. (Jain et al 2013)

4.1 The SDGs

In case of SDGs, the policy frame work has three distinct entities, the environmental, economic and social to meet the targets set under the SDGs. Policies are formulated under these three heads as shown in Fig 1 below:



<u>Policy Framework</u>
<u>Environment</u>
<ul style="list-style-type: none">• Bio-Diversity• Air Pollution• Water usage and pollution• Land use and degradation• Wastes
<u>Social</u>
<ul style="list-style-type: none">• Human Rights• Equal opportunity
<u>Economic</u>
<ul style="list-style-type: none">• Profitable growth• Consumption production• Risk Assessment & Management

Fig 1 – POLICY FRAMEWORK TRIPLE BOTTOM APPROACH

The Policy Framework essentially includes the Bio-Diversity, Air Pollution, Water usage and pollution, land use and pollution and wastes as the environment components. While the Social entities include Human rights and equality and the Economics includes profitable growth, sustainable consumption production and the Risk assessment and Management. These elements have to be supported through scientific and empirical data to be incorporated in the policy Formulations.

4.2 The Policy Cycle & Policy Formulation

The Policy Cycle includes the following steps:

- (1) Agenda Setting
- (2) Formulation of Policy
- (3) Adoption
- (4) Implementation/enforcement mechanisms
- (5) Evaluation
- (6) Support and Maintenance

The policy formulation process can be either Top-downwards or Bottom-upwards. However the policies that are framed bottom-upwards have been more acceptable for the community and the enforcement or implementation becomes easy.

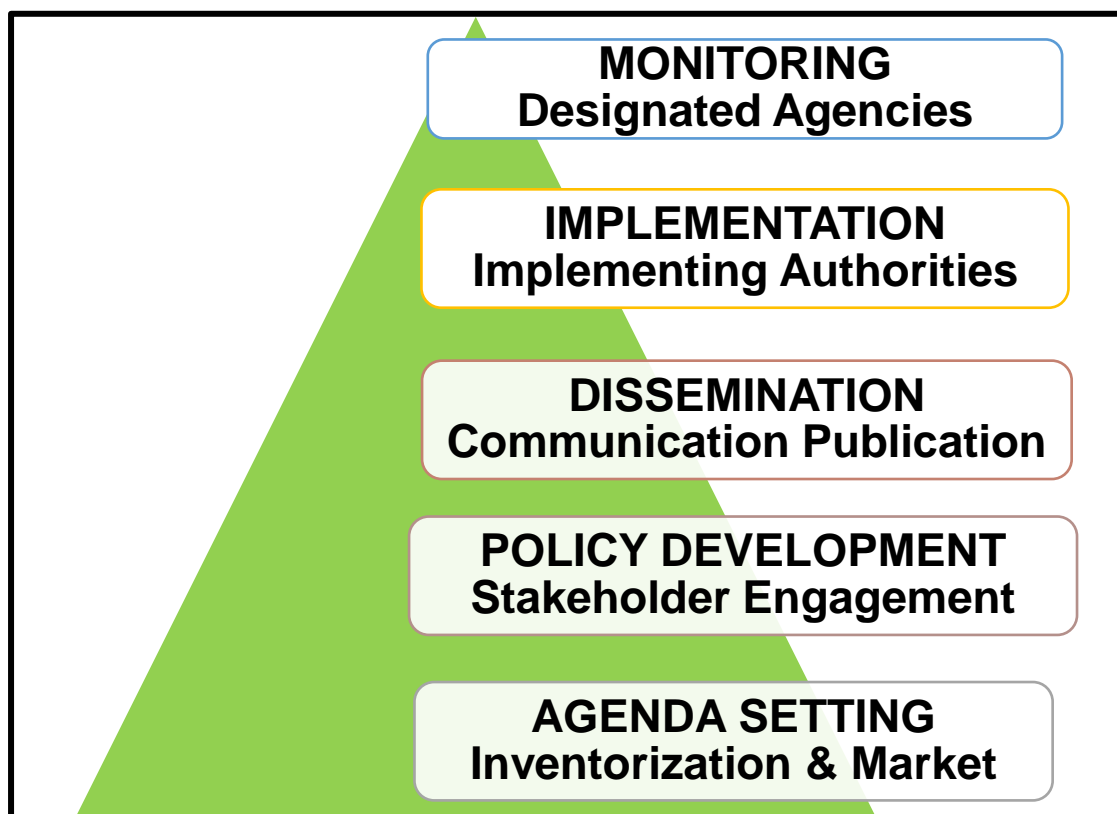


Fig 2 – BOTTOM UPWARDS APPROACH POLICY FORMULATION

4.3 Integration of Science, Research and Policy in Higher Education

The scientific and research inputs are essential in the formulation of policies pertaining to environment and health and these have to be incorporated during the formulation of the policy. The higher education institutions should therefore provide an interdisciplinary education to the students at the post graduate level. These students may have basic education in engineering, science, economics or humanities. The curriculum should integrate the principles of Sustainable Development through interdisciplinary approach to include all elements of environment such as natural resources, energy, waste etc. The program should include courses on Environmental Management Systems, Life cycle Thinking, Industrial Symbiosis, Circular Economy, Resource Efficiency, Newer Technologies, Policies and governance as apart of course curriculum as it has been done in the TERI School of Advanced Studies (Formerly TERI University). Many of the UN guided institutions across the nations have also adopted similar practices. As the students complete the higher formal education through post-graduation or integrated graduation courses, they are capable of handling interdisciplinary areas and cross cutting issues.

4.3 Integration of Science and Research in Policy

The sustainability studies and application of the science in developing polices sustainable development is complex and needs integrated approach as unidirectional scientific research will not provide generic solutions to the problems. The isolated research carried out in institutions of higher education and learning may not provide for the policy needs. The application of science in the policy is possible only when the scientific findings have relevance to the global or national issues and can be implemented in field. The need-based research can be originated from the government or the industry for which a framework strategy is essential. The industry invariably has R&D avenues for improving the production or quality of products. However, the strategy for regulatory compliance and enabling mechanisms have to be developed with a national, regional or local perspective for wider and practical application.

When it comes to application of science in policy a two-way flow is possible in identifying the need-based science and research.

- (b) The **on-going research** carried out in the higher education institutions and scientific organizations may be pure exploratory research or applied research that is applicable in the field. In which case a market needs to be created and the findings of research applied in the field. Such results are also sponsored by the government with a tripartite agreement between the government, research organization or the industry where a partnership is built with specific purpose. This may also be associated with the compliance requirements of the policy and supported by any agency that would be interested in the area of the research.
- (c) The other mechanism is a **policy driven research**. The policy makers or the governance agencies identify the research areas and assign designated organization to carry out research with a specific purpose to cater to the policy needs. This may be supported by the Government or it may also be supported by the multinational agencies such as UN, WHO and funded by international finding agencies.

The research on sustainability needs an integrated approach involving the interdisciplinary areas of research engaging scientists, economists and social scientists. Since the issues are based on global priorities as well as local needs addressing the limitations this dynamic system should aim at short term research programs with time bound targets to provide appropriate timely solutions.

Conclusions & Recommendations

There has been a focus on the strategies for conducting research that would address the policy questions in the science-policy forums. The preparation of policy briefs was found to be ideal ways to bridge the gap between science and policy. The prioritization of the strategy should be considered as a most feasible method. However, this may not be an ideal way into the future in the integrating Science and Research into the Policy thereby bridging the Gap between Science and Policy. The specific requirements of the policy should always be given the priority and a continuous endeavor to encourage science based and well researched policies should be adopted. This would not only give strength to the policy but also provide a safe and long term results.

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