3rd National Conference on Green Technology and Science for Sustainable Development
© 2020 IJSRST | Volume 5 | Issue 6 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
International Journal of Scientific Research in Science and Technology

Role of Science and Technology In Sustainable Development

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ABSTRACT

Sustainable development is define as using the entire earth resources in such a way that meets a human needs at present time without prohibiting future generation of the same opportunity. There are three definition/criteria of sustainable development are : Environmental protection ,economic development and social development. Sustainable development should be a prerequisite criteria in evaluating the objectives and outcomes for any project in any field of life .The roll of science/technology, governence and management and education and civil society are analyzed as three composite actors or pillars of sustainability. It is concluded that the winning formula is a close and strong cooperation between the in equal levels and equal partners if science and technology is kept first in order of actions. This is because science and technology has first word in diagnosis and the last word as in solving issues related to long-term sustainable development.

Keywords : Sustainability, sustainability criteria, sustainable pillars, role of education and civil society, environment, technologies, scientists and engineers role.

I. INTRODUCTION

Sustainable development is generally defined as using the earth resources in such a way that meets the human needs at present times without prohibiting future generation of the same opportunity. The 1987 Brundtland, Report [1]was the first major international engagement in this direction.

The sustainable development definition/criteria are:
Environmental protection
Economic development
Social development

All actions from any field are sustainable if simultaneously fulfilled these three criteria Science , technology and industrial practice Governance (executive, juridical) and management Educational and civil society

The above may be alternatively called pillars of sustainability, if they have as goal to fulfil simultaneously the three mentioned criteria.

Mahatma Gandhi says at that time “The earth ,air, land and water are not an inheritance from our ancestor but a loan from our children”

The simple and clear new sustainability freamework should be the guiding light for analysis of several human activities. In this point of view, this article detects main ideas and conclusions published recently by the author and interpret them under new light of above mention sustainability criteria, bringing at the same time some additional new element to each of them. The article will be concentrated on sci. and tech. and industrial practice as a starting point and the most important pillar, which in close cooperation with the

other two pillars can efficiently achieve the sustainable development.

Sustainability of the Reutilization / Recyclability:
Reutilization and recyclability are sustainable activities because they fulfil simultaneously the three criteria of sustainability. Their advantages are shown below

In the environmental dimension:

Protect the env. And preserves the natural resources for the future generation

Prevent emission of many green house gasses and water pollutants

Eliminate or minimize the volume of wastes that otherwise would be increasing continuously each day
Save overall energy and reduce cost in the long term and in the big perspective

In the economy dimension :
Create and increase add-on value if the tech.is used is fissible Supply valuable semi refine new raw materials to industry

Promote the creation of jobs
Stimulate the growth of greener technologies.

In the social dimension :

Increase living standard of population
Help in profit distribution
Change the culture of various communities in a good direction

AUTOMATION

Automation has been under multiple attacks recently as in activity that wreck the middle class and takes away jobs from the society[12]. In fact, a quick look at the history of 20th century shows that automation has been perpetually under attack for similar reasons. Despite that, automation has been developing continuously and applied all fields of life. "Automation is closely related to the modern need for sustainable development in 21st century. One of the principle of sustainability is 'doing more with less' which in other works,is also one of goal of automation."

Using the above mentioned criteria of sustainable development, automation is a sustainable activity because:

In the environmental dimension:

Control and prevents emission of many green house gasses and water pollutant Save overall energy and reduces the cost in short and long term.

In the economy dimension:

Stimulate innovative growth.
Creates and maximizes the add-on value.
Increases productivity efficiency and quality of product Save time, effort and financial resources in the overall cycle Promote the creation of new job in new sectors

In the social dimension:
Increase the living standard of humans by replacing routine and time consuming duties. Changes the human culture in positive way by urguing a continuous education for non routine and more innovative jobs instead of routine and time consuming jobs. Helps in profit distribution proportional to innovative job created.

ROLE OF SCI. AND ENGINEERING

Sustainability is about resources (Natural,economic and social). Until recently economic growth was predominant criteria among those three. The economic growth was mainly achieved through

industrial revolution, where the new technology created a plethora of products having as ultimate goal only their performance. Sci. and tech., while the creating these magnificent growth, crated at same time problem of environmental degradation and society suffering. As such ,it is logical that the solution should be sought at the level of sci. and technology.

The role of sci. is diagnostic but more importantly strongly remedial. This has been proven time and again when the world was forecasted into trouble 1970s because of food shortages and it was sci. that found the solution through new technologies that increase considerably the crop productivity.

Science and technology, however are not problem free:

Scientists have not treated sustainability as their own issue but rather as an outside political subject.

In their narrow field some technologies claim to sustainable.

New technologies can be use for positive sustainable goals but also for negative non sustainable activity. For example: the dynamite invented by Alfred Nobel for mining was eventually use as an explosive in wars that follow. And here it comes one of role of governance.

II. ROLE OF EDUCATION AND CIVIL SOCIETY

All levels of education and civil society have an important role. They need to educate people and raise awareness about:

The 3 criteria of sustainability and the need to fulfil simultaneously all of them.
The primary role of sci. in finding sustainable solution for this planet.
The primary need to develop sustainable and efficient technology that achieve sustainability.

The principle of recyclability and the need to recycle instead of throwing away whenever it exist a sustainable recycling technology.
The need of life long education on new profession that always replace the old obsolete non sustainable once- a frequent phenomenon in the modern world.
Other cultural changes needed to achieve sustainability.

SOME INTERNATIONAL CAMPAIGN

LA via campesina
The transition network
Ecoregionalism
Friday for future
Fossil fuel disinvestment

III. CONCLUSION

The confusion that exist in the definition and perception of sustainability was clarified. In one hand, the sustainable development is that development that achieves simultaneously three criteria (a)economic development (b) environmental protection and (c)social development. On the other hand there are three composite actors that can achieve or undermine sustainable development: (1) science/technology (2) governance and management and (3) education and civil society. They can also be called as pillars of sustainability. A clear distinction between the criteria and actors should be kept always in mind and to help this a new graphical schema of sustainability framework was designed and presented. Any action in the world, life and society belong to the above actors or pillars. Sustainability goals are in fact the end results to be achieved individually or in group by fulfilling simultaneously the three criteria of sustainability.

In this context, the modified central paradigm of materials science and engineering was presented among with its recyclability/ reutilization dimension. Recycling verses wastes, linearity verses circularity and automation verses manual work, where analyzed in terms of there advantages and disadvantages and it was concluded that recycling, circularity and automation are genuine sustainable activities that fulfil simultaneously the three sustainability criteria.

The role of sci. and technology, governance and management and education and civil society as the three composite pillars of sustainability was analyse and it was concluded that the winning formula is a close and strong cooperation between them in equal levels and as equal partners.

Everyone and every profession is equally important in this world but a specific order of action or priorities needs to be followed in order to be successful and this start with sci. and technology. The technology has the first and last word. As such generous financial and human investment in scientific research and technology is the best short and long term solution to the sustainability issues we face today.

IV. ACKNOWLEDGEMENT

The author wants to thank Lord John Prescott of U.K., leader of British Delegation in the Council of Europe in Strasbourg, member of European parliament, UK Deputy Prime Minister for 10 years in a row and member of British Parliament for 40 years, for his friendly discussion on the role of governance.

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