Concepts of Sustainability within Waste Management

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Abstract: *In this paper, we study about various aspects and theories of sustainability, the need for sustainable development within waste management. The management of solid waste has become a major reason of concern over the past few years in both developed and developing countries. With speedy increase of population, urbanization and industrialization, there has been a marked rise in living conditions of people and this had led to the generation of varied types of solid waste that needs to be efficiently managed. For the sustainable development of any country proper management of solid waste is very essential. Quantity assessment and characteristics of Municipal Solid Waste and its forecasting over the planning period is the key to its successful management plan. This will necessitate more focus on devising appropriate and effective mechanisms for handling such massive and excessive volumes of municipal solid waste management as improper management can lead to health and environmental hazards. With an ever increasing call for waste management solutions, solid waste systems need to be economically viable, socially acceptable and environmentally friendly.*

Key words: SWM – Sustainable Waste Management, SD – Sustainable Development, MT – Metric Tonnes, ISWM - Integrated Sustainable Waste Management.

1. INTRODUCTION

Waste management has become a subject of growing global concern as urban populations continue to rise and consumption patterns change. The health and environmental inferences related with garbage disposal are growing in urgency, predominantly in developing countries. With an ever growing population, the waste being produced by India is increasing rapidly that the total waste generation in India presently is around 62 MTs per annum, of which only 20% is actually treated. The fundamentals of waste prevention, avoidance, minimisation, reuse and recycling for sustainable development, has to be incorporated, in our waste management system. Sustainability has thus become an imperative in every aspect of people's lives and waste management is no exception. The need for waste management which takes into account the needs of sustainable development, is gaining momentum.

1.1 Sustainability

Avoidance of the depletion of natural resources in order to maintain an ecological balance is called Sustainability. Sustainable development is development that fulfils the needs of the present generation without compromising the capability of future generations to meet their needs.

1.2 Sustainable Waste Management

Sustainable waste management targets to address the long span pressures through the recovery, recycling, and reuse of resources, and the minimisation of waste streams. This includes the management of resources in an environmentally sound and economically active manner.

2. HISTORY

Sustainability is often associated with the broader notion of sustainable development and the terms are used interchangeably with one another. *Elkington (1998)* describes the following dimensions as "Three Pillars" of sustainability:

1. Environment
2. Economy, and

3. Society.

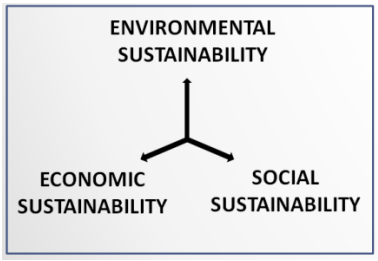

Figure 1 - Dimensions of Sustainability

He believes that these three pillars are inter-related and influence each other in multiple ways. Environmental Sustainability is the most extensively defined and researched area within sustainability. It is based on the premise that on a finite Earth the depreciation of natural capital cannot go on endlessly. Another definition, derived from *Dyllick and Hockerts (2002),* for environmental sustainability is as follows:

- Ecologically sustainable organisations consume natural resources at a rate 'that does not exceed' the reproductive rate and they do not allow emissions that accumulate in the environment at a rate outside the capacity of the natural system to absorb and assimilate these emissions.

- Economic Sustainability: The economic system that provides humans with material goods is sourced from nature. We are therefore still dependant on natural systems for food and resources to sustain us.

As Dyllick and Hockerts note that a company cannot exist without any economic capital. Without funding or investment, in a capitalist world, there will be no chance to develop a sustainable society.

- Social Sustainability: Human and social capital addresses the issues within social sustainability. Human capital is concerned with the skills and loyalty of employees. Social capital, on the other hand, incorporates quality of life and cultural aspects which are part of every society.

The following definition is thus derived from Dyllick and Hockerts (2002): Social sustainability adds value to communities by increasing the human capital and furthering the societal capital of these communities. As described by Elkington (1998), the two concepts of sustainability, outlined are considered to be on the opposite ends of sustainable literature. The difference can be visually defined as seen in Figure 2 and 3. The two views both attempt to describe the boundaries, within which an enterprise can operate while keeping the three pillars in mind.

3. CONCEPT OF SUSTAINABILITY

Sustainability is a matter of what, resources (natural resources), quality of the environment and capital, we bequeath to coming generations. As we know, some loss of natural resources is inevitable, but this may be compensated for by increased capital. However, another idea is that, the capital can substitute for natural resources and says that sustainability is a matter of preserving natural resources essential for our survival. The two views are eloquently stated that:

a) The next generation should inherit a stock of wealth, encompassing of environmental and man-made assets no less than the stock inherited by the previous generation.
b) The next generation should inherit a stock of environmental assets no less than the stock inherited by the previous generation.

These two opinions have been called 'weak' and 'strong' sustainability, respectively.

3.1 Weak Sustainability: It is the traditional and current sustainability principle which describes each pillar as a part of a whole, and each is considered equal as in figure 2. In other words, economic capital is able to take the

place of natural capital or natural capital the place of social. Sustainability is thus equivalent to non-decreasing total capital stock. The concept therefor does not restrict the substitution between different pillars or forms of capital.

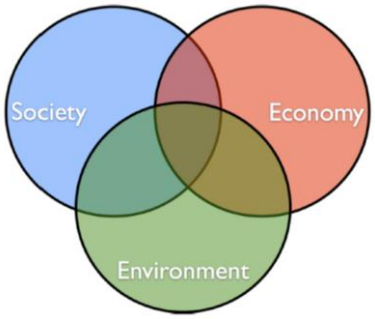

Figure 2 - Weak Sustainability

3.2 Strong Sustainability: is represented in figure 3. It can be seen that, in contrast to weak sustainability, it considers the environment as central to all social and economic activities. In other words social and economic activities only take place within the environment. Going one step further, economic activities can only take place within society.

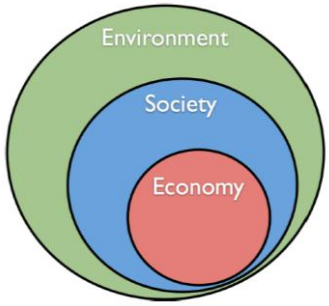

Figure 3- Strong Sustainability

4. INTEGRATED SUSTAINABLE WASTE MANAGEMENT

Integrated waste management is defined as a holistic approach that is the combination of waste stream, waste collection, recycling, treatment and disposal, in addition, other monitoring activities, risk and pollution prevention, with the objective of achieving human health and environmental protection. Generally, functional elements of waste management are generation source, storage at source and separation, collection, transfer and transport, recycling and treatment; final disposal.

There are also interaction between the physical components of the system and the conceptual components that include the social and environmental spheres. According to *F.R. McDougall et al. (2001)*, a sustainable system for solid waste management must be –

- Environmentally effective,
- Economically affordable and
- Socially acceptable.

4.1 Environmental effectiveness

The waste management system must reduce as much as possible the environmental burdens of waste management (emissions to land, air and water, such as CO2, CH4, and heavy metals).

4.2 Economic affordability

The waste management system must also operate at a cost acceptable to the community, which includes all private citizens, businesses and government. The costs of operating an effective solid waste system will be subject to existing local infrastructure, but ideally should be slight or no more than existing waste management costs.

4.3 Social acceptance

The waste management system must operate in a manner that is acceptable for the majority of people in the community. Achieving sustainable goals involves balancing social, economic and environmental perspectives are difficult, and possible conflicts of objectives related to the three pillars of sustainability would be inevitable.

The Key structures of ISWM are as follows:

1. An overall approach.
2. Uses a range of collection as well as treatment methods.
3. Handles all materials in the waste stream.
4. Environmentally effective.
5. Economically affordable.
6. Socially acceptable.

5. CONCLUSION

In the course of time, the concept has been re-interpreted as encompassing three dimensions, namely social, economic and environmental. Separating the needs of the present from the needs of those who will come after us is a sensible way to analyse scenarios and assess the impact of policies, because it clarifies the choices that need to be made. So it is suitable to call the former well-being and the latter sustainability. A sustainable waste management system must be environmentally effective, economically affordable and socially acceptable in all manners. When evaluating sustainability, a distinction should be made between weak and strong sustainability. It is proposed instead to return to the original meaning of sustainability, where this is concerned with the well-being of future generations and in particular with irreplaceable natural resources, as opposed to the gratification of present needs which we call well-being. Though we use up natural resources at the expense of future generations, we also generate capital (including knowledge) which raises future well-being.

REFERENCES

1. Ahmad K. Jassim (2017) Sustainable Solid Waste Recycling. August 29th 2016Reviewed: June 7th 2017.Published: November 29th 2017 DOI: 10.5772/intechopen.70046.

2. CPHEEO (2000). Manual on solid waste management, New Delhi, MoUD.

3. Gupta, Sanjay K (April 2004), “Rethinking Waste Management”, India Together.

4. ISWA Report: Underground Solutions for Urban Waste Management, 2013.

5. International Conference on Solid Waste Management, 5IconSWM 2015. Procedia Environmental Sciences 35 (2016) 101 – 109.

6. Integrated Solid Waste Management : A life cycle inventory, Forbes R McDuogall, Peter R White, Black well science @2001, ISBN 0-632-05889-7

7. Municipal Solid Waste Management Manual. Central Public Health and Environmental Engineering Organisation (CPHEEO) 2016.

8. Pollution free word press/2010

9. Sustainable Waste Management: A Decision Support Framework. Thys de Beer. Stellenbosch University March 2013. T.I de Beer. March 2013.

10. Sustainability 2010, ISSN 2071-1050.