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A SYSTEMATIC REVIEW OF ECONOMIC COST OF SANITATION IN INDIA

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Abstract

Sanitation is a fundamental right for humans, the inadequate sanitation facilities adversely affect the economy. The literate shows $ 1 investment in sanitation gives a return of around $ 5. The sanitation reports of India and global are alarming. The government of India has launched many government schemes to provide better sanitation facilities but still, we are lacking basic sanitation facilities in health, education and water. The present study focuses on the research gap in the sanitation economy in India. The methodology used in this current study was gathered information from different electronic search engines. The study concludes there exists a considerable gap in terms of research related to the sanitation economy in India. No systematic study has been found which could explain the current scenario of the sanitation economy in India.

Keywords: Sanitation, Economics, Cost-Benefit Analysis, India.

INTRODUCTION

“Sanitation is more important than political independence," said Mahatma Gandhi while leading the light for India's independence in the year 1947. This reflects the grim state of sanitation that prevailed in the country before independence. By definition. "a sanitation system needs to perform the following: collect and isolate human waste, safely transmit this waste, and then treat this waste before reusing it or letting it out in the environment" (Carr and Strauss, 2001). There have been no drastic changes in the situation even after more than 70 years of achieving freedom. Globally the scenario is more alarming with World Health Organization (WHO) report claiming 2.3 billion people not having access to basic sanitation in the year 2015. Of these 892 million people still practice open defecation (WHO, 2015). Poor levels of productivity. Another study calculated that in 200l, for every US $ 1 invested in sanitation gets a return of US $ 5.50 by lowering the cost of maintaining health productivity and reducing premature deaths (Hutton et al, 2012).

According to the 2014 report of the Joint Monitoring Programme (JMP) of the United Nations International Children's Emergency Fund (UNICEF) and the WHO" the highest number of people practicing open defecation is in India followed by China and Nigeria (Center for Science and Environment. 2018). According to the report in 2012, around 597 million people lacked access to improved forms of sanitation. The Census data of 2011 states that 49.8 % of the total population in India defecate in open (Nath and Sengupta. 2016). The main reasons for this poor sanitation are poverty, lack of delivery of government programs and less awareness among people that open defecation has health hazards. The current review literate study tries to find out the research gaps in sanitation economics

METHODOLOGY

The methodology used in this paper was gathered information from national and international journal articles using Google Scholar, Science Direct, Web of Science and Scopus. The search was performed in various electronic databases. It included the following key terms disposal, hygiene, cost, financing. The review of literature has been categorized into three parts to identify research gaps in the sanitation economy, History of Sanitation in India, Sanitation Programmes by the Government of India and Research Studies.

Hıstory Of Sanıtatıon In Indıa

"The day every one of us gets a toilet to use, I shall know that our country has reached the pinnacle of progress". Said Pt. Jawaharlal Nehru, the first Prime Minister of India. To achieve this parameter of progress the Government of India (GoI) included water and sanitation as prime agenda in the first five-year plan from 1951 - 1956. A total allocation of Rs 140 crores had been made to address problems related to health and sanitation along with it a grant of 24 crores was made to the states. Despite all these attempts by the end of 1956, only 100 villages and 32 urban sanitation projects were successful.

The second five-year plan again allocated 53 crores for water and sanitation and could achieve sanitation facilities in 1200 villages by the end of 1961. The third five-year plan drastically reduced the allocation of funds for sanitation to Rs 13 crores. This was a huge setback to the straggling condition of sanitation in the country. The sega of sluggish sanitation coverage continued until the first nationwide sanitation program was launched in the year 1986. This was promulgated by the declaration of the 1980s as the international decade of clean water and sanitation by the United Nations. Since 1986 there have been several programme launched by successive governments.

Sanıtatıon Programmes By The Government Of Indıa

The first centrally sponsored programme to address the rural sanitation problem was the Central Rural Sanitation Programme (CRSP) launched in the year 1986. It subsidized the construction of toilets by almost 80% of the total cost to the below 'poverty line (BPL) households. The programme had a supply-driven approach with greater stress on infrastructure creation. This programme resulted in installing more than 9 million toilets worth Rs 600 crore. The planning was done at the state level with no convergence with other government schemes. The consequent studies showed that more than 50% of the toilets created were not in use. This was mainly due to lack of awareness and failure to create consciousness for the use of toilets regularly. This resulted in the continuation of open defecation and lack of sanitation facilities to a major section of the Indian society.

To address the launch of the CRSP, the Total Sanitation Campaign (TSC) was launched in the year 1999. It was a demand-driven and public-centric national-level programme aimed at ending open defecation by the year 2017. "It focused on information. education and communication (IEC) and capacity development activities to increase the awareness of rural people and generation of demand for sanitary facilities" (Center for Science and Environment, 2018). The major difference between TSC and CRSP was that planning was decentralized with Zilla, Panchayatsamiti and Grampanchayat as the main units of implementation and not the states. This campaign also introduced the Nirmal Gram Puraskar (NGP) which was awarded to different

villages on attaining an open defecation-free status. Under this scheme, a total of 87 million toilets were constructed at an expense of Rs 11000 crore. Technocratic governing machinery imperiled the demand-driven principle and bureaucracy that was focused on infrastructure. Also, the carrier incentives created competition for personal interest causing more damage to execution (Bell, 2013).

In a similar development, the government initiated the Jawaharlal Nehru National Urban Renewal Mission (2008) to bring about urban reformation and infuse capital for infrastructure creation in selected cities. A dedicated fund was created for the urban poor but it was limited to only one-third of the investments. A range of slum up-gradation programrnes could not be executed since a majority of the fund was devoured by the low-cost housing. The National Urban Sanitation Policy (2008) was launched with certain goals such as achieving open defecation-free cities and a cent percent collection and treatment of the generated waste (Wankhede. 2015). It had everything covered but tailed due to a lack of dedicated funding.

The Nirmal Bharat Abhiyan (NBA) was launched in the year 2012 to enhance sanitation coverage in the country. It was the Total Sanitation Campaign being renamed with renews strategies and modified guidelines. NBA widened the prospects of TSC by including selections of the society above the poverty line. This included people from SC, ST communities and the small and marginal farmers. The NBA had a four-tier implementation system at the state, district, blocks and village level. It aimed to achieve its objects by the year 2022. However, the newly formed government in the year 2014 replaced the Nirmal Bharat Abhiyan with Swachh Bharat Mission.

On 2nd October 2014, the Swachh Bharat Mission (SBM) was launched with two major verticals of SBM-Urban and SBM-Gramin. The Ministry of Urban Development (M/o UD) is to implementing an agency for the SBM-Urban whereas the Ministry of Drinking Water ad Sanitation (M/o DWS) implements the SBM-Gramin. The SBM-Gramin mission focuses on "improving the levels of cleanliness through Solid and Liquid Waste Management activities and making Gram Panchayats Open Defecation Free (ODF), clean and sanitation". Similarly the SBM- Urban envisages a complete elimination of open defecation along with eradication of manual scavenging. It also aims at generating awareness, affecting the behavioral pattern along with scientific methods to municipal waste management. The implementation of the programme will be done at the district levels and the deadline set for the achievement of the above objectives is 2nd October 2019. The government claims a huge success in terms of placing the infrastructure with more than 92 million toilets constructed since 2nd October 2014. with 30 states and 615 districts being declared Open Defecation Free (ODF). the government has achieved a major feat. Also, it claims that 98.90 % of states of the country have sanitation coverage of more than 90 %.

RESEARCH STUDIES

"A circular economy is an economy constructed from societal production-consumption systems that maximizes the service produced from linear nature-society-nature material and energy throughput flow. This is done by using cyclical material flows. Renewable energy sources and cascading type energy flows (Korhonen. et.al., 2018). The concept of circular sanitation economy is an introduction of sanitation into the circular economy framework. It helps us to recover a valued biological resource (human waste) which has not received recognition as a resource"(Centre for Science

and Environment (CSE), 2017). Sanitation is defined as the methods for the safe and sustainable management of human excreta, through the delivery of several sanitation services including storage, treatment and disposal/reuse of faeces and urine. A provision of adequate toilet facilities will save countries from contamination of fecal waste which causes enteric diseases and gastroenteritis ((CSE), 2018). Recently researchers are studying sanitation with a circular economy approach and the area of circular sanitation economy has developed.

The economic cost of poor sanitation was US$222.9 Billion in the year 2015, incurred through increased cost health care, loss of education and debilitating productivity due to sickness (Lixil, 2016). On a national level, in terms of the total cost of inadequate sanitation, India suffers the most, with a US $ 106.7 billion loss to the GDP in 2015. It is almost half of the total global losses and 5.2 percent of the nation's GDP (CSE, 2016). Previous studies have shown investment in the sanitation of sustainable nature in developing regions gets a return of $5 to $46 for every $1 (Hutton et al., 2007). A report released by WHO in 2014 claims that for every US $1 investment in sanitation, the return is around $4.3 due to the reduction in expenses for health care.

The fecal sludge produced both from open defection and onsite sanitation is about 0.12 million tons/day in India (Shivendra, 2016). A resource recovery approach in which the fecal sludge is being used to derive products such as biogas, protein while processing the sludge. conditioning the soil and also the dry sludge for combustion and building materials (Murray, Cofie & Drechsel, 2011). The resource recovery approach can be an excellent method to deal with the huge volume of waste generated in the country. Thus there have been several studies emphasising the various resource recovery approach. The fecal sludge is being used to derive products such as biogas, protein while processing the sludge, conditioning the soil and also the dry sludge for combustion and budding materials (Murray, et al., 2011).

The various products that are obtained in the value chain can be used to develop sustainable business models to ensure the proper enactment of a value recovery approach (Murray and Ray, 2010). Among the various products that can be obtained in the co-treatment of fecal sludge and sewage is the sludge that is segregated. The wastewater treatment sludge can be an excellent fuel for cement industries provided that the sludge is dried to 28% (Muspratt et al. 2014). The readiness of industries for alternative sources of energy can be used to project the processed sludge as a viable energy source of energy (Diener et al., 2014)

Similarly, another important product that is obtained during co-treatment of fecal sludge and sewage is biogas. There is a dearth of centralised treatment of fecal sludge in developing countries. The absence of full-scale operational anaerobic digesters in this situation are a major constraint to the production of biogas (Deiner et.al, 2014). The development of biogas can be coupled with improved sanitation strategies which will eventually lead to a fall in indoor air pollution and greenhouse gases (Mittal et al., 2018). Another important outcome that can be obtained is the treated sludge which will serve as an excellent conditioner for the soil due to high NPK value (Shivendra, 2016). The sludge has vast potential in terms of application to the land after the reduction in pathogen (Strande et al., 2014). Thus it is imperative to understand the market potential of the compost received after undergoing all kinds of treatments.

The major problem associated with the resource recovery approach is the lack of infrastructure in the country. Only 32% of all urban households which have sanitation facilities are connected to sewerage networks and 48% of the households are dependent on on-site facilities (WaterAid India, 2016), The lack of proper design and performance of the on-site sanitation systems lead to incidences of water-borne diseases. The fecal waste that is being collected from these sites is not being managed properly and thus there is a need to bring in innovative technologies to overcome the problems (Fakkaew, et.al, 2018). The various options in technology in India for containment of fecal sludge, according to the Swachh Bharat Mission are (a) Trenching, (b)Co-treatment, (c) STPs and Faecal Sludge Treatment Plant (FSTP), (d) Drying bed, (e) Constructed wetlands, (f) Settling/thickening tank (GoI,2019).

The best technology in case of waste and water to be managed simultaneously is co-treatment of sewage and fecal sludge. The scarcity of water which transcends into high value discourages the treatment of waste in the existing technological base (CSE, 2018). The processes such as aquaculture, recovery of biogas, production of compost and the use of fecal sludge as fuel to the industries can recover the cost and is possible through the process of co-treatment in sewage treatment plants (Murray et al., 2011). There is a dire need to have a proper understanding of local needs before adopting a particular technology for fecal sludge management (Singh et al., 2017).

The prominence of behavioral and attitudinal aspects cannot be ignored in the process of studying the value chain of waste management. Countries like India are being faecophobic due to cultural and religious aspects which hinder the reuse of fecal waste (Simpson-Hebert, 2005). Countries like China have a history of faecophilic practices which stress the reuse of human waste as compost, making the process of human waste management easier in these countries. A recent survey conducted in the town of Devanahalli to check if the farmers are willing to use the treated faecal sludge in their fields resulted in 74% of farmers not being willing to use the treated sludge The co-ordinate action of improving the markets for access to sanitation, the market for transport and treatment will provide the required system for re-use and safe disposal of waste . A positive approach to marketing is necessary for mitigating the negative perception of fecal sludge (Shivendra, 2016)..

CONCLUSION

There exists a considerable gap in terms of research related to the sanitation economy in India. No systematic study has been found which could explain the current scenario of the sanitation economy in India. A value-based approach to waste management processes have been studied in general but lack focus of the saniation economy.

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