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Review Unleashing the Potential of a Zero Waste Economy: A Review

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Abstract

Zero waste is a forward-thinking notion for dealing with our society's waste concerns. Policymakers have embraced the zero-waste notion because it promotes sustainable production and consumption, optimal recycling, and resource recovery. There have been very few studies that have explored production and sustainable consumption in the fields of zero waste design, assessment, and evaluation. This study demonstrates that the scope of zero waste studies is broad, and the notion of zero waste is always evolving via numerous programs, plans, policies, and strategies. According to the conclusions of this research study, zero waste programs are implemented in many nations without a comprehensive zero waste strategy. Tallying to the report, governments may reach zero waste targets by embracing a public zero waste program and integrating and promoting Zero waste conditioning (in communities) through waste operation legislation.

Keywords: Waste management, Zero waste concept, Sustainable Development Zero waste study Zero waste strategy

Introduction

''Zero-Waste'' concept is one of the promising and an effective way to solve the waste management & recycling issues. Zero waste approach is to inspire the reshape of resource supply chain, as a result that entire products or by-product (resource materials) can be reused & recycled,. Cities around the world are expanding rapidly, taking up vast amounts of resources (e.g. construction materials, food, clean water, gas, oil, electricity) that feed their expanding economies. With cities being thermodynamic systems, an inevitable consequence of the relentless consumption of resources are waste materials, wastewater and polluted air. (Zaman and Lehmann 2011)

Landfill waste management is a key challenge for policy makers and planners in the development of smart sustainable cities, due to their use of land and emissions to the surrounding environment. Existing landfills may help address growing global resource scarcity, serving as a resource reservoir available to be mined. Manufacturing operations have evolved into a complicate d system that mostly employs heterogenous and hazardous materials(UN-MEA2006;Ramsar,2012). As a result, the garbage that comes through varied sources, is not only environmentally harmful but is costly to manage also in a sustainable manner.

Because of the variety of waste streams, decision makers are forced to adopt inefficient and ecologically damaging waste management solutions. (Bryman, 2006; Creswell, 2003)

Throughout the industrial period, resource extraction and manufacturing of commodities have developed to meet the ever-increasing consumption culture A wide range of consumer things, such as clothing, white goods, and electronics, that were formerly considered luxury items are now utilized as everyday commodities. The strategy aims to encourage the reconfiguration of the resource supply chain away from an obsolete manner, so that complete goods or by-product materials may be reused or recycled. (Lee et al., 2014) Until we obtain a thorough grasp of the inputs and outputs, what stays as stock and for how long, and what leaks out of the system in the form of gaseous, solid, and liquid pollutants, achieving Zero

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Waste in urban centers will remain a quest. Zero waste (ZW), a visionary waste operation system, has become an indispensable approach for managing waste in recent decades.

Numerous metro policies similar to Adelaide, San Francisco and Vancouver have espoused Zero waste pretensions as a portion of their waste operation strategies. The ZW conception has been accepted by policymakers because it stimulates sustainable consumption, optimum recycling and resource reclamation, and restricts mass incineration and landfilling. Considering the above, this review could be of considerable use to public administrators when implementing zero waste strategies and improving policies (Inderjeet-Surender 2023)

1. Literature Review

Extensive analysis of numerous studies done in this area speaks volumes about the problems and hazards posed by existing procedures of waste generation and management. The Zero Waste International Alliance gave the first working description of zero waste in 2004, which developed further in a peer- examined panel in 2009. Tallying to the Zero Waste International Alliance, zero waste is outlined as "a thing that's ethical, provident, effective and visionary, to guide people in changing their cultures and practices to emulate sustainable natural circles, where all discarded accoutrements are aimed to come coffers for others to exercise. (UNEP 2015) In order to achieve zero waste manufacturing, products and processes should be designed, managed, and implemented in such a way that can eliminate and exclude waste and ancillaries, as well as conserve and recover all materials and prevent the burning or burying of same. The compass of ZW study covers every ZW life phase from birth of coffers to the final disposal of waste.

Analyzing and reviewing data for a holistic ZW Cycle

This study was carried out using a practice-based research technique. Case-based, evidence-based, and performance- based research approaches are all part of practice-based built environment research. Only case-based and evidence- based research methodologies from peer-reviewed literatures were used in this study to identify the essential problems, dangers, and opportunities for developing a zero-waste city. The results of the literature review are reported in several parts below. (Phillips et al., 2011) The data from Annual Reports of CPCB, Census 2011 and Ministry of Statistics & Program Implementation has been utilized in the present study to understand the Waste Management status and to pinpoint the gaps in waste collection and management. Research for zero waste should focus on zero waste design and production, in order to achieve zero waste goals. Zero waste practices must be studied, practiced and implemented throughout the entire life cycle of the product. The cradle-to-cradle principle makes it easier for waste materials to be recovered as resources. This would lead to optimal resource utilization and recycling programs if zero waste design was implemented.

An elaborate approach to zero waste is provided by experts in various fields of industrial design and manufacturing, mining, process technology, waste treatment and management, and sustainable consumption and production. As a result, the focus and execution of the fundamental ZW ideology varies per field. In numerous research, the ZW principles are broadened and envisioned as comprehensive approaches to zero waste society. (Bartl, 2011; Whitlock et al., 2007) Local communities, government institutions, research institutes, and commercial organizations are all part of the zero waste movement, and zero waste regulatory

laws are critical for guiding and promoting zero waste practices in all sectors of society. (Scopus, 2014) A ZW life cycle broadly includes seven phases: (a) resource extraction and processing, (b) product design, (c) manufacturing, (d) consumption and waste generation, (e) waste management, (f) waste treatment, and (g) waste disposal. (Zaman and Lehmann, 2011b) Strategic policies and awareness needed

The Zero Waste Economy is an economic concept that strives to reduce waste while increasing resource efficiency. To achieve a circular economy, resources must be reduced, reused, and recycled. We can build a world where waste is avoided and resources are saved by implementing sustainable practices. (Biswas et al,2010)

A linear economy follows a 'take-make-dispose' model, where resources are extracted, used, and discarded. This traditional approach often leads to resource depletion and environmental degradation. Emphasizing solely on economic growth, it neglects the importance of long-term sustainability. On the other hand, circular economy aims to minimize waste and maximize resource efficiency through reduce, reuse and recycle principles. It focusses on closing the loop by designing products for longevity, promoting material recovery, and fostering a regenerative system. This approach offers numerous environmental and economic advantages.

The Zero Waste Economy (Premalatha et al., 2013) has various advantages, including reduced environmental impact, natural resource conservation, the development of green jobs, and cost savings for enterprises. We can prevent climate change, conserve ecosystems, and build a sustainable and wealthy future by shifting to a zero-waste strategy.

2.1 Transitioning to Zero Waste by overcoming challenges is an essential part

While shifting to a Zero Waste Economy has problems such as altering consumer behavior, a lack of infrastructure, and restricted recycling alternatives, there are solutions. Education and awareness initiatives, as well as investments in recycling infrastructure and governmental assistance, can help to overcome these obstacles and pave the road for a more sustainable future. (Connett and Sheehan, 2001). San Francisco: Zero Waste Initiative City has successfully implemented a comprehensive zero waste initiative. By implementing source separation programs, promoting recycling and composting, and collaborating with local businesses and residents, it has significantly reduced waste sent to landfills. (SF-Environment, 2014) This case study highlights the strategies, challenges, and outcomes of zero waste journey, serving as an inspiring example for other communities

2.2 Shifting to Circular Economy

The shift to a circular economy, (Greyson, 2007; Zaman, 2012).in which the multidimensional value of resources spanning the political, social, environmental, economic, and technological domains is retained in the Technosphere, requires more evidence-based policies and operational decision-making. Policies that promote material circularity also reduce climate change and might thus be funded. (Monni Adlesa,2006) National and international sustainable governance solutions must acknowledge that settings differ at the regional and local levels, and hence communities must be included in crafting solutions.

Innovation: Product life extension can minimize waste, but it requires financial solutions. Creating things that are long- lasting might result in less waste since

fewer products are generated and then discarded. The volume of trash reduced is generally proportionate to the increase in lifetime. For example, if a product lasts 10 years rather than one year, there will be about ten times less waste created. Planned obsolescence is a business strategy in which things are purposely designed to fail in order to sell additional replacements. Products become garbage for a variety of reasons, including being designed for one-time use, product failure, and becoming old, unfashionable, or technologically obsolete. Innovation plays a critical role in driving the Zero Waste Economy forward. (Zaman 2015) Technologies like advanced recycling methods, waste-to-energy conversion, and circular design principles enable us to transform waste into valuable resources. By embracing innovation, we can unlock the full potential of the zero-waste concept and accelerate the transition to a sustainable future.

2.3 Zero waste and infrastructure requirements

Investment by the government in waste management infrastructure is critical for a successful transition to a zero- waste economy. The government must emphasize the importance of proper recycling and composting facilities, as well as efficient trash collecting systems and innovative sorting technology. Governments may offer the necessary tools and resources to enable the transition to a circular and sustainable waste management system by prioritizing infrastructure development. Adopting the Zero Waste Economy is not only an environmental need, but also a chance for economic growth and social advancement. (Kumar et al., 2005; Zaman and Lehmann, 2011b). We can build a future where resources are protected, pollution is reduced, and communities thrive by rethinking our approach to waste. Let us work together to create a more sustainable future and unleash the full potential of the Zero Waste Economy.

2.4 Reviewing Countries and their approach towards Waste

Global economic growth and consumption rates have both grown dramatically over the world. Waste generation statistics imply that waste volume reduction is one of the most pressing issues confronting all cities. High- consumption cities such as San Francisco, Copenhagen, and Stockholm have established various systems and strategies to collect and handle 100% of garbage at its source. These cities are quite effective at diverting garbage from landfills. (Eriksson et al,2005)
The volume of trash in low-consuming countries such as India and China is rising dramatically over time in tandem with population expansion. Consumption of resources has increased dramatically in China over the previous few decades, indicating prospective increases in waste generation rates in low-consuming towns. Taking into account low-consuming city settings, where consumption levels continue to rise and landfill is the primary waste treatment technique, waste management in emerging cities is also exceedingly difficult to manage in an environmentally friendly way. When low-consuming nations achieve identical consumption rates as high-consuming countries, global waste management and the finite resource situation will become more challenging to manage. Various studies also highlighted that cities are very dynamic in nature, combining several complex sectors. (Black and Phillips, 2010; Braungart et al., 2007; Paez et al., 2004). Furthermore, cities in one region differ from those in another due to geographical and environmental reasons. As a result, without comprehensive study techniques, understanding the dynamic nature of the components involved in city development is difficult.

Results and Discussion

The zero waste city notions are founded on the waste hierarchy, which includes

evasion, reduction, and recovery. Changes in behavior and sustainable consumption practices will reduce the amount of waste produced during the product producing and usage stages (Zaman, 2014a). Extending producer and consumer accountability will ensure sustainable resource usage and personal waste creation and management.

Conclusion

Although 100% recycling is presented as one method of reaching a zerowaste city, the debate remains if 100% recycling is indeed attainable. If we can create goods with 100% recyclable materials, we can achieve 100% recycling. As a result, 100% recycling is heavily reliant not just on garbage collection but also on cradle-to-cradle product design. One might dispute if recycling is always a more sustainable technique than energy recovery or not. Because of growing awareness of resource recovery and landfill greenhouse gas emissions, zero landfill has gained major relevance. Zero landfill is viewed as a key step in transforming cities into zero waste cities. -

2. Declaration of Competing Interest

The authors claim that they have no known competing financial interests or personal links that may appear to constitute a conflict of interest or have an impact on the work described in this paper.

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