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USE OF NUDGING IN SOLID WASTE MANAGEMENT AS AN EFFECTIVE POLICY INSTRUMENT

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ABSTRACT

The majority of the collection, transport, and disposal practices of municipal solid waste in Nepal follow non-engineered means and ad-hoc decisions. The policies so far have relied on end-of-pipe approaches and coercive instruments to address the challenges. To achieve cost-effective, efficient, and sustainable solid waste management, leverage points that exist on the producer-waste interface must be targeted as each person makes several decisions about waste generation and disposal every day. This study aimed to explore the application of the nudge theory, document nudge interventions, and guide policy-makers for policy reformation in solid waste management. The findings of this study are expected to provide evidence that behavioral nudges can serve as effective policy instruments to formulate future environmental policies in Nepal and other developing countries.

***Key words**: behavior change, nudge theory, policy, solid waste management*

INTRODUCTION

Existing Practices and Challenges in Solid Waste Management in Nepal

The rapidly growing population and increasing consumerism have resulted in an upturn in the composition and quantity of solid waste generated around the world. With rising living standards, inadequate infrastructure, and insufficient sanitation facilities, the waste disposal system has become overburdened, resulting in an array of environmental problems. An estimate suggests an annual generation of 2.24 billion tonnes of solid waste globally in 2020 which is expected to increase to 3.88 billion tonnes i.e. by 73%, in 2050 (World Bank Group, 2022). This dire situation has triggered scientists from many countries to seek strategies for effective solid waste management (SWM). Most of the studies on solid waste have primarily discussed conventional means which mostly include a top-down approach. SWM policies of many countries have heavily relied on end-of-pipe approaches to address challenges. SWM policies and practices in Nepal are no exceptions.

The current SWM practices and systems in Nepal are unable to deal with the increasing volumes of waste and its impact on the environment due to a rising urban community. The majority of the collection, transport, and disposal practices of municipal solid waste (MSW) in Nepal follow non-engineered means and ad-hoc decisions. According to the Central Bureau of Statistics (2021), the average waste collected per municipality in the fiscal year 2018/19 was 2232.7 metric tonnes where organic waste accounted for 54%, inorganic waste for 33.3%, and the remaining consists of other types of waste. Waste segregation is not common due to which dumping of mixed waste in landfills is the most dominant waste disposal

practice. Many issues related to these unsustainable practices come down to changes in human behavior. Hence, interventions based on established behavioral science theories can potentially bring positive change. Nudge policy instruments are such tools that can guide human behavior toward desired outcomes. Nudge policy instruments and structural reforms that leverage existing technical and human resources combined with support for critical behavior change have the potential to transform the existing practices.

Nudge Theory in Solid Waste Management

The concept of 'Nudge' or 'Nudge theory' was popularized by Thaler & Sunstein (2008) in the book, 'Nudge: Improving Decisions about Health, Wealth, and Happiness.' A nudge is any type of choice architecture that changes people's behavior in a predictable way without limiting their options or significantly changing their economic incentives (Thaler & Sunstein, 2008)**.** Nudging is based on advanced knowledge of the decision-making process which entails a system of gentle encouragement that holds the power to alter human behavior and steer people towards particular actions.

The issues with waste management are an outcome of human behavior and therefore, changing that behavior is imperative to find solutions to the problems (Milea, 2009). The relevance of using nudge to alter human behavior is exemplified in Table 1 below.

Table 1: Key facts about human behavior

Five key facts about human behavior
1. People give meaning to information based on the context in which they live in. 2. Culture and networks influence people's behavior. 3. People cannot always control the issues that determine behavior. 4. People compete with other priorities. 5. People often make decisions based on emotional factors, not logic.
Source: Dr. Marlon Era, Symposium of the 51st AITAA GBM (27 Nov 2022)

According to Kahneman (2011), there are two human decision-making systems: System 1 – Fast (automatic, intuitive) and System 2- Slow (deliberate, conscious). System 1 (automatic) guides large parts of our daily routines which we do almost automatically, while System 2 relies on a more deliberate mental effort such as when we need to make important decisions about choices in life. As per Lehner et al. (2016), the majority of the waste management governing policies are ineffective because they target System 2 for bringing about desired changes in human behavior. Nudge instruments, on the other hand, target the fast and automatic System 1 and can thus influence human behavior to bring desirable positive changes.

Traditionally, programs and projects on SWM have neglected the behavioral aspect because they relied more on information, education, and communication which is basically prescriptive telling people how to behave.[1] That is why Social Behavior Change Communication (SBCC) is gaining traction as strategies for problem-solving that are based on behavioral science to positively influence knowledge, attitudes, and social norms among individuals, institutions, and communities.[2] The nudge theory provides promising tools to be used in SBCC approach because it guides how behavioral science can be applied in public policies instead of focusing on the typical coercive tools such as bans, mandates, taxes, and fines.

There are many successful instances of nudge instruments. In 2011, a nudge was designed to encourage people to use street litter bins in Copenhagen, where footprints were painted on the ground

[1] *Dr. Marlon Era, Symposium of the 51st AITAA GBM (27 Nov 2022)*
[2] https://www.centreforsbcc.org/

that led up to the bins which were wrapped in a bright color. To test the effect of the nudge, free sweets were distributed before and after the footprints and wraps were applied, and the number of wrappers that ended up correctly in the bins was counted. The experiment team reported a 46 percent decrease in the proportion of wrappers that ended up on the street (iNudgeyou, 2012). Likewise, Akbulut-Yuksel & Boulatoff (2021) investigated the power of behavioral insights to influence households' recycling and MSW by examining the effectiveness of a green nudge, the adoption of a Clear Bag Policy, which was implemented in 2015 in a mid-size urban municipality, Halifax Regional Municipality, in Canada. Under the new policy, households were required to replace the black garbage bags used for refuse disposal with clear and transparent bags, with one dark bag allowed for privacy. Clear bags also make it clear to everyone, neighbors and passersby alike, whether or not people recycle or waste. This green nudge increased recycling by 15 percent and reduced both refuse and total MSW. The study showed that between August 2015 and July 2017, the total MSW decreased by 27 percent overall (Akbulut-Yuksel & Boulatoff, 2021). This policy is a good example of reliance on moral nudges which draws on people's social preferences, their desire for status, to follow norms, and to have a positive self-image (Carlsson et al., 2019, p. 6). With particular concerns toward disposal behaviors and waste sorting, these studies show that behavioral nudges are significant in waste management.

OBJECTIVES AND METHODOLOGY

The above examples show the use of behavioral instruments such as nudge has been effective in developed countries. However, environmental awareness is lower in developing countries which is reflected in their waste management behavior and practices.[3] Moreover, studies on the use of behavioral sciences for SWM in developing countries are very limited. Through this paper, we aimed to provide evidence that behavioral nudges can serve as effective instruments to formulate future environmental policies in Nepal and other developing countries. The specific objectives are as follows:

1. To explore the application of the nudge theory to influence human behavior for beneficial change and sustainable waste management practice in Nepal and other developing countries.
2. To document nudge interventions in the solid waste management sector of Nepal.
3. To guide policies towards behavioral interventions in the SWM domain.

To this end, academic research based on experiments and nudge-based pilot interventions was explored to show the application of the nudge theory. Additionally, information was gathered from various obligatory and nudging instruments implemented by various stakeholders in the SWM sector in Nepal and was documented in this study.

RESULTS AND DISCUSSION

Unlike conventional tools and techniques to coerce the public into behaving a certain way such as penalizing for undesired actions or non-compliance with rules, nudge tools are rather a radical and sophisticated approach to achieving change in people's behavior. It is mainly concerned with designing choices that influence the decisions people make intuitively. According to Thaler & Sunstein (2008), nudges work because they correct for human behavioral biases and errors that occur when the situation does not support the use of cognitive effort.

It has been observed that the current practices in waste management in Nepal have relied on obligatory and coercive policy instruments such as laws, bans, jail sentences, or economic instruments such as taxes and subsidies (Khatiwada et al., 2019). These instruments are generally conveyed to the public usually in the form of harsh words, legal information, and obligatory instructions intended to change

[3] *Dr. Marlon Era, Symposium of the 51st AITAA GBM (27 Nov 2022)*

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their behavior. These in turn either obligate the public to watch out for their behavior or voluntarily agree on what has been requested. However, it is evident that compliance with such tools is low in most cases. In this context, the right nudge tools can possibly shift people's actions toward the desired behavior.

Lehner et al. (2016) have described four types of nudge tools. The application of these tools for SWM is shown below in Table 2.

Table 2: Application of Nudge Tools for Solid Waste Management

	Nudge tools	**Application to SWM**	**Example**
1.	Simplification and framing of information	Providing information in a persuasive way	Information in a notice framed with a polite tone.
2.	Changes to the physical environment	Design of the producer-waste interface	Colorful waste bins with labels
3.	Changes to the default policy	Design of shift in the system	Segregated waste collection
4.	Use of social norms and belief system	Leveraging the moral beliefs	Picture of God in the dumping site; Influence through social media

Source: Lehner et al. (2016) and Khatiwada et al. (2019); modified by the authors

Conventional Coercive Tools versus Nudge Tools

A typical example of the outcomes of coercive policy instruments is given in Figure 1 and Figure 2. Figure 1 shows a notice put by the Siddharthnagar Municipality in Rupandehi, Nepal that reads street littering is strictly prohibited and any person engaged in such activity is liable to a penalty. It exemplifies the use of coercive policies as ineffective because people continue to throw waste under the signboard that mentions imposing a heavy penalty for the restricted act. Similarly, from Figure 2 which shows a notice put by Kathmandu Metropolitan City using harsh language, it is evident that the use of harsh words ("Those who throw waste here are dogs") in combination with traditional instruments such as CCTV surveillance and fines resulted in opposite public behavior in waste management than intended.

Figure 1: Outcome of coercive policy instruments

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Figure 2: Outcome of coercive policy instruments (with harsh language)

On contrary, a notice displayed in Lalitpur Metropolitan City in Nepal as shown in Figure 3 uses a more polite and muted tone towards the public humbly requesting them to throw waste only when the municipal waste collection vehicle arrives and informs them of the designated time. The result is a clean roadside. This is an example of a nudge related to simplification and framing of information (Table 1). Another commonly seen nudging instrument in Nepal to prevent littering is the use of pictures of gods and goddesses as shown in Figure 4, which leverages the social norms and belief system of the people. When people interact with such a nudge instrument, by default it makes them think such an area is not designated to throw waste and rather must be kept clean (Khatiwada et al., 2019).

Figure 3: Simplification and Framing of Information (Polite tone)

Figure 4: Use of social norms and belief system using a picture of god

Recent Interventions for Municipal SWM

The application of nudge tools is apparent in some of the interventions in SWM in Nepal. The most noticeable is the segregated waste collection system instigated by the newly elected Mayor of Kathmandu Metropolitan City (KMC). From the beginning of 2022, KMC prominently faced recurring problems of waste collection (Table 3) due to obstructions from the locals and road construction in the landfill site area. Garbage was piled up in streets posing a high risk of the spread of diseases and infections. This problem worsened the unsustainable waste management practices in the city. Thus, the change made to the default policy by the Mayor has served as a nudge for the public to segregate biodegradable waste from non-biodegradables. The notice published by KMC notifying the public regarding the change in the policy is given in Figure 5. Similarly, nudging through the change in the physical environment using designated colorful waste bins with labels in Waling Municipality of Nepal resulted in improved source segregation (NEFEJ, 2020). A similar intervention gave a similar result in Sri Lanka. An experimental survey was conducted by Samaranayake & Thennakoon (2021) in Sri Lanka where they used differently colored bins with labels for different types of waste. The outcomes before and after the application of this nudge helped compare people's behavior towards waste sorting and clearly, the nudge worked as it resulted in better outcomes.

Table 3: Timeline of Waste Management in KMC

Date	Description
13 February 2022	Locals obstruct the road leading to the Sisdole landfill.
22 February 2022	Over 9 days since waste collection halted; Areas stinking because of piling heaps of garbage.
7 March 2022	Locals obstruct the road to the Sisdole landfill again.
14 April 2022	KMC announces the change in mixed waste collection to a segregated collection system.
16 July 2022	KMC releases a schedule for the collection of biodegradable and non-biodegradable waste.
17 July 2022	KMC started collecting waste according to the change in waste collection policy.

काठमाडौं महानगरपालिका
नगर कार्यपालिकाको कार्यालय

नगरबासीमा फोहोर वर्गीकरण गर्नुहुन हार्दिक अनुरोध ।।

- महानगरपालिका बासीमा फोहोर वर्गीकरण कुहिने र नकुहिने छुट्याउने गर्नुहुन विनम्र अनुरोध छ ।
- कुहिने र नकुहिने फोहोर छुट्टा छुट्टै भाँडोमा राख्नुहोस ।
- कुहिने र नकुहिने फोहोर छुट्टा छुट्टै दिन संकलन गरिनेछ ।
- कुहिने फोहोर संकलन गर्न आउने दिनमा सवारी साधनमा कुहिने फोहोर मात्र दिनुहोस ।
- नकुहिने फोहोर संकलन गर्ने आउने दिनमा सवारी साधनमा नकुहिने फोहोर मात्र दिनुहोस ।
- सम्भव भए सम्म कुहिने फोहोरलाई कम्पोष्ट मल, गड्यौले बनाई आफ्नै करेसा बारीमा वा कौसी खेतीमा प्रयोग गर्ने बानी बसाल्नुहोस् ।
- नकुहिने पुनः प्रयोग हुन सक्ने सामानलाई पुनः प्रयोग गर्ने बानी बसाल्नुहोस । नकुहिने पुनः चक्रिय फोहोरलाई कबाडी व्यवसायीलाई बिक्री गरी आय आर्जन गर्ने बानी बसाल्नुहोस् ।
- प्लाष्टिकको झोलाको सट्टा सकभर कपडाको वा कागजको झोला प्रयोग गर्ने बानी बसाल्नुहोस ।
- २०७९ साउन १ गते देखि कुहिने र नकुहिने फोहोर नछुट्टाइएमा फोहोर संकलन गरिने छैन र सो नगरिएमा **काठमाडौं महानगरपालिका वातावरण तथा प्राकृतिक स्रोत संरक्षण ऐन, २०७७** को दफा ५१(घ) तथा **फोहोरमैला व्यवस्थापन ऐन, २०६८** को दफा ३८ (ग) अनुसार कसुर मानी प्रत्येक पटक रु. ५००।— जरिवाना गरिनेछ ।

कुहिने फोहोर संकलन हुने दिनहरु	नकुहिने फोहोर संकलन हुने दिनहरु
• आईतबार • बुधबार	• सोमबार • शुक्रबार

थप सल्लाह सुझाव वा कुनै जिज्ञासाको लागि Toll Free Number 16600105511 र विभागको फोन नम्बर 015905519 मा थप जानकारी लिनुहुन अनुरोध छ।

हाम्रो काठमाडौं शहरलाई सफा र सुन्दर बनाउन फोहोर वर्गीकरण गरी सहयोग गरिदिनुहुन महानगरवासीहरुमा हार्दिक अनुरोध गर्दछौं ।

काठमाडौं महानगरपालिका
वातावरण तथा कृषि विभाग

Figure 5: Notice published by KMC regarding the change in waste collection policy

In recent times, people are seen leveraging social media for waste management. For instance, a person posted a picture of a waste pile in front of a restriction signboard on Facebook, which caught the public's attention and helped to prod the concerned stakeholders. The authorities quickly addressed the public concerns about waste management to avoid widespread criticism and to ensure that their public image is not tarnished. As a result, the area was cleaned the next day after posting the picture. This instance points out the new leverage points for SWM policymakers in a changing regime of social communication.

Figure 6: An illustration of nudging through social media (Before (left) and After (right))

CONCLUSION

The key to sustainable solid waste management largely lies in the hand of consumers. It is more about how they handle the waste which is a behavior in itself. Hence, the SWM policies that target consumer behavior or in other words use of nudge tools are likely to be more successful in bringing the desired result. The comparison of coercive policies with nudge instruments has clearly shown that people are more likely to change their habits and actions if they are made to act intuitively. Some interventions shown in this study are evidence of this fact. Although they have not been applied widely, there is no doubt about their effectiveness. Nevertheless, there are very limited studies exploring such interventions and moreover assessing and quantifying the degree of effectiveness. Hence, future research can delve into these areas.

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