

# A CULTURE-BASED SOLUTION FOR CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT IN SRI LANKA: A LITERATURE REVIEW

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## ABSTRACT

*Construction projects consume bulky amounts of materials, natural resources, and energy and at the same time generate unacceptable level of solid wastes. There are strategies implemented in order manage the construction and demolition wastes in Sri Lanka. However, most of those have become unsuccessful due to the policy makers being unable to consider the cultural factors stemming from socio-economic factors, while implementing such strategies. Thus, this paper aims at deriving a culture-based solution for construction and demolition waste management in Sri Lanka. This aim is achieved through a broad literature review. As per the extent literature, the main cultural manifestations describing the cultural context of Construction and Demolition (C&D) waste management include values, attitudes and behaviours. Accordingly, Sri Lankans hold many positive values, however majority of attitudes and behaviours are of negative in nature. According to literature, these cultural manifestations exists in a hierarchical order with attitudes being influenced by values and behaviours being influenced by attitudes. Nevertheless, positive values of Sri Lankans are not reflected through the attitudes and behaviours of C&D waste management, requiring thorough empirical studies to justify the dynamisms of value-attitude-behaviour hierarchy in Sri Lankan context. In addition, if these cultural manifestations related to C&D waste to be managed, a reverse cycle to the value-attitude-behaviour hierarchy should be considered, which is introduced as 'cycle of culture management' through this paper.*

**Keywords:** *Attitudes; Behaviours; Cultural Values; Construction and Demolition Waste; Waste Management.*

## 1. INTRODUCTION

In a world headed for an urbanised future, the construction sector is becoming one of the most imperative sectors worldwide (Mahpour, 2018), consuming a hefty amount of materials, natural resources, and energy and at the same time generating unacceptable level of solid waste (Karunasena and Samarasingha, 2015). Hence, the Construction and

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Demolition (C&D) waste management has turned out to be an important matter that has engrossed extensive attention of the world (Karunasena and Samarasingha, 2015). This situation is more critical for developing countries compared with developed countries, where constructions persist as focal economic activities of developing countries (Yuan and Shen, 2011). Sri Lanka, which is also a developing country, is experiencing waste management as a crisis over a long time. With the expansion of the population and economic development, waste generation has also been increased. Proper management of solid waste is a must to eliminate the risk to human and environment (Karunarathne, 2015). According to the Interim Report of Construction Waste Management (COWAM) Project: Vision for 2018 by Galle Municipal Council (2008), the real requirement of proper C&D waste management was aroused after the Tsunami in year 2004.

Begum *et al.* (2009) and Teo and Loosemore (2001) stress that due to the labour-intensive nature of construction activities leading to number of behavioural impediments are likely to influence waste levels significantly. Lingard *et al.* (2000) further explain that a considerable extent of reduction, reuse and recycling of C&D waste can be attained depending on motivational influences on the behavioural patterns of construction work force. Mwiinga (2014) has stated that cultural values impact the awareness of people in managing waste. Although, authorities have introduced lot of sustainable methods to properly manage the waste, the effect of the attitudes and behaviour has been ignored by such policy makers. Awareness campaigns are very significant drivers to change the behaviour and attitudes of the people about the importance of managing waste (Mbeng *et al.* 2009).

As indicated by Karunarathne (2015), still, Sri Lankans are not aware about, why waste management is of great importance and the author further mention that people need attitudinal change to overcome this problem. Although there are lot of awareness programs on the importance of managing waste, yet they have not touched the minds and hearts. Milfont *et al.* (2010) explain that according to value-attitude-behaviour model, relationship between perceived behaviour of the environment and values and ecology is influenced by the environmental attitudes. These studies suggest the importance of focusing on cultural manifestations to bring in a proper solution for waste management, however, a proper mean of doing so us not addressed in the extent literature. Accordingly, this research aims to derive a culture-based solution for construction and demolition waste management in Sri Lanka through a literature review. In order to achieve the aim, initially the construction waste management practices in Sri Lanka and the cultural manifestations of community in waste management in general will be discussed. Then, the linkage between cultural manifestations (values, attitudes and behaviours) of people will be reviewed. Consequently, the cultural values, attitudes and behaviours of community in C&D waste management will also be discussed. Ultimately a culture based conceptual framework for managing C&D waste in Sri Lanka will be developed using the extent literature.

## **2. CONSTRUCTION WASTE MANAGEMENT PRACTICES IN SRI LANKA**

Most of the Asian states including Sri Lanka do not have precise regulations intended for managing C&D wastes, although many countries have some separate sections for C&D waste within their waste management regulations and related policies (Nitivattananon and Borongan, 2007). Thus, Sri Lankan C&D waste management procedures are mainly

limited to landfilling and open dumping (Karunasena and Rathnayaka, 2014). Nitivattananon and Borangan (2007) state that in Sri Lanka, reuse and recycling such as door frames and Cabok are practiced up to some degree. However, after Tsunami in year 2004, management of these C&D wastes comes into consideration with the formation of a C&D waste recycling plant through the Construction Waste Management (COWAM) Project in Galle (Karunasena and Samarasingha, 2015). However, it is problematic, because with the development of construction industry, a single COWAM plant alone is not capable to manage C&D waste (Karunasena and Rathnayake, 2014). Moreover, despite the hard systems and procedures, these policy frameworks and systems do not address the cultural aspects in managing C&D waste.

### **3. CULTURAL MANIFESTATIONS OF COMMUNITY IN WASTE MANAGEMENT**

The world suffers from numerous environmental problems that requires to be addressed at the individual level and requires individuals to develop their attitudes that lead them to environmental support behaviour (Ahmed *et al.* 2009). The establishment and change of attitudes are intertwined. People always adopt, modify and abandon attitudes to adapt to changing needs and interests, but, simple education cannot change attitudes. Accepting a new attitude depends on who grants the knowledge, the way it is presented, how people are perceived, the credibility of the communicator, and the conditions for acquiring knowledge. Social science research suggests that knowledge about a topic may increase and people might even change attitudes, but the steps to develop behaviour and practices depend on a compound set of social and psychological factors (Desa *et al.* 2011). Rewards and intensified behaviours, opinions and attitudes may be repeated and eventually incorporated into our personal values and everyday behaviour. The wise usage of rewards and reinforcements can increase the chances of an individual being recognised to repeat an ideal and can also motivate others to adopt this attitude (Gagne, 2003).

In order to achieve successful waste management, not only the local authorities should provide infrastructure, but also public awareness, attitudes, knowledge and behaviour should also be considered (Akbar *et al.* 2015). Teo and Loosemore (2001), stress that the composition of the construction sector itself impacts the attitudes and behaviours of the people involved. According to these researchers, the construction projects reward productive workers and bonuses are been rewarded for timely completion. Hence, the attitudes and behaviours of people are moulded in a way to obtain rewards even by preceding waste management practices. Further, active involvement of subcontractors for a shorter period in a project creates complexities in procedures to be adapted for waste management. Jayawardane (1994) indicates that the material wastage by labour (subcontract) is greater than by the direct labour. For the effective execution of waste management practices on a construction project, communal effort and shared responsibility from all parties tangled in it is important. This highlights the attitudinal differences of subcontract labourers and direct labourers. According to Teo and Loosemore (2001), attitudes concerning waste management vary from one organisation to another, depends on the waste management regulations and policies and culture. In addition, different occupational groups have diverse attitudes towards generation and management of waste. Different studies have been conducted to assess the factors affecting these behaviours, including attitudes, knowledge, and practices in waste management (Akbar *et al.* 2015; Laor *et al.* 2018). In overall, clear differentiation of these

cultural manifestations such as values, attitudes and behaviours in C&D waste management context is yet to be unveiled.

#### **4. THE LINKAGE BETWEEN CULTURAL VALUES, ATTITUDES AND BEHAVIOURS OF PEOPLE**

The linkage between cultural values, attitudes and behaviours of people will be discussed in detail in this section, together with a comparison of cultural manifestations in pairs.

**Values** - Out of different cultural manifestations such as behaviours, attitudes, artefacts, norms and so on, the most dominant feature of culture may be the existing value emphasised in a society (Hofstede, 1980; Schwartz, 2006). These values highlight common understanding of what is desirable and good in cultural morals. Cultural values emphasise and rationalise individual and collective beliefs, goals and actions. The underlying values of cultural values in societies are expressed in institutional arrangements and policies, norms and everyday practices. For an example, a cultural value of triumph and ambition can be mirrored in highly competitive economic systems, educational practices and conflicting legal systems that drive children to succeed (Schwartz, 2011). Further, Schwartz (2011) stresses that peoples' values stem from biological and psychological needs related to social adjustment and survival. Accordingly, at the level of society, cultural values which derive from the functional requirements that societies face in order to survive (Morales *et al.* 2018). Another significant characteristic of cultural value orientation is that, they are comparatively steady (Schwartz *et al.*, 2000; Hofstede, 2001). However, in contrast, Samarasinghe (2012) has pinpointed that social adaptation to epidemics, improvements in technology, increased wealth, interactions with other cultures, and other external factors are leading to changes in cultural values. According to Rabinowicz and Rønnow-Rasmussen (2004), pro-attitudes influence in creating cultural values. Moreover, considering the context specific nature of values, researchers emphasise the need to conduct research separately for developed and developing countries (Diekmann and Franzen, 1999).

**Attitudes** - Attitude is described as a hypothetical structure that signifies whether a person likes or dislikes anything. Attitude is the judgment of "attitude objects" (people, places, tasks, events, skills, and so on). Attitude evolves over time and stems from the inner framework of beliefs and values (Jung, 1971). There are individuals, who might have the skills and knowledge to finish the task, but only a positive attitude towards the particular task will motivate, the intention to participate and complete the task (Kumar, 2018).

**Values vs. Attitudes** - Traditionally, values or primitive beliefs are seen as a fundamental aspect of self-concept, and a form of "fundamental truths" in reality (Sherif and Cantril, 1947; Rokeach, 1968). Many researchers have not yet conceptually differentiated values and attitudes, but some have recognised the importance of understanding the relationships that exist between more abstract and more specific evaluations (Sherif and Cantril, 1947; Nordlund 2009). Knowles (1975) states that always values and attitudes interact with the peers, family, and the society and people seems to intuitively 'like' those, who is sharing share their core values. Coordinating the value system is the reason for the success of any kind of relationship, whether it is personal, educational or professional. The researcher pin point that to achieve excellence and competence, people not only need to be capable to teach and assess skills and knowledge, but also requires to teach and assess attitudes.

Furthermore, people should be able to distinguish core values that support attitudes in order to achieve excellence. This indicates that values impact attitudes in a cultural context.

**Behaviours vs. Values** - In 1976, Edward T. Hall developed the iceberg theory of culture. Hall (1976) believes that if the culture of a society is an iceberg, then only some aspects are observable above the surface of the water, but a larger part is unseen beneath the surface. The author further stresses that the external part of culture is what we can see, which is the tip of the iceberg, which includes behaviour. The internal part of culture is laying below the surface of society, which includes beliefs and the values and modes of thinking that constitute behaviour (Akbari, 2016). Schein (2004) indicates that values are demonstrated through behaviour of people. Accordingly, there is a possibility of values influencing the behaviour of people.

**Attitudes vs. Behaviours** - Solomon *et al.* (2006) indicate that an attitude is based on the observed behaviour. Attitudes of people towards observed behaviour also has an impact on judgment. Behaviour can also be fake. A person may show ritual behaviour and fallacious obedience, when they require a positive opinion or else if they feel they are being observed for their performance. This may specify an attitude, but the spectator needs to explain the difference between the false behaviour of the true attitude and its implied attitude (Kumar, 2018). Therefore, a person, who is constantly discussing and accepting everything his or her supervisor says may not necessarily agree, but may very well try to gain favour. Herzberg (2008) has pinpointed that individuals need a positive attitude in order to be motivated and involved in the task. This shows the forward link of attitudes impacting the behaviour.

Herzberg (2008) further states that attitude stems from the core values and beliefs, which people hold internally. Consequently, it can be specified that beliefs are assumptions and beliefs that we believe are true, based upon past experiences. Values are founded on concepts, things and people's valuable ideas. Behaviour is the expression of these internalisation systems (attitudes, beliefs, and values) (Kumar, 2018).

The model of Homer and Kahle (1988) assumes an intellectual hierarchy of value-attitude-behaviour. Values influence behaviour indirectly or directly through attitudes conferring to this model. Yet, the main characteristic of the model is to highlight the intermediating role of attitudes on behavioural relations and values (Homer and Kahle, 2004). Thus, the model infers a hierarchy of cognitions, where the effects theoretically flow from more abstract cognition (i.e., value) to medium cognition (i.e., attitude) to a specific behaviour. Therefore, the model can be visually portrayed as a causal sequence: value → attitude → behaviour. Even though the value-attitude-behavioural intellectual hierarchy model has been applied to the varies extents (Shim *et al.*, 1999), such as describing professional attitudes (Shim *et al.*, 1999), the model is being mainly using for studies on environmental issues. Subsequently, it is worth looking into cultural values, attitudes and behaviours of community in C&D waste management.

## **5. CULTURAL VALUES, ATTITUDES AND BEHAVIOURS OF COMMUNITY IN C&D WASTE MANAGEMENT**

Studies, which are led in a cross-cultural context depict that environmental protection is usually accepted in both developed and developing countries (Milfont and Schultz, 2016). When understanding of specific environmental issues, cross-cultural differences exist on

the impact of environmental orientation on environmentally friendly behaviour (Milfont *et al.*, 2006). Kaplan, *et al.* (2019) have shown different structural circumstances associated with waste management, such as recycling systems, while cultural factors, affect the degree to which people partake in environmentally friendly behaviours, such as waste minimisation and recycling. In addition, the influence of personal motivations and preferences, such as the effect of environmental orientation and values on environmentally friendly behaviour, is also culturally different. Therefore, more efforts should be made to develop research models that consider these cultural factors highlighting the cultural manifestations of values, behaviours and attitudes in C&D waste management for efficient and effective management of such waste. Table 1 presents the cultural values, attitudes and behaviours of Sri Lankan community, extracted from general and C&D waste related literature.

Table 1: Values, attitudes and behaviours of community related to C&D waste management in Sri Lanka

| Values related to C&D waste management  | Attitudes related to C&D waste management  | Behaviours related to C&D waste management   |
|---|--|--|
| <ul style="list-style-type: none"> <li>• Acceptance of workability of waste management alternatives and disposal practices</li> <li>• Ensure integrated, economically feasible and environmentally favourable waste management measures for the country</li> <li>• Maximise resource recovery to minimise the amount of waste from disposal</li> <li>• Minimise adversative environmental impacts</li> <li>• Reusing the resources available in the collected garbage to the maximum before final disposal</li> <li>• Interaction with outside institutions and communities</li> <li>• Public education and personnel training</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Local authorities are not managing their solid waste properly</i></li> <li>• <i>'We dump – They collect'</i></li> <li>• <i>Lack of credibility in decision makers, waste managers, control mechanisms and decision processes for waste facility setting and operation</i></li> <li>• <i>Fear of damage to the environment</i></li> </ul> | <ul style="list-style-type: none"> <li>• <i>Open dumping Open burning and land filling</i></li> <li>• <i>Not segregating the waste</i></li> <li>• <i>Unplanned industrialisation and urbanisation</i></li> <li>• <i>High waste generation</i></li> <li>• <i>Malfunctioning of existing waste management systems</i></li> <li>• <i>No use of advanced technologies</i></li> </ul> |

Sources: Kulatunga *et al.* (2006), Begum *et al.* (2009), Wijetunga (2014), Karunaratne (2015), Eheliyagoda (2016), Gunaruwan and Gunasekara (2016)

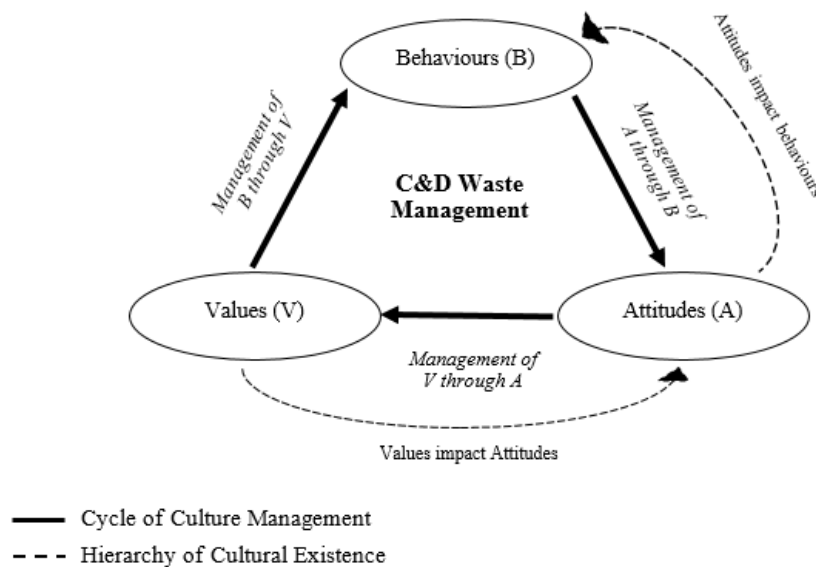
According to Table 1, it is apparent that Sri Lankans hold many positive values with regard to C&D waste but, majority of attitudes and behaviours take a negative stance (negative attitudes and behaviours are indicated in *italics* in Table 1). These lists are not exhaustive, however, provide a general overview of the cultural manifestations of Sri Lankan community in C& D waste management. Nevertheless, according to the values-attitudes-behaviour hierarchy, attitudes are influenced by values, and behaviours and influenced by attitudes. Although many positive values are held by Sri Lankans, such values are not reflected through the attitudes and behaviours as described by values-

attitudes-behaviour hierarchy. Thus, a proper empirical study is required digging further into values, attitudes and behaviours of Sri Lankans related to C&D waste management to interpret the dynamisms along the value-attitude-behaviour hierarchy.

## 6. CULTURE BASED CONCEPTUAL FRAMEWORK FOR MANAGING C&D WASTE IN SRI LANKA

The previous sections discussed the linkage between values, attitudes and behaviours in general and related to C&D waste management context in Sri Lanka. Such discussions revealed a path to manage C&D waste through a cultural perspective as depicted in Figure: a culture based conceptual framework for managing C&D waste in Sri Lanka. According to this framework, values, attitudes and behaviours exist in a hierarchical manner as discussed in Section 4 of this paper. Within that hierarchy, values related to C&D waste management impact (influence) the attitudes correlated to C&D waste management and such attitudes further impact (influence) the behaviours related to C&D waste management. Otherwise, behaviours depend on attitudes and attitudes depend on values. This primary linkage between values, behaviours, and attitudes is represented through thick dotted arrows in Figure 1. However, managing values, attitudes and behaviours could be achieved only in a reverse cycle to the values-attitudes-behaviour hierarchy as indicated through thick black arrows in Figure 1. These cyclical links were derived through the discussion at Section 4 as described below:

- Behaviour of the society influences the creation of good attitudes in people for managing waste (Management of A through B).
- Pro-attitudes influence in creating cultural values (Management of V through A).
- Socially accepted cultural values influence in changing bad behaviours of people into good behaviours (Management of B through V)



*Figure 1: Culture based conceptual framework for managing C&D waste in Sri Lanka*

Accordingly, the conceptual framework in Figure 1 argues that if C&D waste to be managed properly in Sri Lanka, such mechanism should not overlook the cultural values,

attitudes and behaviours of society related to C&D waste. Further, such a culture-based management could be achieved by focusing on the cycle of culture management.

## 7. CONCLUSIONS

Minimisation and management of C&D waste have been accentuated in terms of enhancing performance while attaining the sustainable goals of the construction sector. This literature review aimed at deriving a culture-based solution for C&D waste management in Sri Lanka through reviewing waste management practices in Sri Lanka, cultural manifestations of community waste management and trying to identify a linkage between values, attitudes and behaviours of people in C&D waste management.

It is identified through literature that there are three substantial manifestations of culture as; values, attitudes, and behaviours. Since the construction industry is labour-intensive, the values, attitudes and behaviours of the people affect its growth and thus, the minimisation of C&D waste is not an exemption. Moreover, an effective change in the values, attitudes and behaviours of the construction workforce is important to achieve the maximum benefits from C&D waste management practices. According to the popular literature, Sri Lankans hold many positive values in C&D waste management, while many attitudes and behaviours are of negative in nature. Existence of these three manifestations is explained through the value-attitude-behaviour hierarchy. According to this hierarchy, values influence attitudes, while attitudes influence behaviours. Although many positive values are held by Sri Lankans as per the popular literature, such positive nature is not reflected through the attitudes and behaviours of Sri Lankans in C&D waste management. Therefore, a thorough empirical study is required to explain the dynamisms of value-attitude-behaviour hierarchy in Sri Lankan context.

In addition, a culture based conceptual framework (refer Figure 1) was derived in this paper to better manage C&D waste in Sri Lankan context. According to this framework, it is argued that management of values, attitudes and behaviours in C&D waste management should take a reverse cycle to the value-attitude-behaviour hierarchy, which is named in this paper as cycle of culture management. Further research stemming out of this paper is to develop mechanisms to operationalise the cycle of culture management in C&D waste management in Sri Lanka.

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