THE INFLUENCE OF CULTURE, BELIEFS AND EXPERIENCE ON THE SUSTAINABLE END-OF-LIFE MANAGEMENT OF BUILDINGS IN NIGERIA

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ABSTRACT

While it is usually believed that economic incentives are behind waste management practices in developing countries, this article discusses culture, belief and experience as the other major influences in the management practices of building demolition waste in Nigeria. Practitioners in the building demolition sub-sector were interviewed to identify the influences that contribute to the emergence of reuse as a preferable demolition waste management technique in society, in addition to the economic incentives. This study will give an insight into some practices in a pre-industrial society with potential for recognition and contribution of the development of formal waste management systems in developing countries.

Keywords: building demolition waste, Kano, Nigeria, non-economic factors, culture, beliefs

INTRODUCTION

As stated by the Royal Institute of Architects, sustainability is indeed man's major issue of the 21st century (RIBA, 2009a, 2009b, 2009c, 2009d). This is even more pertinent when considering examples from history from a number of pre-industrial societies that collapsed as a result of the unsustainable exploitation of the environment described by Diamond (2005) as "ecocide". Some of these societies include the Maya cities in Central America, the Great Zimbabwe in Africa, the Mycenaean Greece in Europe, and Easter Island in the Pacific Ocean (Diamond, 2005). As demonstrated in the Biosphere 2 experiment (Rogers, 2011), present societies face the same environmental problems as past societies, with additional challenges. According to Diamond (2005), the eight environmental challenges similarly faced by past societies can be categorised into deforestation, soil erosion, water scarcity, overhunting, overfishing, population growth, and increased human impact per capita. Nevertheless, four other threats not found in past societies are human-induced climate change, toxic chemicals in the environment, energy shortages, and exhaustion of the photosynthetic capacity of the earth (Diamond, 2005). These latter four threats are the consequences of the introduction of machinery and the development of industry driven by

fossil fuel consumption and rapid natural resources extraction. These consequences include the degradation of the natural environment and new social phenomena such as population increase and urbanisation, consumerism and solid waste generation, and a new order for social stratification in society (Chappine, 2015).

In the built environment, according to Morris (2013), before the Industrial Revolution buildings were typically vernacular and made from locally available materials and technology. Nevertheless, as described by Hawkes (2011), in England for example, unsustainable architecture replaced vernacular architecture from the inception of the Industrial Revolution. New construction methods utilising glass and steel as products of the Industrial Revolution emerged (Hawkes, 2012). However, it was also was realised at this time that that the continued unsustainable exploitation of nature beyond its capacity should either be stopped by choice, or would be forced by natural consequences (Meadows, Meadows, Randers and Behrens, 1972), including the possibility of the extinction of the human race (Mark, 2000).

The built environment is one of the sectors central to the sustainability agenda owing to its huge environmental impact. The vernacular architecture once adapted to the natural environment has been replaced by buildings that rely on the supply of unsustainable energy generated from fossil fuels for the running of the newly introduced mechanical services (Banham, 1969) However, an energy conscientiousness has emerged since the 1970s and 1980s (Hawkes, 2013).

The negative contribution of buildings to global warming starts with the embodied "energy" consumed in the manufacturing of the building materials and proceeds to the stages of construction, operation, and ultimately, demolition (Berge, 2009). Buildings are responsible for 70% of the energy consumption (Brandon and Lombardi, 2011), nearly half of the estimated 560 million carbon emissions in the United Kingdom (UK) (RIBA, 2009b, 2009c, 2009d), and 30% of the global emission (Belogolovsky, 2009). The impact of buildings is not only limited to energy consumption and carbon emission, but also extends to 40% of the global acid rains (Belogolovsky, 2009), natural ecological imbalance, fresh water depletion, land usage, and solid waste (Kibert, 2005). It is acknowledged that 90% of all materials ever extracted may be residing in the built environment (Kibert, 2005).

Furthermore, many of these materials are returned to the earth as waste with the associated negative impacts in a pattern described by McDonough and Braungart (2009) as cradle-to-grave. In the UK alone, an alarming figure of annual 90-120 million tonnes of waste are associated with construction and demolition (C&D), with more than 10% of unused materials as disclosed by government sources (Osmani, 2012; UK Green Building Council, 2013). This makes the built environment central in the need for optimal utilisation of resources (Dasgupta and Heal, 1979). Subsequently, a solution to the solid waste generated from the demolition of buildings at the end of their usefulness will be a move towards addressing one of the major sustainability challenges facing humanity: the risk of resources exhaustion. One possible approach to achieve this objective is for construction to learn from other sectors, an idea advocated by Latham (1994), Egan (1998) and others as cited by Keraminiyage (2009) and Lee (2002). However, if construction must learn from any other sector, the best of such other sectors for lessons in the management of waste are natural ecological systems.

In natural ecological systems there is no waste, rather an inter-dependent relationship among different species. The droppings from animals, for instance, are utilised as nourishment for plants, and the carrion left behind by predatory animals is a ready-made meal for scavengers (Bishop, 1973). Consequently, no waste is generated; the potential waste from one organism

becomes a raw material for another in a closed-loop cycle, or what McDonough and Braungart (2009) term as cradle-to-cradle. Additionally, the natural ecosystem utilises renewable solar energy, organic storage systems, segmented operations, efficiency, interdependencies between systems, and adaptation. Thus, the question arises whether the construction industry can be organised in the same kind of natural ecological system with zero waste output.

This is the subject discussed by Kibert, Sendzimir and Guy (2000), who propose a conceptual reorganisation of the construction industry to operate in line with the principles of natural ecology as well as in harmony with the natural environment under the tag/label of construction ecology. The three tenets of construction ecology are the closed-loop material cycle, the use of renewable energy, and the conservation of nature. The idea of construction ecology is adopted from the biomimetic concept of industrial ecology, whereby human economic activities are organised in the style of nature with the by-product of one process used as the raw material for another process (Odum, 1993). Industrial ecology is a widely accepted concept that was recognised as the main theme of the national technology strategy policy of Clinton's administration in the United States of America (USA) (Benyus, 1997). The popularity of the industrial ecology concept as an analogy to the natural ecology suggests a recognition of the superiority of the natural systems over artificial systems.

Similarly, the question can be asked where there is a human system that resembles the natural ecological system in its operations and interrelation of its constituent sectors; where such a system produces zero waste; and where a by-product from one operation becomes the raw material for another. What if such a system emerges naturally without systematic efforts and being policy driven? Then it can be argued that such a system is more favourably in line with the sustainability thinking than other systems that exhibit fewer characteristics of the natural systems. While the resemblance of the Nigerian practice of the end-of-life management of buildings to the natural ecological system is a subject of yet another discourse, the research inquiry in this article examines the influences of culture, beliefs and experience on the Nigerian system of building demolition waste management.

RESEARCH CONTEXT

Despite many subdivisions among cultures and regions, Nigerian society is mainly divided between the north and the south and this dichotomy is reflected in virtually all aspects of political, cultural, and economic life. Discussions of Nigerian cities are sometimes approached according to this line of cultural dichotomy (Phillips, 2003, 2004). Nevertheless, the Township Ordinance of 1917 was motivated by the complexities and heterogeneous nature of the townships that make administration too challenging for the native administration to handle. Thus, the townships were classified into first-, second-, and third-class townships (Olukoju, 2004). First-class townships were administered by a council, while an administrator assisted by an advisory board was nominated for the second-class townships. According to the Nigerian Township Ordinance, there were eighteen second-class townships and despite the emergence of more post-colonial townships (Olukoju, 2004), these remain major settlements and population centres to the present day. Lagos was the only first-class township administered by a council in line with its unique nature.

Figure 1: Major townships in Nigeria (Source: CIA [The World Factbook], 2017)

Lagos may probably be one of the ten most populous cities in the world by 2025 (Phillips, 2003). It is largely made up of four islands interconnected by bridges that are barely adequate for the large population it accommodates. Characterised by pollution, crime and overcrowding, Lagos was once a state and federal capital city with limited capacity for expansion (Chattopadhyay and Slack, 2009; Phillips, 2003, 2004). This unique nature of Lagos was cited as the reason for relocating the federal capital city to Abuja, based on the recommendation of a panel, subsequent military decrees and implementation. The peculiar nature of Lagos places it in a class of its own: it is not representative of a typical Nigerian city, and therefore considered unsuitable as a site for this study.

The site for the new capital city of Nigeria, namely Abuja, was purposely selected for its geographical location, climate and neutrality, and was designed and built as a modern administrative city (Chattopadhyay and Slack, 2009; Phillips, 2003, 2004). Predominantly developed by the government to accommodate administrative office buildings and residences for the bureaucrats, Abuja is in a class of its own and cannot be representative of a typical Nigerian city; therefore, it is equally excluded from consideration for the study site of this research.

According to the National Population Commission (2010) and the National Population Commission (2016), Kano is the second most populated city in Nigeria and the most populous among the second-class townships recognised by the Township Ordinance of 1917. The city of Kano has a heterogeneous composition (Olukoju, 2004), and currently remains a vibrant commercial and cultural centre. Moreover, as described by Urquhart (1977), four different types of settlements with official recognition emerged in the urban centres of northern Nigeria. These were the ancient walled city usually left intact, the European official settlements popularly known as GRA (an acronym for Government Reserved Area), the *Tudun Wada*, a settlement for non-indigenous northerners, and the *Sabon Gari*, the living quarter for settlers from southern Nigeria (Urquhart, 1977). This structure still exists in Kano and makes the city a confederation of all Nigerian nationalities. Subsequently, this became a

tradition that can be observed even in recently developed settlements as demonstrated in more recent news reports such as: "Witnesses say…in the mainly Christian area of Sabon Gari" (BBC, 2014).

Therefore, the subject of this investigation is the serendipitous discovery of Kano. Kano was selected as the study site for three reasons, namely population, heterogeneity, and the identification of the phenomenon. Moreover, in a qualitative inquiry of this nature, the subject of study may be determined by who or what satisfies the interests of the research (Baker and Edwards, 2012).

RESEARCH METHOD

The practices of handling demolition waste as a concurrent phenomenon and the concept of the industrial ecology as theoretical presupposition qualify this study to use a case study strategy. As described by Yin (1981, 2009) , a case study is a synchronous study of situations whereby the subject is not distinct from the context without the researcher's control over events. Similarly, the researcher has no control over the variables in the building demolition waste management practices in the Nigerian cities. Moreover, a case study is considered convenient for exploratory and descriptive inquiries that seek to answer the 'How?' and 'What?"' questions as in this research.

The unit of analysis in this research is the community of *Yangwangwan*, referring in the local Hausa language to the group of stakeholders dealing with salvaged building materials of Kano city. Active players in the industry with first-hand experience in at least one building demolition project were selected to participate in this research. Such informative persons were expected to identify a further three participants for the research in a snowball fashion; however, while in the field, this was seldom practical. Therefore, 75% of the research participants were identified directly by the researcher. An equal quota of three (3) participants from each of the seven (7) stakeholder groups was expected to form the sample for the research, but this was equally impractical whilst in the field as some of the participants belonged to more than one stakeholder group, and the willingness and availability of the participants could not be obtained evenly across the stakeholder groups. A total of 16 participants across all the stakeholder groups participated in the research (see Figure 2 for the selection process).

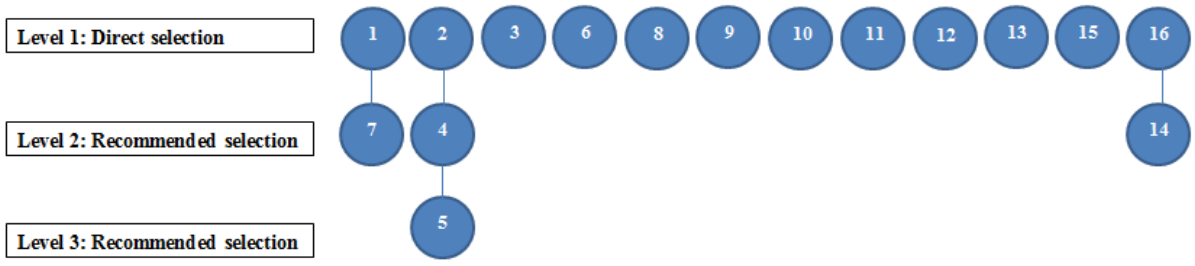

Figure 2: Selection of research participants

Information was obtained from the research participants through a semi-structured in-depth interview guided by a priori themes developed from the best practices of waste management across sectors with the emphasis on lessons from natural ecological systems. In addition, information was solicited from real-life projects in which the research participants had played an active role. Thereafter, the interviews were transcribed verbatim for analysis using a qualitative data analysis application, namely QDA Miner.

The sub-themes of the interviews included the following:

- Narrative of the processes of building demolition from experience,
- The stakeholders and their roles,
- Challenges,
- Improvements,
- Historical evolution,
- Health and safety, and
- Influencing factors.

However, another variation of the thematic analysis procedure is the template analysis that was described by its proponent as being flexible for use in different research scenarios, more especially with presumptive themes, otherwise referred to as a priori themes (Brooks and King, 2014; King, 2012). The main feature of template analysis is a flexible coding template that may be developed without the need to comply to any rigid format or differentiation between descriptive and interpretive data. The a priori themes were applied to structure the initial inquiry according to some theoretical concerns of particular importance in relation to the topic. The flexibility of the template analysis allows for new emergent themes to be incorporated.

The discussion in this article is limited to the relevance of culture, beliefs and experience in the management of materials at the end of service of a building as emergent themes, and the key findings of this research are presented as follows.

RESEARCH FINDINGS

Five of the 16 interviewees representing 31% of the participants highlighted that culture and belief are two of the factors that influence the prevalence of the reuse of salvaged building materials in society. While participants EN3, EN7 and EN16 mentioned culture without explanation, other participants, namely EN14 and EN13, discussed it in more detail. According to participant EN14, "Some people have this belief, the older the material, the better are the materials! You find that you can salvage even the blocks from older buildings [sic]". Similarly, participant EN13, who has more than 30 years' work experience in the construction industry in a different capacity, said: *"*The older the material is, the more probability that it will be of higher quality. You will realise that the most recent materials are even destroyed in the process of decommissioning, therefore, they are less valuable [sic]" (EN13). He went further to elaborate on this point as follows:

> *"…that is what I said - if what the stakeholder wants is aesthetics, then definitely newer materials from decommissioning may be valuable, but where quality is considered, the older ones are better. It is logical that if a building material can last for fifty years in a building and is still in good condition, it means the quality is tested and trusted. There is a probability that it will last for more years. Even the manufacturer of that components will enjoy preference for even the new materials he is making now; his products have been tested and even among the newer products now, his own will be more valuable. He has established goodwill with the public - his product has been tested and trusted [sic]".*

The possible interpretation and implications of these remarks form the research participants are presented in the following discussion.

DISCUSSION

The influence of culture and tradition

Culture is defined as "…the collective programming of the mind which distinguishes members of one group or category of people from another" (Geert and Jan, 1991). There is a correlation between environmental sustainability and the national culture as mentioned in the writing of Park, Russell, and Lee (2007), as there is in theories of management, employee motivation, leadership, organisational structure, planning and problem- solving approaches (Hofstede, 1980, 1984). Similarly, the remarks of the research participants can be interpreted to suggest the influence of culture, belief and experience in the choice of waste management techniques to adopt in deciding the fate of materials at the end of service.

There is an old custom among the Hausas described by Schwerdtfeger (1982) whereby a dead person is buried in or around his or her room and the buildings is allowed to collapse naturally over time. The timbers from the roof are reused for a new building or as firewood, while the mud and the space of the collapsed structure are used in making bricks and rebuilding another room for the next generation. It can be speculated that this culture might possibly have persisted and unconscientiously influenced the choice of reusing building materials among the present day generation of the Hausas in Nigeria. Moreover, the Hausas are renowned for their conservative attitudes in many respects (Adamu, 2006; Callaway, 1987; Whitsitt, 2003). A study in West Africa classified Hausas along with other short-term orientation societies associated with the attribute of respect for traditions (Geert and Jan, 1991).

Another aspect of the Hausa culture that may come into play are the informal traditional housing and finance that provide most of the housing stock for the Hausas and probably Africa in general. The Hausas live in patrilocal communities organised in co-residential kinship groups in which family heads are expected to self-build and provide residential accommodation for their families, sometimes with some contributions from members of the kinship (Schwerdtfeger, 1982). This culture is further reinforced by the collapse of the official housing policy (Ogunshakin and Olayiwola, 1992), and myriads of other challenges facing the housing sector in Nigeria (Akeju, 2007). In order to meet with the obligation of providing shelter for the family in the midst of scarce resources, the reuse of salvaged building materials may provide an easier option.

In the context of demolition waste management, culture and tradition encourage the prevalence of reuse of the salvaged building materials in yet another building or for other purposes, not necessarily in the construction sector. In an analogy for the natural ecological systems, waste from one building becomes a raw material for use in another building or other sectors, thereby eliminating any waste. This is a practical form of industrial ecology. Moreover, reuse of materials is considered the second most sustainable waste management strategy in line with the principle of the waste hierarchy and the EU directive on waste management (DOE, 2012; Kibert, 2005; Nowak, Steiner and Wiegel, 2009). Therefore, this culture is worthy of recognition and integration into the formal waste management systems for its contribution to the sustainable utilisation of resources.

Beliefs

A*rgumentum ad antiquitatem*, meaning 'appeals to antiquity', is a common belief among the Hausas that may have contributed to the choice of the reuse technique for building demolition waste management. The Hausas believed that the older a material, the better its quality. This

philosophy may be a fallacy; nevertheless, it reinforces the culture of reusing salvaged building materials as well as attracting economic value to the materials.

A common proverb in the Hausa language most often cited to support older items as more valuable says, *Da tsohuwar zuma a ke magani,* meaning 'Only an old honey can cure*'*. The reasons for the prevalence of this philosophy may be beyond the scope of this article; however, this philosophy is friendly to the environmental sustainability agenda. It is contrary to the unsustainable fashion and trend psychology in other societies whereby a temporary seasonal cyclical phenomenon is adopted temporarily and discarded just as quickly (Bhardwaj and Fairhurst, 2010).

Experience

In the fields of psychology and sociology the after-effect of especially negative experience on future human behaviour is a well-established area of study (Cook et al., 2005). Nevertheless, the relationship between experience and consumer behaviour in the context of environmental management may be another area that requires further study. In this study, there is a pattern that is illustrative of such a relationship between collective consumer experience, consumer behaviour and the management of materials from decommissioned buildings. The philosophy of prioritising older over new building materials may be explained by the transition of the Nigerian consumer market from the British standard goods to the Chinese sub-standard products that flood the market (Falola and Achberger, 2013; Raine, 2013). In Nigeria, labelling a product as being made in China is synonymous with low quality. This psychology of Nigerian consumers was the subject of public discussion among Nigerian citizens as well as a concern for the authorities of the two countries (Agency Report, 2015; Okafor, 2015). An experience of a generation of post-colonial stakeholders that witnessed the transition from the high-performing British standards products to the poor-performance newly introduced sub-standard Chinese building materials may be inclined to reinforce the notion of "the older, the better in quality". Moreover, these stakeholders cannot easily divorce themselves from the influence of their native culture and beliefs. Statements as cited above should therefore not be unexpected. Therefore, this collective experience of the entire society might have further reinforced the culture and belief in the superior quality of the older over new building materials.

Figure 3 represents the interplay of these factors in reinforcing the prevalence of the sustainable practice of reuse of salvaged building materials in the Nigerian society of Kano.

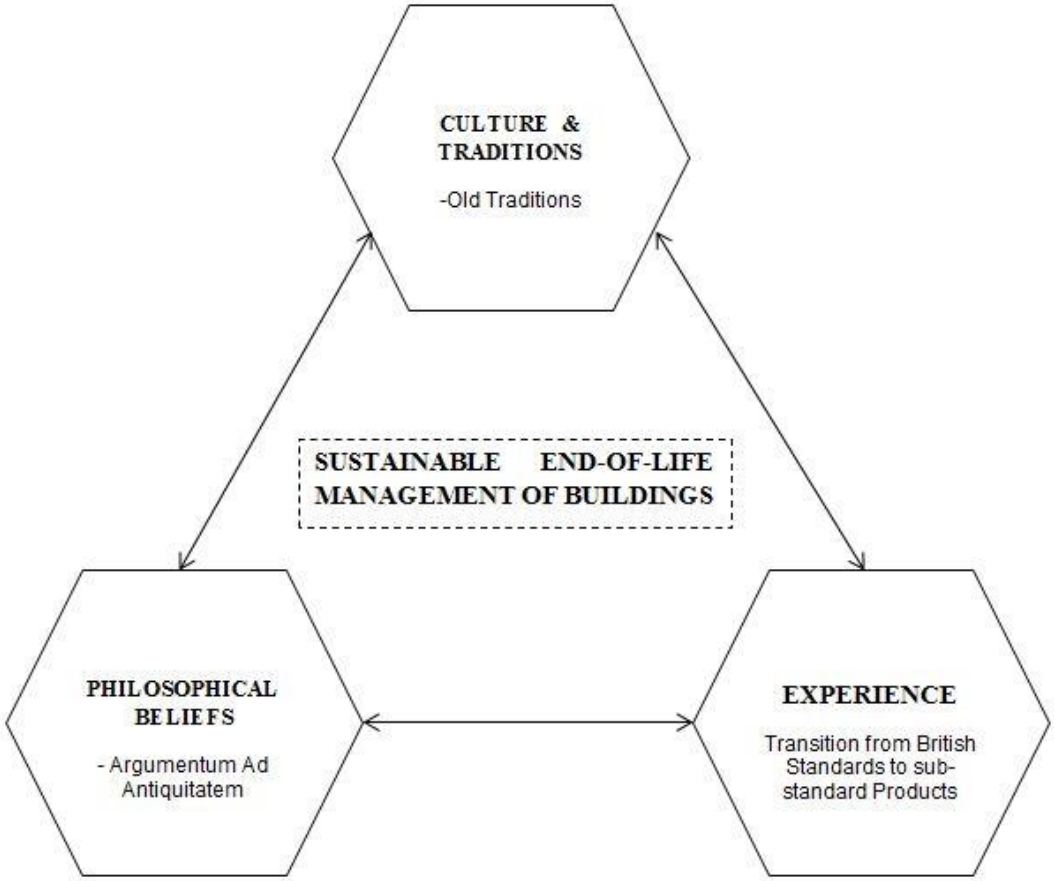

Figure 3: Influence of culture, beliefs and experience on sustainable end-of-life management of buildings

CONCLUSIONS

Sustainability is indeed man's major issue of the 21st century (RIBA, 2009d). Conferences and summits have been organised on sustainability at various levels, some attended by over a hundred world leaders (Brandon and Lombardi, 2011). Despite some initial resistance by developing countries (Najam, 2005), it was later accepted as a global agenda to pursue development for the satisfaction of the current generation without jeopardising the feasibility of the same privilege for the future generations (Brundtland, 1987). Global warming and resources consumption are among the most critical issues in the sustainability debate; therefore, this positions the built environment among the central issues of focus as probably the largest contributor to both global warming and resources consumption.

The search for solutions for construction may include looking into other sectors such as the natural systems. Nevertheless, the wisdom of respecting nature as a teacher is inherent among some of the native societies (Benyus, 1997). While historical evidence suggests on the one hand that there were societies that arguably collapsed from human-induced ecological catastrophe (Flenley and Bahn, 2007; Hunt, 2007; Mieth and Bork, 2010), on the other hand, there were success stories of a number of pre-industrial societies such as Tokugawa Japan and Tikopia that were able to manage the ecology sustainably and survived for thousands of years. These success stories suggest that there may be an abundance of lessons to be learnt from these cultures even by present-day societies (Diamond, 2005). Nonetheless, when discussing waste management policies at an international level, the typical approach is to

dismiss the waste management techniques in developing countries as informal and primarily driven by economic incentives (Schneider and Ragossnig, 2014).

This article advocates a paradigm shift and argues that looking beyond the surface of these cultures with a different motive of finding inspirations for sustainable solutions is likely to be more revealing. As argued by Husted (2005), culture must be included in addition to economy for a complete discussion of sustainability. Diamond (2005), in his frequently cited book on how societies chose to fail or succeed, identified religious beliefs as one of the factors that prevented the doomed societies from realising the catastrophe ahead of them while destroying their ecosystem. The Moai statues that the prehistoric Easter Islanders were competing to erect despite the negative consequences to their resource base were a manifestation of the influence of belief.

Consequently, this article discusses other driving factors which are beyond economics and which are behind the sustainable practices in a preindustrial society i.e. the cultural attitudes, traditions of respecting and reusing materials in building constructions, and experience. In line with sustainability thinking, this culture is more favourable than the trend and fashion culture prevalent in contemporary affluent societies. Even in advanced countries the practice of reusing building materials is now gathering momentum, as evidenced in the advocacy for recycle aggregates in concrete, new life for old wood, the mission of the American Construction and Demolition Recycling Association, and some private corporations (Brito and Saikia; CDRA, 2016; Fast, 2001; Kibert, 1993; Pacheco-Torgal et al., 2013; Sassi, 2008), hence the return to the long established practices in some of the preindustrial societies.

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