Talking Durability in Architecture

Sudarshan Raj Tiwari
Professor

When Laurie Anderson, an American music-maker, was asked to talk about her music once, her response had been to say, "Talking about music is like dancing about architecture". Such remarks are not so uncharacteristic of exponents of fine arts, who seek more of sensory invocation and appreciation rather than a linguistic appraisal of their works. Her purpose could have been just to mean that the best way to know about music was to draw joy through listening and dancing about it, just as the *Gopini* emote dancing to the music of Lord Krishna's flute. What is interesting for us here is that she made a simile with architecture and seems to suggest that talking about architecture is as joyful a way of expressing understanding or savoring architecture. Architecture is not an object for visual appreciation alone, it has a human purpose and provides shelter and frame for actions and social structures too. In recent historical times, as the architecture of the public and corporate buildings started becoming attributed to the 'creative genius' of individual architects for their design, development and even construction ideas, ingenuity has largely replaced beauty as the key attribute of great architecture. Indeed uniqueness may have replaced visual aesthetics as a defining character of architecture, although sometimes the uniqueness may itself be concerned with the visual character. Because of this changing character of architecture and the greater role given to linguistic understanding of architecture, controversy itself has developed into a distinguishing factor, the more controversial the design, the more likely it had the chance to be famous and, thereby, great in the media age. Controversy is of course a discursive phenomenon and talking about architecture would be a natural way with this criterion of good architecture. However, only rarely does architecture get recognized for its stamp on time or contribution to formation of historical value. Only this attribute seeks temporal value in architecture and justifies creating long durability for such architectural masterpiece. Otherwise, architecture with short building life should be able to stand great as well. This article proposes to discuss architectural basics and revisit the idea of durability in architecture.

With Vitruvius's canons of architecture, theory and practice of architecture in the west started on the principle of synthesis of aesthetics, function and construction and continues to develop with a sense of inseparability of the three characteristic dimensions. Thus, two millennia later, we find Norberg-Schulz's categorization of the systemic components of architectural design as form, building task and *technics* essentially similar. *Technics*, of course goes beyond 'firmitas' and enjoins architectural design to use appropriate construction technology and techniques to ensure services and energy performance as much as to develop firmness and strength in the building. The key objective in construction or *technics* is still largely structural and remains close to Vitruvian position – to develop strength and durability while contributing to make the building beautiful and useful. Although the strength of building is analyzed and computed and building engineered to respond to the 'dead and live' loads as well as other stresses brought upon it by such natural phenomena as wind, snow, earthquakes, etc., no such 'quantification' is spelled out for durability as such. The durability of an architectural work in a temporal

sense, its life span although rarely quantified, is accepted at the level as determined by the durability of the material and methods of building and its potential for renewal. We may argue for permanency or indefinite life for an architectural work only if we are also able to universalize it to its other dimensions of aesthetics and usefulness, also. Perception of beauty or idea of the aesthetic is unlikely to remain same over time even as we may observe agreements among several ancient civilizations in their choice of geometric figures, forms and proportions particularly for the definition of the architecture of the sacred. Since usefulness or functionality of a building is a social construct and its 'durability' could not be any longer than the durability of the social organization and the style of living itself. Social organization, socialization and life style are all the time changing in the passage of human civilization and make illogical any argument to seek permanency in the functionality of majority of buildings. The pace of economic as well as socio-cultural change in the modern period has evidenced premature functional obsolescence of many a 'permanent' and sometimes even temporary buildings, and demolition, removal and disposal of building structure have been a business of significant proportion in today's towns. It has been observed that designed interiors of commercial spaces become obsolete in a decade or two. Since, architecture uses building materials for its realization and its waste by product on removal is also the same materials. Thus, both durability and disposability of building are functions of its materials and methods of construction.

We find some nomadic building cultures that accept seasonal and even shorter term obsolescence of buildings and define durability accordingly for buildings with seasonally recurring functions. The *Igloo* of the Eskimo is one glorious example of temporary building with sufficient durability and high disposability. *Igloo* is a vaulted domical snow house used as winter dwelling or temporary hunting shelter. Built using cut-snow blocks, even its tables and ledges for living inside and doors were made of snow blocks. As winter came to an end and summer sun started warming, the snow-slabs of the dome would start melting and the *Igloo* got discarded in favor of *Qaqmaq*, a house with circular snow-block wall and a tent pitched on the walls to make roof. The Igloo will then melt to merge with the landscape until the coming of winter will bring a fresh cycle of construction of the domical snow house. The form, material and technology of Igloo gave the Eskimo a building, of sufficient strength and 'durability' and environmental performance- the hemispherical form giving least surface area to keep heat loss to a minimum and its roundness combining with smoothness of snow-block to keep air movement to the minimum. This high level of disposability of the Igloo and its full merger with nature at the end of useful life, speak volumes of the eco-sensitivity of this building practice. Even though the Igloo has become a story of the past even in Alaska, as an example of building's fitness with place and nature and disposability, it has few equals.

However, most of the ancient high cultures sought permanency in construction as in the modern days. The most permanent of buildings were built by the Romans in the west and the Indians in the east. One achieved permanency by using mass concrete and the other by using stone for building. For both, the key technological edge giving high durability was their non-use of iron and use of monolithic construction system with elements

predominantly in compression. In a sense, they lasted because they used rocks, the hardiest of building materials available in Nature. The action of 'weathering agents' of Nature, air, water and heat is so slow on rocks that we get the feel of great durability. Whereas some temporary buildings may be designed with a short or limited time of functional purpose, in most cases temporariness of a structure is simply a result of a faster than 'normal' pace of disintegration of the whole or part of the building when exposed to the weathering actions of nature.

Modern developments in the practice of conservation of heritage monuments have also brought to fore what are called reversible technologies – conservationists recognize that use of this class of technologies is as important in conjectural restorations or in situations requiring additions of new structures as assuring authenticity of both materials and technology is in the of preservation of monuments. In the field of construction, this is a new way of defining performance and durability and it severely affects the choice of technologies. The case of choice of technology for conservation of Mayadevi temple at Lumbini can illustrate how tricky the question of durability, permanency and temporariness can become. Mayadevi temple at Lumbini, the birth place of Lord Buddha being a UNESCO World Heritage Site, the stakes were high and a long internationally participated exercise had reduced the options to two: (a) a design using bolted steel frame structure with pre-cast concrete slabs, proposed by Nepali architects and (b) another using light cable structure with stretched Treflon sheets proposed by a Japanese architect. Both used reversible techniques down to the anchoring of foundations to the ground. One important issue was the life of the proposed structures. Both the designs were being touted as the state-of-art technology, one using 'temporary structure' and the other 'permanent structure'. In fact, the falseness of 'permanency' and true 'temporariness' of the structures were evident; modern technology of construction would have a life at most of one-hundred and fifty years, where as the ruins that they were to protect had survived two thousand five hundred years already. Such consideration drew the 'permanency' out of any modern technology and made all of them temporary by comparison to its own period of survival and the purported intent of the designs to continue that far further into future! The expert meeting had concluded that the Treflon tent design was a better option as it was humble in its temporariness. But the Prime Minister of Nepal disagreed with the experts' recommendation and the steel and concrete protective shell was instead built.

Indeed no human technology could reach any sense of permanency when we compare to time scales in Nature. This should ingrain humbleness into all our efforts and should form an important character of technology. It reminds me of reading somewhere that the Chinese word for architecture is *Tu-Mu*, mud and wood. This not only is a great example of a word from a pictographic language, but also a philosophy of building itself – the word clearly spells out the belongingness of building to Nature and more, the perishable quality of buildings, man makes. The humility of the ancient Chinese architectural philosophy in objectively preferring perishability to permanency in residential architecture stands in stark contrast to the Roman learning that sought to promote permanency in building through the technology of concrete. The quest of permanency has led to loss of human humility vis-à-vis Nature and ill-founded pride in technological might has progressively made controlling and harnessing of nature the central objectives

of most modern technologies; as a result this has weakened the western civilization's ability to respond positively to ecological problems being faced by the world these days. Perishability of a material does not make it inferior, it is actually a superior property as it makes the disposal of inert material a part of the natural phenomena. Such property of materials, of course, also go qualified by a more commonly used and respected eco-sensible term, biodegradable. How desirable is the property of biodegradability in any material is more than driven home by the case of plastics bags, which is commonly used in *Kirana* grocery stores as well as the big department stores in Nepal as if that is the global way to wrap-up! Here is what Green Zebra says about plastic bags in U.S.

"Every year 12 million barrels of oil go into producing the plastic bags in the U.S. Less than 1% of these bags get recycled. Plastic is not biodegradable, so bags hang around indefinitely. Even worse, they tend to blow away. Each year more than 1 million sea birds, turtles and mammals die from eating or getting entangled in plastic litter."(Cohen 2008)

But since disposal of many inert building materials is achieved through weathering and chemical action rather than through bacterial or biological action, for our discussion of durability of construction the use of the term 'perishability' may be better suited then bio-degradability. Also the term 'perishability' accepts nature as the ultimate recipient environment rather than just as action agent! Looking at weathering from the perspective of natural ecology may be actually desirable because it leads to disintegration of the building material so that it may be assimilated in nature, mostly with good results. When this assimilation fails, it becomes a problem for disposal and a pollutant. As the presence of synthetic materials and parts are on the increase in architectural usage, it is only a matter of time before the problem of disposal of building waste takes environmental and ecological proportions. The growing environmental problems of the town, particularly resulting from the difficulty of assimilation of solid waste and pollutants in the Natural system around it without harming its ecological function, balance and chains of renewal give us good reason to consider the building significant level of perishability in the property of waste materials. It is clear that perishability is highly desirable in all material by- products of human action and technology and those applied in architecture can not be exceptions.

The bacterial and biological agents of degradation need the presence of one or more of the very same weathering agents of the inert materials such as air, water, heat, land (solids and chemicals?). These very 'elements' along with space, called the *pancha-tatva* in Hindu philosophy, also form the total natural environment or physical Nature itself. In order to clarify the perishable nature of matter and the role of the environment in executing the natural order of dissolution of matter into itself, it may be useful here to take a closer look at the immortal sayings of Lord Krishna in the Bhagavatagita. He says, while talking about the larger Nature,

नैनं छिन्दन्ति शस्त्राणि नैनं दहति पावकः।
न चैनं ल्केदयन्त्यापो न शोषयति मारुतः॥
अच्छेद्यो यमदाह्यो यमक्लेद्यो शोष्य एव च।
नित्यः सर्वगतः स्थाणुरचलो यं सनातनः ॥

[Tr. "This, (the soul, atma) cannot be cut by arms and it cannot be burnt by fire, nor can water make it wet nor can air dry it up. Because it is undivided, un-burnt, un-wet and un-dried, (only) this is ever present, everywhere, firm and unmoving and coming from the beginning." – Bhagavatgita, 2.23-24]

Although this stanza is about the nature of the timeless and the formless *atma*, we can infer the character of the temporal material objects with form as well as that of the physical environment from this description of the non-material. We can see that it is the property of material elements, the *pancha-tatvic* world and the physical environment they make, to be cut, get hot and burnt or be wet and dry. Clearly for the material to be material at all, it will have to give in to cutting, heating, wetting and drying and thereby disintegrate and disperse into its environment. Degradability, thus, appears to be an universal property of all materials. In this scheme of things, development of technologies that demand or create a totally a-thermal/fire-proof, water-proof and evacuated (air-less) situation would be unnatural and result in un-ecological outcomes. This negates the natural interaction between the *pancha-tatva* that forms the world of forms, i.e. land, air, water, fire and space and adversely hits the essence of the environment. The degradability of any material (solid?) is an interplay function of how much it can be wetted (penetration of water), dried (penetration of air), heated (absorption of heat) and spaced (penetration of radio-waves?). Depending upon which sub-property dominates and how the other sub-properties are approportioned, the nature and speed of disintegration, dispersal and assimilation of a material into the parent environment is determined.

Incorporating such principles of allowing moderated presence of all of the *pancha-tatvic* elements in material as well as the environment can highly increase the potential of perishability in architecture. In order to inculcate such ecological sense in construction, it would be necessary to moderate the idea of permanency by introducing some level of perishability in most materials and methods of construction in contemporary architecture also. This should be complemented by a revision of the associated theory of architecture redefining durability in terms of social performance rather than the firmness and strength of its construction engineering. All the three changes put together have a potential to usher in a new era of eco-architecture.