

Unity and Diversity in Habitats

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Abstract- *Architecture is based on and contributes to the collective human experience. While thus embodying a certain continuity and maintaining unity, it also represents change and embraces diversity. The balance is struck by the interplay between culture, ecology, materials, technology, economics, and function. These both set boundaries as also fuel a combination of the architects' analytical insights and creative syntheses, which are finally responsible for giving rise to the range of built forms. This movement can be visualized along temporal, spatial and functional planes. The edifice of the creative non-rational element must be based on a firm foundation of rationality. Innovations will thus be made - those that work and are well received will be copied and preserved. Others will fall by the wayside, leading to the survival of the fittest, much as it happens in biological evolution. The profession can flourish only if it adapts to various emergent challenges while maintaining its core strengths. It also has a key role to play in helping to confront the larger challenges facing the human race.*

Key words: *Space, Time, Function*

I. INTRODUCTION

A. Built Form and the Human Existence

As evolution progressed, organisms learnt to reshape their surroundings to their advantage. And not just individually; coral reefs, beehives, ant colonies, spider webs and other complex and diverse structures housing entire communities of primitive creatures, cooperating as a community.

This ability is seen most strongly amongst vertebrates – snake holes, bird nests, otter dams, rabbit burrows, and a variety of other functional, beautiful and often intricate structures made of a variety of materials. Like those of the above primeval creatures however, their overall design and fabrication too is driven primarily by instinct.

B. Increasing Safety

In terms of almost all physical abilities, humans, while adequate all-rounders, lag far behind specific animals or birds. Their only competitive advantage in the law of the jungle arises from their minds, which they use to shape their physical and social surroundings.

Thus, at the most basic level, shelter served as a safety barrier – from animals, from elements, and to some extent from other humans too. In many ways, it still does, since, while we have

formally abandoned the law of the jungle in the interests of group-work, our deep-seated animal instincts, run too deep to be ignored completely.

C. Convenience

Given the comparatively (perhaps below) average physical abilities of humans, their only method of competing and often surviving in the tough world is to leverage their limited physical abilities and compensate for their physical handicaps through various techniques and tools. Humans are unsurpassed tool (and in fact machine) makers, using them to overcome the limitations of limited muscles, senses, stamina, digestive powers, resistance to extreme temperatures and a range of other parameters.

Except for the most rudimentary shelters, all works of construction are machines - complex and long-lasting systems of artifacts aimed at facilitating and automating a range of tasks. Starting from simple doors and windows, to hooks, plumbing, electrification and now to intelligent buildings and even street signals, the outputs of construction are the largest machines created by man.

II. THE COMMUNITY

Starting from the family, the neighborhood, the organization, the nation, almost all aspects of our lives are governed by communal rhythms. Such cooperation also implies, in most cases, the desirability of a settled life-style, or at least the absence of a pressing need for nomadic ones.

Built forms are one of the powerful methods of giving shape and expression to the concerned group on a sustained basis. By creating a well-defined space within which members of a group come together, it serves to reinforce the group feeling, and facilitate its working.

Conversely and almost equally, in the interests of our own safety, and thus of maintaining good inter-group relationships, a range of mechanisms have been devised to ensure that norms are not transgressed. One such mechanism is that of physical boundaries, whether in terms of locks, walls, gates, forts, etc. in the olden days, and their electronic counterparts nowadays.

III. IDENTITY

The human race at an early stage, easily established both its superiority over other species as also its abilities to survive in a wide range of environments. Hence, since basic physiological needs have been taken care of a bulk of the race, Maslow's theory tells us that higher order needs will automatically come into play.

Many of these needs centre around the issues of status and prestige – whether at the level of the individual, the group or the

society. As group work increases and individualism is thus submerged, all want, to an ever-increasing degree, to reaffirm their respective identities.

It is usually the fear of death and its mirror - the desire for immortality, which drives people to set up empires, create works of art and otherwise leave their mark. Since such accomplishments are only for a few, many make do by trying to differ and excel in terms of one or more of the 5 C's – careers, clothes, cars, construction and children!

The latter two, since they survive over a longer term, also serve as an antidote to the fears of death that haunt most of us. It is perhaps for this reason that most people who can afford to, and even those who cannot, often invest disproportionate and even non-rational amounts of time, money and resources on these aspects.

IV. CONTRIBUTION OF DESIGN

A. Historical Origin

Modifying one's own surroundings to adapt them to one's needs is integral to life itself – as has been mentioned at the beginning of the paper. That is why the three basic needs have traditionally been enumerated as food, clothing and shelter.

The vastly increased power of the human race to create and to communicate abstract thoughts is what has enabled its members to cooperate in extremely complex forms over unprecedented time spans. It is this cooperation between and within groups, and the corresponding gains from specialization and division of labor, that has enabled Homo sapiens to emerge as the dominant species within a very short time frame on the evolutionary scale.

Habitat was both a tool of establishing the unquestioned superiority of the human race over other species in this era, and a manifestation of that same superiority on the other.

Settled habitats were sparked off by, and in turn fuelled the agricultural revolution, with settled lifestyles marking a significant break with the nomadic and almost animal like hunting/gathering origins.

B. Analytical Framework

Architecture is thus a cumulative human experience that is a function of five major variables - ecology, materials, technologies, economics, and the socio-cultural environment.

Each of these changes, to a significant extent, across the three parameters, of space, time and function, within the framework of, a carefully interwoven continuity. Either or both of these diversity-unity dipoles may be limited or augmented, through one or more of the above three influences.

This dipole may be analyzed by setting out qualitative and/or quantitative data within a matrix – a sample for the variable “materials” is given below, as a starting point for collaborative research and documentation in the matter.

This same matrix could be filled on a quantitative basis. Similar matrices can be constructed for the other variables such as technology, ecology, economics and culture, and even various combinations of these, holding a few variables constant within a given matrix. The analysis of such data is likely to throw up significant data useful for making medium term projections about the future dimensions of habitat and the role of design in shaping it.

V. VARIABLES INFLUENCING CONSTRUCTION

A. Ecology

As has been mentioned earlier, animals create habitats for themselves - instinct driven primarily, and thus largely unchanged across millennia, except for minor changes arising from changes in local materials and land characteristics. The major adaptations to local situations came with the advent of primates one thus sees chimpanzees near human habitats living very differently from those in the deep forests.

With their superior thinking and communications ability, the human race adapts to the environment, to the extent that except the lowly cockroach, and the almost as lowly rat, humans are the most widespread animal species in the whole world. Plains to mountains, islands to plains, forests to deserts, tropics to Polar

	TIME		SPACE		FUNCTION	
UNITY	Jaisalmer Fort in Rajasthan.	Patwa haveli in Jaipur	Jodhpur Fort in Rajasthan	Jaipur Fort in Rajasthan	Elephanta Caves located near Mumbai	Ajanta and Ellora caves in Aurangabad
DIVERSITY	Jawahar Kala Kendra at Jaipur	Shilpagram in Udaipur	Humayum's tomb at Delhi	Taj Mahal at Agra	Jodhabai's Palace at Fatehpur-Sikri	Salim Chisti's Dargha at Fatehpur-Sikri

Design, whether of habitats, or other artifacts, started out as a method of fulfilling user needs in a cost and time effective manner within a given environmental context?

Regions, humans are everywhere, in their ever more frantic search for space, adopting completely different lifestyles and habitats.

Just imagine the degree of variation between tents, mud-huts,

igloos, log-cabins, house-boats, multi-stories, stone homes etc. Ecology also operates through materials availability, land economics and transportation networks to further shape habitats.

B. Materials

The earliest construction was based primarily upon easily available local natural materials. In many cases it still is, especially for the poor as also among isolated communities. The gradual evolution of man-made materials – bricks, lime plaster, glass, cement, steel, plastics, and composites not just transformed economics, but also opened up possibilities for forms which were earlier impossible or at least economical for all but the elite. Overall, with advances in materials availability, there is a tendency towards less resource intensive construction for similar lifestyles as compared to the past.

This is counterbalanced to a significant extent by ever-increasing drives for more convenient and functional interiors, thus leading to ever-increasing per capita resource use. In the case of many materials, chiefly wood, that ancient mainstay of construction, shortages are already leading to the use of alternates in a variety of situations.

C. Technology

Not only are buildings machines, as has been pointed out earlier, but their fabrication from the time of the Pyramids, also involves the use of other machines. Thus, apart from technology advances in materials sciences, advances in construction techniques profoundly affect design – both the boundaries of what is technically possible, and within that, what is economically viable.

Arches, domes, RCC, skyscrapers, geodesic domes, earthquake-proof designs are well known examples in the field of overall construction. Piping, flushing, electric lighting and temperature control, elevators, electronic self-regulation are their counterparts in the areas of micro-design, which also often have profound effects on the boundaries of macro-design.

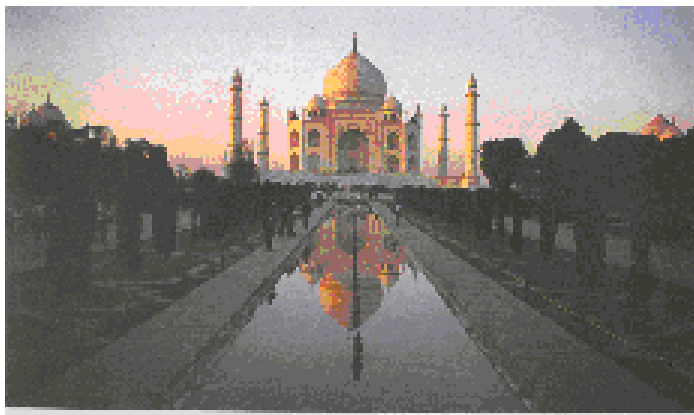


Fig-1: The Taj Mahal

D. Economics

With increasing urbanization and spiraling real estate costs, basic materials become an increasingly less significant part of the overall cost of construction. The focus, at least in prime parts of urban areas, more so in the third world, is on maximizing the productive use of land.

With high labor costs in the West, there is an equal emphasis on reducing labor costs, by deploying capital equipment, standardization of designs and practices, and using pre-assembled components. This aspect is not so important in third world countries, where labor costs are much lower.

However even these are higher than they were in the past, and there is thus an ever-reducing emphasis on elaborate ornamentation during construction. This is largely counterbalanced by increased expenditure on in-built systems, utilities and appliances, which are an inescapable part of today's work

Speed in construction has also become very important to minimize locked up capital during the construction period. Standardization, automation, pre-fabrication and project management are the common responses to this issue.

Safety issues both during and after construction are becoming of great importance due to the disastrous consequences of being sued for mistakes and catastrophes. With very high maintenance and running costs of complex buildings, there is now a tendency to look at building costs over the whole life cycle rather than merely during construction.

Economics driven construction is becoming increasingly common with the corporatization of construction on both supply and demand sides, and the resultant drive towards financial accountability. As a result, aesthetics has to be increasingly integrated into functionalism, rather than being treated as a cost increasing add-on.

E. Culture

The role of habitat in contributing to a sense of community has already been brought out earlier. It is for this reason that communities with similar cultural roots, even though widely separated in space and/or time, tend to display tremendous similarities in the various architectural elements, even though the prevalent materials at that point in the space-time continuum may well justify other options.

Thus structures in East and south East Asia will display similarities, as will places of worship of various faiths such as Hinduism, Buddhism, Islam, Christianity, Sikhism etc. The converse is also true – even among communities operating in similar eco-systems at the same point of time, one can see significant differences in the built form depending on cultural and functional aspects..

The mosque within Jeddah airport, the courtyard vs. verandah systems among ethnic Indians and the British in India, and many other examples come to mind. On the corporate front, differences in the styles of various organizations lead to major differences in the way offices are visualized – cabin size, open office and a range of other variables.

On the temporal front, the milestone was the reformation and renaissance period from the 1300s. It spawned not just the industrial revolution, affecting the material world, but also transformed the psychic realm causing people to break the boundaries of tradition and the shackles of the feudal structure.

People thus became unwilling to accept their traditional lot in life, creating an upward thrust in aspiration levels, initially in the West. A parallel development in South Asia has been the break-up of the joint family within the last 50 years, which has caused habitat designs to make a clean break with the past.

Perhaps the subtlest effect of the rapid technological advances has been the birth of the belief that everything is possible, limited only by one's dreams, and also that whatever problems arise, can be solved through further advances rather than by changes in social structure. Traditional values of being content and satisfied, which helped both to keep eco-systems balanced as also socio economic disparities within limits, are thus getting a go-by.

VI. EVOLUTION OF THE CONSTRUCTION PROCESS

A. Functional Dimensions

Within the limits imposed by the external environment, there was, in the early stages, a certain uniformity of both the construction process and the overall final profile of the built form, due to the relative homogeneity of skills, status and command over resources within and between communities. As communities grew more differentiated internally, differences in designs started emerging.

Most primeval communities were rural, subsistence oriented ones; these variations initially took the form of differences in the design of spaces for leaders and religious activities. However, the innate design similarities were usually far more than these differences – and can still be observed in economies which have just recently become monetized – e.g. in India's North Eastern region, or certain parts of Africa.

The onset of the industrial revolution, and the linked wave of global mercantilism, provided the impetus for completely new forms of built spaces. This was both at the level of room layout (hostels for single workers), buildings – factories and offices, neighborhoods and even whole new settlements for the factory and trading towns which came up all over the world.

B. Spatial Dimensions

The farmer and artisan oriented early economies served to ensure that, except for the spaces used by the elite, homes, which also doubled as workspaces, had a fair amount of homogeneity within a given community. Except for civilizations that remained isolated due to various reasons, a fair amount of cross-fertilization took place across communities, civilizations and cultures, propelled primarily by the movements of merchants and preachers.

The increasing numbers as also growing aspirations of the human race, as the dominant species, has been fuelling intense migration till recently and thus caused communities to become geographically more dispersed. With the creation of capital after the onset of the market economy, and the closely linked rise of urbanization, social, economic and occupational stratification grew, with corresponding effects on lifestyles – including construction.

Another trend emerged in due course - ever rapider and more comfortable/cheaper transportation technologies have largely delinked the proximity of work, living, learning and shopping spaces for many. This has led to relaxing a number of constraints that formerly restrained variations in the built form.

Nonetheless one sees significant differences in designs between countries due to differences in ecology, materials availability and overall standard of living, and within them due to the different land prices and functional needs of villages, small towns, cities and metros.

There is now a reverse trend slowly emerging - the recent advances of ICT (information and communications technology) which allows those willing to integrate all these all over again, living big parts of their lives without having to step out of their homes, if they so desire. We are slowly moving towards rur-urban architectural styles, with many common elements linking habitats in both the cities and the countryside.

C. Temporal Dimensions

From the instinct driven habitats of animals, things took a quantum leap with the advent of Homo sapiens, with habitat needs and resource sets which were completely different from those of all other animals. Thus began a long journey which started from adapting to the environment, to a stage where the environment is being adapted on a large scale to serve various needs of the human race.

One of the key tools for the purpose was language, which enabled not just cooperation at a given point of time, but also enabled the learning arising from the resulting experience to be preserved within the collective memory of the community. By thus obviating the need to perpetually reinvent the wheel, the evolutionary process has thus accelerated, almost to the extent that civilizations separated in space and time could be considered as de facto separate species, despite the high genetic similarity of their members.

This was given a fillip due to the series of communications revolutions starting with the advent of printing, and accelerating with the rise of electronic communications, which made transfer of learning independent of the movement of people. The lead time between the creation of something new, and its spread to remote regions, is growing ever shorter.

VII. UNITY VS. UNIFORMITY

A. Evolution of Construction Processes

The earliest construction involved using materials collected from near the site, with minimal reshaping. Over time, with advances in transportation and construction technology respectively, the radius of collection and the degree of material processing increased progressively.

However, even after the industrial revolution, most processing, at least its final stages have always been done on site, with operations being in the project management mode.

Recent times however are seeing a transition from in situ activities to assembling components processed elsewhere – premixed concrete, readymade switchboards, doors and windows, modular furniture, culminating in whole rooms which just need to be put together.

While reducing costs, boosting speed and increasing quality, this switching to a factory-oriented mode certainly tends to reduce diversity and user-centeredness. With the advent of the internet and the recent trends towards mass customization, even this drawback is now being taken care of.

The ever-growing regulation of the built form along with convergence in the thinking of regulators, once again strengthens this tendency considerably. The only remedy is the creativity of the architect to maximize user utility and differentiation within the constraints set out by the regulatory framework

B. Evolution of Habitat Preferences

The earliest habitats while primarily functional did not fully ignore the aesthetic aspects – as can be seen from the prehistoric cave paintings in France. Over time, as the net surplus increased, significant parts of it were converted into housing, which along with agricultural land and cattle, were often the only or at least the main capital goods of most people.

An equally strong effect of the industrial revolution was the increasing and widespread rise in the standard of living – due to more intensive resource use on one hand, and lower effective cost of goods and services due to more effective deployment of technological and organizational innovations. As a result, lifestyles which were formerly only within the reach of nobility gradually came within the reach of all.

An even more profound effect of the electronics communication mentioned earlier has been the onset of the global village. This is causing increasing convergence of preferences and tastes, often overwhelming considerations of history, culture, ecology and local materials availability.

One thus sees ever-greater forces towards universal design elements, features and styles. Paradoxically, the resultant loss of roots and dilution of identity leads people to try and make it up through cultural fanaticism, linguistic chauvinism and blind nationalism – Vasudeiva Kutumbakam is not as easy at it sounds!

C. Change vs. Continuity

Spells of change and continuity alternate in accordance with the need-curve. Change has four major components each of which combine with the others to influence the direction of the built form at any particular point of time:

Reactions to specific events and forces such as changes in legislation, material availability, land costs etc.

Cyclical aspects, with tastes coming and going, perhaps with some small modifications in terms of intensity and directions
Secular trends which pull steadily in a constant direction over the medium, and often the long term

Unpredictable occurrences arise, from the inner inspiration of the designer, independent of all external influences.

Changes maintain certain continuity through a self-selection process. As per the basic principles of biological evolution set out by Darwin and Hugo de Vries, those animal habitats which enhanced the inhabitants abilities to deal advantageously with the environment survived, and over time supplanted others.

The same principle now operates on the social plane for human habitats. Those changes that lead to significant advantages in cost, convenience, aesthetics and/or other aspects survive by emulation – others gradually (and sometimes swiftly!) fall by the wayside.

VIII. CHALLENGES AND QUESTIONS

A. Impact of Corporatized Construction

Construction is growing increasingly corporatized. In a way, we are moving back to the master-builder tradition, only on a much larger scale. This however has profound impacts on the nature of professional work involved.

Globally architect firms are becoming larger, like those of most other professions, as the clients they serve are increasingly corporatized construction firms, or else large corporate end-user

clients. Going one step further, many construction firms, interior design showrooms and even construction materials factories, appoint their own in-house architects and other designers, to exercise tighter control and ensure better coordination at various stages of the operating process.

B. The Role of ICT (Information and Communications Technology)

The first major impact of computers was through the evolution of software for making precise structural engineering calculations, especially for complex structures. The coming of the PC cut costs and boosted computing power, thus revolutionizing matters.

Project management software also started becoming available around this time. The rise in computing power then enabled drawings to be computerized, combined in some cases with automatically integrating bills of materials, and even cost estimates

This has gone to the extent today that designs can be created and visualized in 3-D. Simpler versions of design packages can be used by laypeople to design the interiors and overall dimensions of their own habitats.

The internet has added a completely different dimension to the profession. Clients, architects and draftsmen need never meet personally, with all communication being done electronically – not just talking and e-mails but also viewing, critiquing and modifying designs.

Going a step further, many designs have now been put up on the internet, allowing clients to review a range of buildings even before meeting an architect – and in fact using it as a basis to choose one. While magazines always allowed this, the presence of the internet allows a range of designs to be reviewed at far lower cost in a far smaller time, leading to far better informed clients with extreme clarity in their minds.

Things are now poised to go, a step further, with, designs and detailed drawings already used for one client being potentially available for reuse by others on the payment of a much smaller fee. The first step has already come up, with many freelance sites coming up where clients put up projects and professionals bid for them, with inputs and ratings from their past clients being available for public scrutiny.

We can expect a number of electronic design marketplaces to come up in the coming years, where designs and details for whole structures or their parts can be bought and sold. This will potentially lead to a drastic reduction in diversity of designs on one hand, and a lowering of revenue streams for all but the top architects on the other.

C. Changes in the Design Profession

The design profession has been changing over time. Starting with prosumers who produced the habitats they wished to inhabit, it moved to craftspeople that provided specialized inputs and services in the construction process. The next move was from artisans to master-builders, who took charge of both design and construction.

The earliest pure designers were artists with significant grounding in the craft – this was workable in situations of stable technology and low pressures of cost-effectiveness for the religious/official structures they focused upon. With increasing

focus of commercial accountability after the industrial revolution, the civil and construction engineers took centre-stage, handling both the design of spaces and the enclosing structures.

With ever increasing trends of specialization, architects emerged as a separate profession, the recognition in some cases as late as a few decades ago. With projects becoming larger, they have moved not just from being doers to supervisors, but also from pure designers to team managers.

As projects become more complex, the wheel is turning full circle, and one thus notes the gradual giving way of the generalist architect to one who specializes in specific:

Aspects of the work (landscape, acoustics, interiors, etc.)
Types of habitat (house, office, hotel, hospital, school...),
stages of the construction process (client interaction, master planning, design, detailing, supervision, sales of construction materials, maintenance etc.)

D. Issues of Sustainability

Humans not just adapt to but indeed shape the environment, in ever more profound ways, on ever larger canvasses. This has gone to the extent that significant pockets of habitats, at least of the elite, are virtually independent of the local ecology, and thus look and feel uniform.

All this ingenuity cannot however overwhelm the 2nd Law of Thermodynamics, which postulates that overall entropy within a system cannot reduce. This sealing out the environment in pockets is causing such rapid climatic changes that the luxurious lifestyles of some are to a large extent at the expense of misery of the majority in the short term.

This is also rapidly draining non-renewable (and even renewable) resources and on the other, making such lifestyles unattainable for all, and perhaps even unsustainable in the medium term for those who have already achieved it. We are thus heading rapidly towards unprecedented upheavals on both social and physical fronts.

The design profession certainly has a strong role to play not just in terms of reducing intensity of material use, but also in terms of shaping tastes towards preferences for more sustainable habitats. And this particular challenge is not an optional one to face – for if the human race does not survive in a human state, where is the question of designers continuing to design at all?

IX. CONCLUSION

Architects services may be marginalized if uniformity and standardization creeps into the field in a real big way. These must be embraced only to the extent of convenience, beyond which it will attract non-architects who are looking for opportunities to take on repetitive high paying turnkey jobs with a small and dispensable design element, thus eliminating the designer altogether.

The profession is less in the danger of being bypassed by executors of the projects, if a large numbers of innovative and useful design ideas are generated by present day architects - effective enough to make a drastic difference to the built form, thus rendering themselves altogether indispensable.

We thus need to develop outstanding skills to consistently ensure all the time that we are not replicable by non-architects. It is perhaps even better if we shift our loyalties from being purely designers to being a multipurpose designer supervisor and

executer of the project. This will also save the energy lost in transferring ideas to a third party who in turn further needs to be supervised.

The system builds into it the basic flaw – architects' absolute reluctance to take on other related responsibilities - safety, workmanship and speed in construction, which matter much more than anything else to the client. Currently all these rest in the hands of builders, contractors and engineers. With interiors and landscaping gone to the specialists, what is our role actually reduced to?

If Unity, Uniformity and Standardization are to be read as synonyms, architects need to rethink their role seriously in the interest of the very survival of the profession.

However, diversity for its own sake will make architectural patterns incomprehensible and lead to chaos in terms of conflicting images and statements in architecture. It would be akin to the problem that would occur if people speaking different languages are thrown together and are asked to discuss a burning issue.

One would be better off if one tries to aim for unity in diversity. Unity would play a role of tying different pieces together to make a complete whole, making patterns comprehensible for the society. At the same time, diversity is what would create the necessary interest arousing curiosity and elements of surprise, thus keeping the spirit of experimentation, growth and continuity alive within the environs of the society. Architects need to come back to images specific to typologies, which the society is used to. This gives architecture some anchorage, and prevents it from going haywire, taking ridiculous and sometimes even absurd forms.

Perhaps the architecture profession will have to go the way of engineering, with specialization at the stages of both education and work. What remains intact is the role played by the holy trinity of perception, analysis and synthesis during the four-fold path of sensing user needs, boundary setting, creating alternatives and weighing options.

While maintaining this core, unless we are willing to accept and in fact embrace change along most other dimensions of our profession, we run the risk of becoming extinct or at least marginalized. Are we capable of meeting this challenge?

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