Ekistics
and the New Habitat
The problems and science of human settlements

SPECIAL ISSUE

India and Jugaad:
The Impact of Innovation by the Resilient Indian Mind on Habitat

Guest Editor: Prof. Brinda Somaya

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Ekistics and the new habitat: the problems and science of human settlements

The International Journal of *Ekistics and the New Habitat* is an online double-blind, internationally peer reviewed research journal. The journal publishes scholarly insights and reflective practice of studies and critical writing concerning the problems and science of human settlements. The field of Ekistics is mapped against a classification of settlement scale, from the remote village and rural township to global systems of dense smart cities, and increasingly the challenges of on-and-off world sustainable habitats.

In broad terms, papers in *Ekistics and the New Habitat* contribute to the scholarly discourse about the systemic nature of how humans design, build, link-up and transform their world. Articles examine empirical and non-empirical research and ideas that critique the necessary relationship between people, our human settlement designs and technological systems, and our natural and designed habitat. Models, case studies, rigorous conceptual work, design critique, smart-citizen education for smart cities, resource flows, network behaviour, and reflective practice are published in order to continually improve and advance the application of integrated knowledge that defines the epistemic telos of Ekistics.

History and back issue archives

Ekistics and the New Habitat: the problems and science of human settlements is the 2020+ online and revised continuation of the ground-breaking and influential ideas published throughout the preceding print version of the journal in *Ekistics: the problems and science of human settlements* 1957-2006.

- Back issues are lodged with our archive partners at JSTOR: https://www.jstor.org/journal/ekistics

Standard Call for Papers.

There are few scholarly journals whose papers archive the evolution of development and thought tracing back to 1957: *EKISTICS* is a rare exception. This background makes for an extraordinary historical collection of research and practices documenting how humans have colonised the planet and transformed our built habitats. The journal seeks papers from students, post-graduate candidates, academics and practitioners. We seek papers, typically of a cross-disciplinary nature that:

- Target any aspect of the *United Nations New Urban Agenda, in Habitat III*, including reference to the *Sustainable Development Goals* .
- Critiques *local, regional and global policy* of human settlement development, design and planning, and urban transformation
- Offers a critical description of the *core elements that define the liveability of human settlements* such as:

  NATURE: Habitat foundations. How settlements rely upon, interact with, alter, or produce living ecologies, biodiversity, and climate.

  PEOPLE: Physiological/biological and social-psychological needs and constraints. How settlements rely upon, interact with, or affect people's livelihood, safety, embodied and shared knowledge and skills, security and well-being – whether they are transiting visitors, settlers (citizens), or neighbours of settlements.

  SOCIETY: Social, economic, educational systems, fiscal and political organisation. How settlements rely upon, interact with, or are affected by governance and leadership, vicarious or present communities, groups, markets, cultures, beliefs and values.

  SHELLS: The envelopes that contain settlement functions. How the design, technologies and places created, altered or removed in settlements affect the functions and amenity of the settlement from the scale of personal shelter to the home, to urban business districts and precincts, to towns, cities or regions.

  NETWORKS: Node-to-node systems and flows of resources, waste, data, people and information and communication systems. How the design, technologies and transport of goods, waste, energy, resources, water, food, people and information affect a settlement's functionality, amenity and viability.

  SYNTHESIS: Combined, coherent design and knowledge. Physical design and planning; Ekistics theory expressed through evolving models and principles of habitat. How systems of systems may differ from small and remote, to large and urban-dense settlements and linked-up settlements in regions.

This journal invites and accepts three types of submissions, all double-blind and internationally peer-reviewed for their type:

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1. **Scholarly articles/reviews (full papers, double-blind review):** typically, with title, authors, institutional affiliations, abstract, keywords, body text (5000-7000 words), and APA 7th References at the end of the article. Body text typically includes:
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   b. the key prior papers in Ekistics archives and other sources that best relate to the topic,
   c. the methodological or conceptual framework and methods used,
   d. a summary of key results or findings,
   e. a critical concluding discussion
   f. the Editor assigns papers to their best-fit classifications in the Ekistics grid index.

2. **Scholarly essays/extended abstracts (double-blind review):** typically, with title, authors, institutional affiliations, keywords, body text (1000-2500 words), and APA 7th References at the end of the article. These shorter submissions are well placed for academics and practitioners seeking to share a critical reflection of an issue, or for first-time students seeking to publish an academic submission (often co-authored with a mentor/supervisor). They may focus on a think piece style of critique, or a project in process, or a topic of interest for a geo-location or generic issue. Short ***Essays/Extended-Abstracts may be tested in Ekistics*** before a full paper version is submitted elsewhere.

3. **Practitioner, industry or citizen think-piece (short article only, peer review):** typically, with title, authors, regional/organisational affiliations, keywords, body text (500-1000 words). *A Citizen Think-piece* may be up to 3000 words. Where appropriate, APA 7th References at the end of the article may be included. These shorter submissions are well placed for practitioners, industry or citizens to raise provocative ideas to which we invite the research community to respond in subsequent issues.

We welcome book reviews. Submissions are copy-edited, normally 300-500 words, designed to share with the readership community interesting or provocative volumes, monographs, or edited books that may be of interest to scholars, practitioners and students of human settlements, Habitat III New Urban Agenda, and the Sustainable Development Goals of the United Nations.

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EDITOR'S DESK

EKISTICS CONTINUES!

2020, Vol. 80, Issue 2

Welcome to the second special issue of the contemporary international journal *Ekistics and the New Habitat: the problems and science of human settlements*.

On behalf of the international board of editors, it is with pride that I welcome you to this exciting issue led by Professor Dr Brinda Somaya, founder and principal architect at Somaya & Kalappa Consultants, A.D White Professor-at-large at Cornell University in the United States and founding trustee of the HECAR Foundation.

Prof. Somaya has gathered around her contributors who explore and challenge the concept of 'jugaad' – a form of innovative 'making do' that is recognisable in a range of Indian contexts. Both lauded and looked down upon, 'jugaad' has sparked debate in various arenas and has proven to be a lightening-rod for analysis and research. In a world facing multiple challenges involving lack of resources, lack of equity, and lack of trust in institutions, our consideration and understanding of informal economies, workarounds, and new methods to overcome entrenched systemic problems takes on global significance. India's unique form of 'jugaad' calls into question how resources are managed, how we work collaboratively, and how we solve the problems of human settlements.

The studies in this special issue bring into sharp relief the importance of research and analysis to better understand the practice of 'jugaad' and its use by various political discourses. Our contributors critically examine the built environment and its management, our neighbourhoods and their histories, as well as new and renewed living spaces and habitats. They do so in order that we may live better lives in diverse and tangible ways. We therefore encourage readers from all backgrounds to engage with the historical and contemporary case studies and analyses presented in the special issue: *India and Jugaad: The Impact of Innovation by the Resilient Indian Mind on Habitat*.

The present issue is the second of several special issues currently being prepared by the Editorial Board. While the first special issue led by Prof Dr Derya Oktay focused on *Turkey, Urbanism and the New Habitat,* the next turns our attention to *Cities and Transport in the Mediterranean Region*. Guest Editor Prof. Dr. George Giannopoulos has led the creation of two issues (Part 1 and Part 2) that examine urban planning and transport problems in the region. But before looking ahead to these future issues, let us enjoy the present special issue prepared by Prof. Somaya and her contributors.

Dr Ian Fookes
Deputy Editor | *Ekistics and the New Habitat.*
Lecturer, School of Cultures, Languages and Linguistics, University of Auckland, Aotearoa New Zealand

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Special Issue: India and Jugaad: The Impact of Innovation by the Resilient Indian Mind on Habitat.

Guest Editor: Prof Brinda Somaya

Somaya and Kalappa Consultants (SNK)
Architecture & Planning Mumbai, Maharashtra

Contents

Editorial

Brinda Somaya, Founder and Principal Architect, Somaya & Kalappa Consultants, A.D White Professor-at-large, Cornell University. USA. Founder Trustee: The HECAR Foundation Founder and Principal Architect
E-mail**:** bsomaya@snkindia.com

The revival of the 62-year-old *Ekistics* journal, with its valuable history of tracking habitat evolution and its complexities, is of global significance, particularly given the prevalent uncertainty in the world today. *Ekistics* has always provided an interdisciplinary forum and scientific approach to discuss human settlements holistically, including their problems and solutions. In its new online format, the journal sports an updated title, *Ekistics and the New Habitat*. It continues the Ekistics project, beginning with a series of special issues from around the world.

I was invited by Prof. Kurt Seemann in June 2019 to guest edit this Special Issue: 'India & Jugaad - the impact of innovation by the resilient Indian mind on habitat'. Little did I realise that this topic would become so relevant in the Indian context and more broadly, when globally we have seen systemic solutions fail and people challenged with increasing scarcity. But armed with ingenuity, the resources within their grasp, and the capacity to make a change within their networks, we have witnessed much agency, innovation, and resilence. In India, our lives are intertwined with our history, geography, culture and architecture. India is almost as large as Europe, not including Russia. It has a multiplicity of civilizations within it, being many countries in one. So the solutions and answers will be complex and multiple. We will need new and relevant long-term strategies based on what we can learn from the situation today, and we will then be able to plan the way forward. In this process, the importance of the built environment should never be underestimated, thus the significance and power of good design is ever more crucial in the Global South. Until one lives in India and experiences the country fully immersed in its wonder, culture, poverty and generosity, it is difficult to understand the complexity of the Indian mind and how it enables over a billion people live to together in this democratic nation.

'Jugaad' was awarded the status of "an English word" with its entry in the Oxford English Dictionary in 2017; as a Hindi word which is "a highly specific vocabulary with no direct equivalents in English." Its dictionary meaning is "A flexible approach to problem-solving that uses limited resources in an innovative way". The etymology of 'Jugaad' is from the proper Hindi word 'Jugat', which, in turn, is an improper word for its parent Sanskrit word 'Yukt', which means "a carefully planned, schemed, arrangement to achieve an objective." In the Indian context, it represents "the most common scheme that would be adopted would be the team-work, the co-operation of everyone's body and mind to resolve the crisis situation" (Origin of the word "Jugaad", 2012). Its contemporary slang equivalent would be the verb and noun 'hack'.

'Jugaad' has been celebrated for uplifting the Indian condition using what is available and then severely criticised for overshadowing innovation that should result in 'affordable excellence'. The possibility of merging both high technology solutions and simple innovation needs to be explored and defined. Moreover, with the burgeoning growth of population, there is a need to balance both of these ideologies to serve the future, mitigating the urban impact on habitats in India.

I would like to believe that the Indian Mind has always been resilient. Devdutt Pattanaik, author and Indian mythology interpreter writes, "At a deep cultural core, most Indians believe there is nothing rigid about life. Everything is manageable, solvable, everything has a workaround" (Pattanaik, 2008). We are a people who accommodate and evolve with the changing of the times. Our 5000-year history has withstood turbulent times and is the birthplace of Eastern philosophy, mathematics and science. Having seen several golden eras with flourishing art, culture, and architecture, as well as having survived colonisation, India has embraced outsiders and amalgamated their beliefs down the ages, a fact which is reflected in its diverse and endemic socio-economic fabric. The ability to face adversity with hope, to rise to challenges with bravery, and to innovate with resilience in the face of scarcity are just some of the characteristics of the nation.

Historically, dramatic urban changes have been led by crises. 2020 marks the year of a pandemic, which has threatened our entire world. Questioning globalisation, our environmental and urban systems have been put to test with the fracturing of local supply chains. Planetary interdependence has been shaken at its roots and the fragility of globalisation has caused a return to self-centred nations and self-supported cities. The urban crisis has compelled us to redefine governmental policies, economic practices, social norms and personal habits. The familiar city with which we were familiar; where trade was conducted, bonds were established, social interactions occurred, and where our identity was created, has had to transform. It is now a different place with new qualities, developed within the existing frameworks of its tangible and intangible heritage, along with its historic buildings and mixed-use open spaces.

Cities in Asia, especially India, are currently growing and will continue to move on their current high-speed trajectory, turning into megacities, urban agglomerations and metropolises far beyond 10 million inhabitants. Growing urban opportunities have attracted hundreds of millions of people to cities resulting in haphazard growth, a struggle for resources, and equity challenges within an inceasingly unequal social situation.

India's hyper-connectedness is a hotbed for affordable and sustainable indigenous hacks for converting adversity into opportunity for its 1.35 billion people. Its largest city, Mumbai - MMR, has a population of 22 million (Mumbai Population, 2020), closely followed by Delhi - NCR, with 22 million people (Delhi Population 2020, 2020). Overall, there are more than 50 urban areas in India with a population of more than one million people. This has manifested as an acute shortage of housing in most Indian urban centres, resulting in the rise and development of informal housing systems without basic infrastructure creating unhygienic and unhealthy conditions. This housing inequality needs to be addressed. For years, I have talked about the importance of ownership of land in cities where there is informal housing. Greed has to disappear and there has to be political and bureaucratic will to do so. The complex make up of residents, varying from corporate billionaires to the migrant workers, makes this issue an area of much needed research, important for the creation of new and 'out-of-the-box' solutions.

Resilience has its limits, though, as we are seeing in cities like Mumbai, today. Three of our essays highlight this specific housing problem and the possible solutions which arise in high-density pockets of urban centres in Mumbai and Delhi. Matias Echanove & Rahul Srivastava highlight the humane angle of this housing crisis by drawing attention to the contribution of the "ordinary people"; the slum dwellers, the actual agents of the design and construction process. While new norms are being setup, it is imperative that the existing fabric of society is considered, as Sanjay Prakash and Swati Sharma's essay also elaborates. Sustainable urban renewal is possible only if carried out in a participatory manner. This examination of the development of informal settlements leads us to explore urban contemporary economic practices in India, where a majority of the construction activity is beyond the scope of the architect, being builder and contractor driven. These settlements are in derelict condition, not due to poverty, but civic neglect. This unique situation, which disqualifies the design innovations occurring in these neighbourhoods by naming them as "Jugaad" is unjustified, even if they happen outside the statutes of the developmental code. In other words, regulations of an urban centre need to encompass all kinds of habitats. This bottom up approach of building would explain the definition and success of Jugaad as finding solutions to maximise resources.

This brings to mind the traditional Indian housing systems in which self-contained communities are both independent and interdependent, like 'Wadas' and 'Chawls '. With the changing demographic of the aged, and the rise of the young migrant, urban solutions need to be appropriate, inclusive and scalable. This has been expounded upon by Sameep Padora's essay, whose premise is the study of traditional housing forms used to develop a new housing system in a bottom-up manner, one that could be scalable and used to form the basis of new housing policies.

The rapid spread of disease is a dire consequence of a lack of natural air and light. In Dharavi, Mumbai, the world's densest informal housing system, this problem impacts the health of its one million inhabitants. During the pandemic, the city quickly became a hotbed for the COVID-19 virus. This crisis however was averted in an exemplary manner, as acknowledged by the World Health Organisation. Armed with the strategy of "chasing the virus", authorities pre-emptively set up amenable quarantine centres where residents could access medical resources, and be screened efficiently. Private doctors were also enlisted to work in tandem identifying, isolating and treating patients.

Circumstances have shaped civilizations, culture and ushered in progress. Five of the eight essays featured draw from historical evidence, some from as far back as the Indus Valley civilization (3000 BCE), to devise innovative solutions to current housing and urban issues, systematic water distribution problems and to emphasise the necessity of community participation. Indeed, as I put together the list of contributors for this issue, Shikha Jain and Poonam Verma Mascerenhas, architects and conservationists, came to mind immediately. I had interacted closely with them during our conference Women in Design 2020+. Their essays, from the northern state of Rajasthan, talk about a time when regulations, as per the modern context, did not exist and their design principles were a response to local conditions and the cultural context of the community, when traditional technology was employed for construction. The examples cited in these essays elucidate how history, culture and the vernacular lexicon remain significant in the modern context.

Pandemics and the environment have a close relationship. Throughout history, epidemics have caused large scale deaths, reducing human influence on the environment. The environmental improvements that we are witnessing currently due to Covid-19 will also be short term if we do not make fundamental changes in the economy and our lifestyle. Fortunately, we have an opportunity to make these structural changes. Covid has slowed down the world but accelerated change. 19th-century pandemics helped usher in developments in water and sewage systems, as Cholera led to the introduction of the modern street grid and roads became wider and straighter in London. In Mumbai, the plague of 1896 was the reason that the Bombay City Improvement Trust was established and the first planning laws for its healthier development were laid down.

Ganesh Nayak, who specialises in sustainability, focusses on the importance of inclusivity for the differently abled in the built environment to make cities sustainable and equitable to people with differences of class, colour, race, caste, gender, disability. This piece highlights how "first responder solutions" and the lack of resources compromise safety and sometimes, "they hazardously translate into permanence". This moots the point that 'Jugaad' needs a framework and norms for success.

Durganand Balsaver, an architect and theoretician of architecture, presents a case for rebuilding communities post-natural disaster by employing indigenous methods and local design sensibilities. When redevelopment is carried out in a participatory manner in which communities create their own processes, they succeed in establishing systems that go beyond description as just being "Jugaad".

To balance all this, Neema Kudva, a Professor and colleague at Cornell University, contributes an essay which distinguishes sharply between the contemporary notion of 'frugal innovation' and 'Jugaad'. She puts it succinctly, "the lack of ability to standardise and scale up jugaad remains a serious problem." While some other essays in this issue throw light on how jugaad succeeds when it is scalable and applicable in a set of scenarios, Neema analysis suggests that these sets of scenarios are precisley where jugaad fails. Nevertheless, all the essays strive to discern between innovation and Jugaad.

Finally, to conclude the issue, respected architect, researcher, writer and professor from Ahmedabad, Madhavi Desai, provides a book review of my monograph: *Brinda Somaya, Works & Continuities*, covering my 40-year practice and locating it in the broader social, cultural and academic context of the India.

Disease has shaped many cities including Mumbai, New York, London etc. New urban history is being written today, which may be more about continuity through crises than about transformation. This is our chance to take up the challenge and create a new urban language which is contextual, sustainable and an efficient utilization of the resources available. Improvements in health infrastructure will have to be supported by governments and the private sector. The present crisis has made it clear that the present urban development model is inadequate. What India needs now is the resolve of the government and bureaucracy to bring about lasting change - not as a reactive flurry of action plans, but rather in the form of long-term, persistent programs. This time of the pandemic and its effects have given us time to observe, reflect and modify our thoughts, actions and goals. So, we need agency – the capacity of individuals to act independently and make free choices. We can prioritise nature and sustainability when we build new or preserve. Urban Planning needs to include many new factors and paradigm shifts for the future. When resilience is built into a system, sustainability follows. The change will occur over time, and there will no doubt be difficulties too, but recovery will follow.

It is imperative to locate cultural conversations in a space liberated from the shackles of unidimensional, homogenised western thought in order to allow for context, innovation and inclusivity. Adhocracy has surfaced in several essays, which manifests that Jugaad is a response to an acute need, making it inherent to its origin. Jugaad allows for finding the common ground between regulations, context and the user needs. Like the racially and culturally heterogenous India, this anthology of essays is geographically diverse, ranging from the north, Delhi, West from historic cities of Rajasthan, as far south as Tamil Nadu, and the cultural melting pot of Mumbai. This volume is a collection of pieces, each with their own interpretation of the word, which could begin a conversation to re-assess Jugaad from many perspectives.

This posits the question: Should we expand the definition of Jugaad and redefine its currently limited connotation, thereby legitimising it as a design solution?

I would like to thank Prof. Kurt Seeman for his continued support and the opportunity for bringing out this special edition. I would also like to thank Dr Ian Fookes for his timely efforts and commitment in bringing out this issue, Parul Sheth, and the team from SNK (Somaya & Kalappa, Consultants), for being there for me at every stage of compiling this special edition. Along with the editing and other back end work, she and her team had to ensure that all the authors submitted their pieces in time, to be processed and compiled, so that we could bring out this edition in a timely manner. No easy task!

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The Design Comes as We Build

Matias Echanove and Rahul Srivastava

Urbz, Dharavi, Mumbai, India

Abstract

This essay discusses urbz' 'The Design Comes As We Build Project' which recognizes local builders in homegrown settlements by providing them a space to showcase their design imagination. The project started in Dharavi, Mumbai, a settlement populated by self-taught experts with a strong, practice-based, and experience-rich learning background. By recognising the agency of local actors in the production of their own habitats, this essay focuses on the processes at work in this context. We employ an ethnographic lens informed by the language of architecture to illustrate how artisans imagine and build thousands of tiny houses on a daily basis. These anonymous "contractors", usually blamed for operating illegally and without formal education, are shown to be the heroes of an epic story in which neighbourhoods are created out of nothing through the transformation of meager local resources. Typically selected on the basis of previous work and common acquaintances, these artisans belong to the same community as their clients, often living in close proximity. Together, they design and build without formal plans or contracts, using trust and reputation as the cornerstones of their professional relationship. As a result of their collaboration in all stages of the project, unpredictable features become an inherent part of the structures that emerge organically from this process.

Introduction

The concept of Jugaad (Navi et al., 2012), – working innovatively through and around rules to achieve ends – sheds light on processes, products, and projects which otherwise would have remained unknown, hidden, or simply ignored. It opens up a mode of recognizing the efforts of millions of people who make do and innovate with very little means, even when they are provided neither the usual support nor have the means to be creative. From transport improvisations like make-shift tractors and cycle-carriers to making a video film in a small village with a basic camera – the jugaad way has been well documented and valorized, primarily in the world of entrepreneurship.

An organizational version of what 'Jugaad' implies was alive in the late sixties and seventies through the concept of 'adhocracy' - a term coined by Warren Bennis (1968) and popularized by Alvin Toffler (1970). 'Adhocratic' is the opposite of 'bureaucratic' and refers to a process or structure that is adaptive, flexible, and creative. Futurologists in the seventies, like Toffler, predicted the dominance of adhocratic procedures, which today can be seen most clearly in the internet revolution; and primarily in the way in which communication distances have collapsed, changing many of the rules governing organizational structures, work procedures, administrative methods, and business practices. In fact, adhocratic processes seem to have become so integrated into communication conventions that we no longer feel the need to refer to the word adhocracy itself.

It would be a stretch, however, to say that bureaucratic processes are absent from our lives today, or that the information and communication revolution unleashed by the internet has changed every aspect of our lives. The predominantly urbanized lives of the twenty-first century have ensured that much of our lives remains under the control of various bureaucratic structures and regulations. Health, governance, planning, education, and corporate practices are all infused by bureaucratic structures keeping civic life in check. What the internet has done in many of these spheres is to provide a means to empower the subjects of bureaucratic control; allowing for feedback loops, creating pressure groups, and connecting mass movements with consumer / civic action. This has led to increasing numbers of people who are more engaged and who demand greater accountability.

As urbanologists engaged in urban spaces of all kinds with varied practices, we routinely navigate a diverse range of contexts, from working with local builders in homegrown settlements in Mumbai and São Paulo, collaborating with neighborhood associations in Geneva and Tokyo, organizing participatory planning workshops in Kochi and Chandigarh, to conducting research into circulatory urbanism and migration in rural India.

Throughout this experience, we have qualified many terms and concepts that routinely become part of our operations. For example, we have written extensively on the need to reject the term "slum" (2011), to question the term "informal" (2014), and to qualify the process of "participation" (2019), as an actual practice which involves inhabitants from the inception of an urban program to its completion in a neighborhood.

In this essay, we focus on a very specific project and practice connected to our office in Mumbai called "The Design Comes as We Build" project (2016). It recognizes the talent and skills of local builders in homegrown settlements by providing a space for showcasing their ideas and design imagination. Their processes are rooted in practice, experience, and live interaction with users and the local context. The point of departure point for the project is recognising the agency of local actors in the production of their own habitats, focusing on the processes at work in their settlement.

The project uses an ethnographic lens that integrates the language of architecture, and analyses how houses are imagined and built by artisans, who, day after day, build thousands of tiny houses to accommodate the multitudes of low-wage workers sustaining the city's service and manufacturing sectors. These anonymous "contractors",

usually blamed for operating illegally and without formal education, become the focal points for creating neighborhoods out of little, transforming meager local resources into homes. They are typically hired by a family living in the neighborhood keen on rebuilding their house. The family selects them on the basis of previous work and common acquaintances. Both the contractor and client typically live in close proximity to one another, often belonging to the same community. They discuss their plans, agree on a schedule and budget, and start work. No formal plans or contracts are signed, as trust and reputation are the cornerstones of the process. Design is thus organically co-created; inputs are given throughout the process by the users with the contractor autonomously adding flourishes that harness their skills. The unexpected and unforeseen take root in the structure, since the design is indeed something organically linked to the process itself.

The project seems to be an obvious example to illustrate, debate, and critique the concept of Jugaad in this Special Issue. It can be said that the contractors are largely self-taught and make use of a world of skill, learning, and practice that is adapted to a challenging context, much in the same way as the processes of Jugaad. However, we treat it as an opportunity to explain the project thoroughly, and through this resist its classification as 'improvisation' and 'frugal innovation'. We do so, not by questioning Jugaad – which is an important observation in its own right - but by having a dialogue with a related concept – that of the "informal" itself.

The reason why the world of self-taught local builders and their work comes very close to the resourcefulness associated with Jugaad is because this entire urban context is seen to be a Jugaad neighborhood – a makeshift place. The word "slum" in an urban context has been replaced by that of the 'informal' in the literature about cities, much like how the world of 'imitation' or 'hastily assembled solutions' have been replaced by Jugaad. Since we have reservations about the concept of the "informal" as urban practitioners, we extend that reservation to the concept of Jugaad as well, which is how this essay argues its case.

The term 'adhocracy' had a comparatively short shelf-life and was upstaged even in the seventies by the term 'informal economy' - coined by economic anthropologist Keith Hart (1973). The phrase took over the sentiments which 'adhocracy' summarized, re-channeling them into a huge discursive space which became a powerful lens through which one could understand how modern economic life expressed itself globally, and in diverse societies and histories.

It showed how divergently societies relate to value and have unexpected needs and desires. It also exposed how culture thoroughly shapes economic choices, and ultimately, how universal economic modernity actually is. However, despite this, people continue to make different rules wherever they are, and it is important to understand those self-made rules. The term opened a whole new space to understand economic life and it would not be inaccurate to say that a spotlight on Jugaad in India owes a small part to what the term 'informal economy' had introduced to the understanding of contemporary economic practices in India (Hemant & Bhaduri, 2014). Indeed, several articles on innovation in the informal sector published over the last decade treat the idea of Jugaad almost as if it is intrinsic to the informal sector of the Indian economy.

We argue that, since the conceptual framework of the 'informal economy' is itself limited (often pointed out by the scholar who coined the term himself), it is necessary to understand precisely why and how it is so, and by that logic extend its critiques to allied concepts such as Jugaad as well.

Over a decade of practice has taught us that the term 'informal settlement' was far too inadequate to describe the processes observed in neighborhoods such as Dharavi, where our Mumbai office is located. The nuances of construction processes, the language of architectural design and the emergent institutional processes in that context could not simply be termed 'informal'. Nor could the typologies that emerged be classified as such. They had their own rules, discipline, and learned practices; and the more we worked with them, the clearer they became. The professional pride, the desire to establish a practice, a style, all of these indicated that, even if there was a semblance of adhocracy, they worked within the bureaucratic universe of urban planning at large. If there were elements of what we call 'Jugaad', it was not without a desire to professionalize, practice, improve and compete with practices that they saw around them.

One of the sharpest critiques of the concept of Jugaad comes from Thomas Birtchnell (2011), who refers to Jugaad as systemic risk and disruptive innovation in India, declaring it a product of widespread poverty and dilapidated infrastructure.

As urban practitioners, we are familiar with such critiques. Voices like Birtchnell's echo similarly against our own kind of practice, especially when they claim that, by working within spaces of poverty and dilapidated infrastructure, we valorize both. Not unsurprisingly, we disagree with such views as neighborhoods such as Dharavi can hardly be called poor (Echanove & Srivastava 2014), nor can we blame them for their dilapidated infrastructure which is mostly due to neglect by civic authorities. To reject neighborhoods like Dharavi (or the concept of Jugaad for that matter) wholly on these counts is unjustified.

Having said that, we do agree with Birtchnell when he points out that localized innovation has value precisely because it is both embedded in a local context and that context itself is part of its success. To make it a portable practice decontextualized from its space - as the concept of Jugaad tries to do - is problematic. To simply take the creatively assembled jugaad, whether as a product or as a process, and view it as a symbol of innovation is only half the story. Understanding the context in which it emerges, seeing the limits and strengths of the actors involved, recognising its infrastructural challenges from the point of view of the locality, even understanding the socio-economic dimensions of caste and class, are all vital ingredients of an analysis which needs to be made. Finding ways of recognising processes that exist with their own forms and structures is as important as celebrating the output that emerges unexpectedly, as in the Jugaad narrative.

In the essay, we present the details of the project before discussing the key concept that muddies the conceptual waters around it: the notion of the "informal". We then move from the abstractness of the informal to the embeddedness of the 'homegrown neighborhood'. We present the local context in which 'The Design Comes as We Build' project operates, noting the challenges related to it. Finally, we argue that the project sits uneasily with the concept of Jugaad because attempts to promote Jugaad as a unique process with universal application ignore the fact that it cannot exist apart of the locally embedded dynamic in which it is rooted. Our discussion of 'The Design Comes as We Build' project is a clear illustration of this point.

The Design Comes as We Build

The project recognizes the talent and skills of local builders in homegrown settlements by providing a space for showcasing their ideas and design imagination. From Cairo to Mumbai, from São Paulo to Tokyo, cities work with multiple strategies to fulfill the building-related demands of urban life. Construction activities often spill over institutionalized professional boundaries. Most architecture and civic administrations, urban infrastructure projects, and real-estate developments work on a financial model of large-scale capital mobilization, often founded on speculation.

However, a majority of inhabitants raise small amounts of capital from their familial and community networks to finance a local economy of incrementally growing construction projects outside this space. Large numbers of self-taught experts and professionals operate in such spaces. They emerge from a strong practice-based experience-rich context of learning. Rather than seeing them in opposition to professional and certified practices, or through polarized narratives that get trapped in the euphemisms of the 'formal' and the 'informal', The Design Comes As We Build Project treats them all as an integral part of a common-space of dialogue and collaboration.

The project's point of departure is the recognition of the agency of local actors in the production of their own habitats. It focuses on the processes at work in an iconic unplanned settlement at the heart of Mumbai, which is usually, though inaccurately, described as Asia's largest slum, Dharavi. Putting preconceptions aside and using an ethnographic lens that works with the language of architecture, the project looks at how houses are imagined and constructed by artisans, who build thousands of tiny houses on a daily basis to accommodate the multitude of low-wage workers who sustain the city's service and manufacturing sectors.

The way the contractors and artisans work is not unique to Dharavi, Mumbai or India. It is the way artisans have been working with their clients since the dawn of time. Amidst ongoing discussions about the "redevelopment" of Dharavi, which plans to turn this vibrant low-rise, high-density and mixed-use neighborhood, where hundreds of thousands of people live and work, into high-rise mass-housing comprising tiny 200 to 300 square feet units, we thought it important to highlight the skills and knowledge of local artisans and builders.

We also wanted to positively reframe a typology that has been dismissed as "informal" for decades. The term 'informal' evokes something that lacks form or logic, something messy and problematic which should necessarily be replaced by something rational. Yet, what we have witnessed in our years of collaboration with local builders in Mumbai is that their work is expressive of a logic embedded in its context, such that ignoring it will be a recipe for urban failure. In fact, we are convinced that the key to improving the living conditions of the majority of Mumbaikars (who live in slums according to official sources) is to work with residents and local actors, to understand the context in which they are working, and to learn from how they themselves are respond to the challenges they are confronting. The key actors in this process are the local builders or contractors.

In order to reveal the hidden logic in the way houses are built in Dharavi, we asked some builders from the neighborhood to think of the best possible design for a typical Dharavi house of 12 x 15 feet for a family, which should also accommodate some form of economic activity. Once the designs were ready, the local builders got in touch with local artisans to build a 1:20 scale model of their design. As the contractors saw their designs come to life, they realized existing design flaws and corrected them on the spot, asking the artisan to make changes accordingly. Sometimes, the artisans offered their own suggestions. This exchange reflected the on-site, adaptive, and evolving manner in which contractors worked.

Fig. 2: The 'toolhouse'

Contractors typically give instructions to the laborers on site, projecting the ideas they discussed with their clients directly onto reality. For some, the models were the first time they saw their work as "design" rather than as construction. The urbz team sat with the builders as they described how the house should be built, translating their

Fig. 1: House design by Joseph Koli, Dharavi Koliwada, Dharavi.

vision into 3D drawings. We did not intervene in their designs, but encouraged them to be ambitious with their ideas. Once the drawings were done, artisans built a model of these houses using the materials they specialized in: steel, clay, wood, glass, and recycled plastic. The first model constructed for the project was by Joseph Koli (Fig.1), a contractor from Dharavi Koliwada, Dharavi.

The 'toolhouse' he designed was a four-storied structure (Fig.2) with a grocery shop on the ground floor, two residential units, on the second and third floor, and a roofed terrace as a multi-purpose space. The second-floor residential unit was to be used by the shop owner's family, the first-floor unit would be given out on rent, each unit has a separate kitchen and toilet. Joseph wanted the house to engage with the street and designed balconies for every floor. These balconies could be used for a variety of purposes ranging from socializing, relaxing, and drying laundry. Clay artisan, Ashwin Narshi Bhai Wadher, (Fig.3), made this model. Ashwin was born in Mumbai, but his family hails from Lodhva village, Gujarat. He is part of the Kumbhar community that has settled in Kumbharwada, Dharavi. For the construction of the model, each part was designed to be easily dismantled in the future, as Joseph strongly believes in recycling building components once the structure has served its purpose.

The second model house was designed by S. Murugan (Fig.4), a contractor from Tamil Nadu and resident of Kamla Nehru Nagar, Dharavi. The structure he designed was a four-storied tool-house (Fig.5), with the ground floor to be used as a shop by the house owner who would live on the first floor. The first floor has a living space, a kitchen, a toilet, as well as a balcony. This balcony became the access point for the steps leading to the second floor, which was an open terrace-like space that he called his 'Sunday room', with open space for family dinners and recreation. Adjoining this space on the same floor was a separate kitchen and washing area. He made the third floor an enclosed residential unit that he planned to rent out, with another kitchen, toilet, and living space. The roof was sloping to allow for more headspace to accommodate a mezzanine level that served as a sleeping area. The staircases and balconies on all floors functioned as an interconnected system, through which the tenants could access the third floor without entering the private family spaces. This model was made by Manoj Viswakarma (Fig.6), a carpenter who was born in Uttar Pradesh, and has lived and worked in Dharavi since 1996.

The third model house (Fig.7) was designed by Mallappa Kotam who hails from Telangana. He has been working as a local builder in Dharavi for over a decade. The design is an attempt of the contractor to collectively realise the aspirations of the local residents of Dharavi. The entire structure is three storeys instead of four (Fig.8). This allows for the floors to have higher ceilings for better light and ventilation, and extra floor space in the form of mezzanines, to be used for sleeping or storage. The ground floor accommodates a workshop, including a workspace, cabin for the workshop manager, and a loft for storage. The first floor is designed for a family of 8, with the sleeping area on the mezzanine, an independent kitchen and toilet, and a balcony. The terrace is roofed and can be used by all the residents. It also has space for a water tank. The remarkable feature of this house is the spiral staircase which optimizes space and provides independent access to each floor. The artisan involved with this model was steel fabricator, Rehman Abdulah Khan (Fig.9), who has a workshop in Kamathipura, fabricating steel components for roofs and metal staircases.

These models represent not only the kind of housing typology that exists in Dharavi but also the capacity of local actors to imagine a better version of their present. The models were exhibited at various locations across the globe (Fig.10).

The project continues to grow and the next phase in an existing street in Dharavi in currently being planned. Design proposals and models for 16 houses and shops, 8 on each side of the road, have been called for. The program for each house and the street will be based on existing and projected uses (done in a participatory way, with the people who currently live there). Accordingly, the designs will be based on existing local typologies and practices and there will be proposals made by local contractors, models by local artisans, combined with designs from international architects who will respond to the designs of local contractors. An entire streetscape of homes, workspaces and tool-houses modeled on a real street in Dharavi Mumbai will be open to a diverse set of practitioners working within one framework. This is the most unusual and sensitive part of the project and will require architectural firms to understand the challenges and working styles of the local contractors.

Through this project, we plan to make a powerful statement about the state of construction today and the direction it should take. Moreover, by showcasing their ideas on one platform and in one project, learning from and exchanging knowledge, some of which may even be eventually implemented on the ground, and by rejecting

false dichotomies, our local builders and artisans, together with established architects can develop new ways of practicing effective and quality construction and architecture in a collaborative and creative way.

In launching this project, the most problematic dichotomy we have confronted is that of the formal and the informal. So many achievements of the design process could have been easily dismissed by slotting both the maker and the product itself into the 'informal' world – a place synonymous with makeshift skills, incomplete education, and faulty structures. Artisans are usually expected to work in conditions that force them to accept this 'informal' self-description. However, the following section will demonstrate why such a term is unacceptable and inappropriate.

From the 'Informal'…

The term 'informal economy' was first used by Keith Hart to describe an economy previously invisible to development economists at a conference on 'Urban employment in Africa' in 1971. He later reflected (Hart, 2000) on the appeal of the concept and the positive connotation of the word 'informal':

> The label 'informal' may be popular because it is both positive and negative. To act informally is to be free and flexible; but the term also says what people are not doing – not wearing conventional dress, not being regulated by the state.

Hart justifies the creation of the term by the fact that development economists applying economic science categories to Third World countries were only able to account for jobs in state and corporate sectors, rendering invisible all other forms of employment. This produced unemployment figures of around 50% in developing cities, an unrealistic number unobservable to any visitor. In Hart's words: (2006)

> Anyone who visited, not to mention living in, these sprawling cities would get a rather different picture. Their streets were teeming with life, a constantly shifting crowd of hawkers, porters, taxi-drivers, beggars, pimps, pickpockets, hustlers – all of them getting by without the benefit of a 'real job'

Building on observations made by anthropologist Clifford Geertz as well as his own, Hart coined a term that would effectively account for that invisible economy. What characterized the informal economy, according to Hart, was the absence of bureaucracy. What happened next is history. The term 'informal economy' became hugely popular, and economists have been using it ever since to devise strategies, and to assess the potential impacts and risks associated with different kinds of loan and development schemes in poor countries.

Soon the term 'informal' came to be used not only to describe certain kinds of economic transactions, but also entire geographical areas or "sectors". Hart (2000) was well aware of the shortcomings of the term, especially when extended to entire "sectors":

> The informal sector allowed academics and bureaucrats to incorporate the teeming street life of exotic cities into their abstract models without having to confront the specificity of what people were really up to. To some extent, I sacrificed my own ethnographic encounter with real persons to the generalizing jargon of development economics.

One of the major problems with the 'informal' label is, then, that it conceals as much as it reveals. Hart (2000) acknowledges that within what he describes as informal, forms exist:

> Any observer of an informally dressed crowd will notice that the clothing styles are not random. We might ask what these informal forms are and how to account for them.

This point challenges the validity of the concept of informality itself. Does not accounting for informal forms amount to recognizing that they were never 'informal' to start with? Is not the idea of informal forms an oxymoron?

Significantly, Hart used the term 'informal' to mean non-bureaucratic such that employment in the informal economy referred to non-government, non-corporate jobs. If we take the same parameters in the urban field, informal settlements mean settlements that have been planned neither by the state, nor by developers, but rather, by local masons and the people themselves. If 'informal' settlements are those that were built outside bureaucratic systems, most settlements around the world are informal to some degree. Lax enforcement of planning regulations suffices to qualify a neighborhood as 'informal'. By this reasoning, any vernacular architecture following norms other than that of the bureaucracy would be considered as 'informal'. In Italy, France, Spain, or Portugal masons build and repair country homes with little or no oversight by the authorities. Only countries with long traditions of heavy regulation of the real estate sector that have left no possibility for smaller contractors to build houses on their own, such as the US, could be considered purely formal. But even there, repairs, extensions, and other maintenance work are done by local contractors, who may or may not be employed by registered companies. According to architect Mario Gandelsonas (November 2012), entire parts of Los Angeles, New Jersey, and many other large urban agglomerations are built and used in non-conformist ways. More often than not, authorities choose to simply look the other way.

Most people in neighborhoods identified as 'slums' - and the process of identification is the same from Rio to Manila - do not have legal tenure of their homes. However, having occupied their homes for at least two or more generations, they develop a sense of entitlement. This is reinforced by political legitimation which partially protects their occupancy rights. Over time, residents invest in their homes and businesses, improving their structures, building higher and better. 'Slum dwellers' often leverage their homes to generate income, building an extra floor and renting it out to relatives or newcomers. Most neighborhoods are therefore mixed-use, with a large number of residents using their homes as workspaces.

Houses are constructed through a network of local owners, contractors, laborers, carpenters, electricians, plumbers, and suppliers. Although their structures are built locally in a 'vernacular' style, they are made with industrial products (bricks, corrugated sheets, cement, steel pipes, and I-beams) which are bought at market prices from local

hardware stores. Like any middle-class homeowner, most homeowners and contractors in these 'slum' neighborhoods choose high-quality materials over low-cost ones. The investment in quality is justified by the enhanced use-value, especially in terms of higher living standards or improving the income-generating capacity of the structure.

In these self-reliant settlements identified as 'outside the urban norm', the home plays an important double-role. It is equally domestic and productive space; with an active economic life beyond consumption, the home is used almost all the time and across diverse contexts. Such an approach is not new, rather, the etymology of "economics" itself is linked to this type of home-based enterprise. Moreover, just as the local is the foundation of spatial logic across scale – even the most global of all activities and abstractions are rooted in some locality – the productive home is the foundation of neighborhoods, particularly "those" so-called "informal" ones.

…to the Homegrown

Homegrown neighborhoods have been developed by masons, carpenters, plumbers, and electricians who live and work within the locality. For the most part, they are built by hand with industrial materials such as bricks, steel, cement, and plaster of Paris. This gives an interesting twist to the notion of "vernacular architecture" since the techniques and labor are local, but the material is part of a global market. The small footprint of houses means that they can fairly easily be rebuilt with improved materials and designs. Thus these neighborhoods characteristically improve over time, both incrementally and in phases. Finally, as they improve, the scheduled castes and tribes and poor Muslims who inhabit them tend to improve their social position. Residents are upwardly mobile.

Having worked closely with local masons and "contractors", visiting many homes with architects, engineers and material suppliers while studying the construction process, we can attest to the fact that by and large, houses built in the past 5 to 10 years in these areas are of good quality. If anything, they are often over-engineered, as clients and contractors are obsessed with making the house "pakka" (meaning "baked" or solid, a term opposed to "kacha" or raw, which is used to describe shacks made of fragile and temporary material).

The relationship between the contractor who coordinates the construction, and the client who provides inputs and finance is intimately connected to the social life of the neighborhood. Contractors are local residents themselves and typically well-known in the neighborhood. They share the same social network as their clients and are either their direct acquaintances or friends of friends. Since contractors build mostly within their own community, their work is highly visible to potential clients who can easily judge the quality of their work by looking at past constructions and by talking to neighbors. There is thus fairly limited scope for the contractor to cheat clients or leave work unfinished. Obviously, things can sometimes go wrong for different reasons, but it is the exception rather than the rule.

Homegrown neighborhoods have a well-functioning "domestic" construction industry. The word industry may sound like a strong one, since the practice of construction is mostly based on craftsmanship and artisanship-type of know-how and skills. But it is industrial in the scale of its production, and in the kind of material and level of technicality involved.

In 2014, to illustrate the scale of the homegrown construction industry in Mumbai, we conducted some research in an area of 135 hectares referred to as Shivaji Nagar in Govandi, Mumbai (which also encompasses other neighborhoods such as Baiganwadi, Gajanand Colony, and Lotus Nagar). At that time there were about 50,000 structures (houses, shops, and others). It was discovered that in this area alone, 3000 houses are built or rebuilt by local construction workers each year. The houses typically have a 10x15 feet (3x4.6 meters) footprint and cost anything between INR 3 lakhs and 8 lakhs (USD $ 5,500 to 14,500) for a ground plus one-floor house. A back of the envelope calculation tells us that if we use a low INR 4 lakh (USD $ 7,300) figure per house figure and multiply it by 3000 houses, the construction market represents over INR 100 crores or USD $20 million dollars annually in Shivaji Nagar alone, which is only one of many homegrown neighborhoods of Mumbai.

Clearly, the municipal authorities know about the market since there is a standard 10% informal tax on any new construction to be paid in the form of a bribe to municipal officers. From this total amount about USD $2 million is lost in bribes. If this informal payment to municipal authorities was recognized as a well-functioning tax system –which it is–, this money could be used to both increase the salary of municipal officers and to reinvest in the neighborhood's infrastructure.[1]

While it is difficult to evaluate what the construction industry represents as a share of Shivaji Nagar's economy, which may be home to well over 200,000 people, we can be sure that it is a highly significant source of income and employment. In India, the real estate sector is the largest employer after the agricultural sector. Valued at USD $12 billion it has been growing at a rate of 30% in recent years in India (Globaljurix 2020). It would surely help homegrown neighborhoods to capture a share of this market through their local construction industry. It is unfortunate therefore that the authorities do not recognize the positive aspects of this development process. Moreover, while houses are locally built, the materials used for their construction are not locally produced. Bricks, cement, steel are all industrial materials produced by major corporations and distributed via well-established regional and national networks. One hardly ever sees mud houses or bamboo roofs in Mumbai – at least not in homegrown neighborhoods. Not only are these materials often unavailable locally, but they may be more costly to

[1] Urbz Primary Research (2014) Shivaji Nagar, Govandi, Mumbai.

process and distribute. Most importantly they are not aspirational. Industrial materials are seen as solid and modern by homeowners and builders alike. Industrial construction material suppliers, including multinational corporations, have certainly taken notice of the market represented by homegrown neighborhoods throughout the city and are very keen on tapping into the proverbially deep 'base of the pyramid'.

Neighborhoods developing outside bureaucratic control or under a lax planning regime tend to generate a variety of forms because they do not necessarily follow urban development codes, such as height limits or functional segregation in different zones of activity. What emerges are urban forms that tend to closely match the means and needs of their users. From this perspective, neighborhoods usually dismissed as 'informal' settlements become a living-laboratory for the emergence and design of diverse forms of social and urban organization. Forms emerging under lax (or non-existent) planning regulations are not devoid of logic; and as such, are not 'informal'. On the contrary they embody processes that must be understood by planners interested in developing locally sensitive approaches. Further, they reflect a multifaceted context as well as the best efforts of local actors to respond to it. Far from curtailing the creative freedom of designers, they provide the most potent sources of inspiration. In other words, these homegrown settlements have their own structure and form, developed within the adhocratic logic in which they exist.

Beyond Jugaad

Our practice, which we call 'urbanology', combines complementary impulses: our shared skills of participatory urban planning and those of anthropology. Both planning and anthropology share an interest in the past, present and future of a locality and in the lives existing within them. Engaging with any context brings together a universe of skills and learnings – the professional, the institutionally trained, the expert, the self-taught, the local expert, not to mention a multitude of collective skills rooted in diverse community lives which co-exist in that space. We are therefore honored to participate in a discussion on how local processes shape settlements – a discussion curated by this particular journal. *Ekistics* has discussed and presented the world of human settlements in a holistic way since the 1950s. By creating a space for philosophers and practitioners to respond to the science, technique, and tradition of human settlements – its discourse allows us to present our ideas that draw as much from planning as from anthropology. The vast archive that Ekistics has created, highlighting issues ranging from low-cost housing in underdeveloped countries to understanding the nuances that local identity generates in the context of a globalized narrative around urbanization – expands the horizon considerably. It allows us to situate our analysis at intersection of the social world of building, construction and locality as rooted in a powerful and dynamic locality (Keller, 2006).

The moment we spotlight that context, a specific locality, we see how it nourishes and shapes all the worlds that emerge there – built, natural and cultural. And what almost every formally trained professional acknowledges at some tacit level is that they must eventually depend on the knowledge that is embedded in that locality to fulfill the project – be it architectural, social, civic or environmental. Not only is the expertise of the local an objective asset, her involvement or lack of it can make or break the project.

What 'The Design Comes as We Build' project suggests is that a locality is a point of convergence and that the agency of local actors should be recognized. Indeed, in this case, it is the homebuilders and their intimate knowledge of the context that is of the utmost importance. Significantly, they are also professional in their aspirations, and this is something that needs to be recognized. Throughout the project, our own dialogues and conversations became part of a joint process in which the learning was enriched by the dialogue that took place – between the trained architect and the self-taught builder. Both were aware that recognition of each other's learning and processes meant an exchange of skills and knowledge across professional boundaries conducted with an openness of attitudes and styles. By the same token, it was important for urbz to recognise their role as experienced builders, to value the typologies that emerged in the context, and to understand that the neighborhood had its own form and structure – besides the lives and livelihoods that emerged in them - and that the presence of great ideas, interesting innovations, and agile inventions were an intrinsic part of the process because of the process being integral to the lived world.

It would make little sense for us to highlight one or two architectural innovations and present them as stories in themselves without the surrounding context that made it possible. It was not important to highlight just the idea or the model, but the whole networked context - with the artisan, the builder, and the urbz office itself as part of the project. Such a narration of the project is vital for understanding its value and ensuring that it does not get stuck in a moment of surprise and wonder at one innovation or one surprising dimension. If they are there, then they are part of the lived local context and that context itself is part of the story, to be told in all its detail.

With regard to Jugaad, the project suggests that celebrating the moment, the innovation, the product or the idea is only the starting point. There is a whole world beyond it which needs to be brought to the fore. That world needs to be reclaimed from a gaze that slots it into rigid categories – rural / informal / poor. Such a narration also needs to bring back the context as a point of convergence: where many minds and skills interact. Indeed, as our project has illustrated, we must recognize the Jugaad that takes place in a laboratory or a studio, just as frequently as it does in places we expect it to.

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Urbz, Dharavi, Design as We build Project, ethnography

Beyond the Binary: What does it take to tread the 'Third Way' of Urban Regeneration in India? Leading Urban Revitalization, the Jugaad[2] way

Sanjay Prakash and Swati Sharma

Future Institute, New Delhi, India

Abstract

Urbanisation is an inevitable part of India's growth, which places enormous strain on existing infrastructure and settlements. Although the need for urban renewal or urban regeneration (as contrasted with greenfield development) is clear, it seems current policy and institutional frameworks have yet to offer any significant results. Lack of financial resources is one of the most critical challenges being faced by governments at various levels, and despite sufficient financial means and instruments to develop new infrastructure (such as the FDI, PPP, TDR, and so on), funding channels for urban renewal projects remain almost non-existent within an environment of mutual distrust. Through a discussion of three ongoing projects, the need to explore outside of conventional models will be demonstrated. In essence, this article advocates for an intermediary working structure of PPPP (Public-Private Partnership with the fourth P standing for People), which can be situated between a strict / formal approach and an unregulated / informal one, often referred to in the Indian context to as Jugaad. Though jugaad is typically characterized by 'ad-hoc-ism' and informality, the outcomes still provide affordable solutions for stakeholders. Jugaad is notable for both its process-driven approach involving people-to-people collaboration, and its circumvention of the need for reform of the prevailing systemic environment. We suggest, therefore, that Jugaad in urbanism be reconceived as going beyond quick-fixes to serve as a possible model for resolving challenges in a participatory manner, without resorting to rule-bound contracting methods.

Introduction

India's attitude towards urbanisation has changed in the last decade and urban planning has come to the forefront of development policymaking. Cities now occupy a central role in driving the narrative of India's growth story. As large an opportunity as it may sound, India's journey towards being an urban majority state by 2050 is not devoid of some complementary challenges. Recent studies indicate that in India, the gap in urban infrastructure investment is estimated at US$827 billion over the next 20 years (Ahluwalia, 2014), and India must invest more than $150 billion over the next five years in the development of urban infrastructure.

Lack of financial resources and institutional capacities of urban local bodies (ULBs) in developing, delivering, and managing urban services has already predisposed the institutional regime to accept and embrace the participation of the private sector in India. The government, transitioning from the role of a service provider to that of being a facilitator, in provisioning essential services such as water, power, transport, and sanitation, has acknowledged the significance of private sector in planning, financing, delivery, and management of public services. Over the last decade, policymakers at both central and state levels have been increasingly focusing on infrastructure investments to enable fast-paced economic growth. However, as planned infrastructure projects throw up funding and technological challenges, governments are increasingly turning to the private sector with the PPP route emerging as the most favoured mechanism for cooperation, not just for investment, but also for capacity building (human resources, materials, machines, etc.).

As a developing nation, while India is continually eyeing the building of new infrastructure to meet the needs and aspirations of a growing economy, there is a dire need for upgrading and renewal of existing infrastructure lying derelict and distressed under the pressures of the transforming socio-economic structure of cities. To varying degrees, urban regeneration poses a significant challenge to city authorities and requires significant investment, whether it be financial, creative, managerial or natural resource deployment. Many cities are no longer able to meet these challenges on their own, whether due to shortage of public money, poor capacity to harness renewable resources, limited professional skill pools, or simply because the associated risks are too great (URBACT.EU, 2006). These challenges relegate urban regeneration to the bottom of the to-do list of urban local bodies, if they feature at all.

Emerging trends in the PPP model of urban development and urban regeneration in India

PPP (Public-private-partnerships) is a management model being enthusiastically espoused (in principle and practice) by the Central and State governments through their policies and initiatives over the last two decades.

[2] Jugaad is a term applied to a creative or innovative idea providing a quick, alternative way of solving or fixing a problem.

Jawaharlal Nehru Urban Renewal Mission (JNNURM) was the leading flagship program in implementing urban development and urban renewal projects in PPP mode. Since then, continual attempts are underway to bring PPP to the forefront of managing Indian cities. Such projects include the Atal Mission for Renewal and Urban Transformation (AMRUT), the Heritage City Development and Augmentation Yojana (HRIDAY). Cities like New Delhi, Mumbai, Kolkata, Indore, Ahmedabad, Mysore, Pune, and Hyderabad have harnessed PPP cooperation to design, develop, and deliver public services more effectively and with increased efficiency.

In the Indian context, the concept of PPP operates between two extremes. On one side, the model attempts to characterize the private sector almost as a service provider, usurping the role of a ULB. On the other hand, the private sector is involved as the operator or manager of the public infrastructure created or already existing, while the government occupies the role of a regulator in both cases. A formal code of practice is adopted throughout a project's execution, beginning with the selection of the private partner. Since sourcing finance acts as one of the primary objectives of PPP cooperation, the Requests for Proposal (RfPs) and Expressions of Interest (EoI's) floated by the government are centered around financial eligibility, i.e., the participating organisation's turnover for the last five years. This has also become necessary for government agencies as fiscal rules now guide government players to use financial criteria to select partners. Financial measures thus supersede performance and experience criteria (in the absence of an ability to form an impartial jury to choose the best planning approach), and this leads to conflicts of interest between the purpose and objectives of the project. It leaves no room for appointing good architects, planners, urban designers, or practicing organisations with the relevant domain expertise who may have been able to match the desired top line numbers. Repeatedly, it is one of the top 10 or so infrastructure and construction powerhouses ruling the so-called business of urban development in India that gets selected. When the process itself remains exclusive, the result tends to favour a handful of top players.

The process cycle of a typical PPP project is very rigid from project identification to service delivery. The standard modes of cooperation between the government and the private sector, including management contracts, lease contracts, concessions, variants of build-operate-transfer, all set out stringent terms and conditions, limiting the scope of broader participation, or the integration of unconventional yet innovative solutions within the contract terms. In an environment where corrupt practices are waiting to be brought into the open at any time, this also becomes necessary in order to reduce or remove discretion in the hands of government officers. Thus it creates a partnership between two parties that strongly distrust each other.

When the Standard Operating Procedures (SoP) of PPP are applied without creativity to urban regeneration projects, we are denied the opportunity of engaging with the best or most appropriate solution to real-time challenges arising out of existing socio-cultural complexities. Often the RfP's and EoI's are driven by the relationships between spatial planning, real estate (land) and economics. Both public and private actors operate within their existing institutional context and are influenced by market conditions (demand for real estate, investment climate, etc.). There is a subliminal impact of cultural values on the outcome of any planning exercise, as the actors (from public and private sectors) from different cultures may (in a more general way) value risk, trust and cooperation differently (Li et. al., 2019). The value differences, in turn, lead to different attitudes in some specific situations: for instance, whether to invest in high-risk but high-reward development projects, how much to invest in monitoring business partners and agents, and whether to cooperate or act alone when the relative benefits are uncertain. Therefore, when the PPPs are adopted, in their conventional and formal manner, within market constraints, the real needs and cultural values of users are not reflected in the results and most of the developed projects are either forsaken by the beneficiaries or lead to extreme gentrification forcing the native communities to eventually move out of the redeveloped and now unaffordable precincts.

Resources (money and capacity) and risks of urban regeneration – a different sort of R&R

When it comes to measuring PPP as a tool for promoting urban renewal and socio-economic revitalization in the Indian context, a variety of questions should be posed to determine the type of public-private cooperation for urban regeneration. It is imperative to understand that every urban regeneration project/initiative comes with its own and unique set of challenges. The nuances and details concerning the existing and envisioned socio-economic scenario are far more complex than a greenfield urban development project. Often there arise varied areas of conflict that hamper inner city renewal interventions. The conflicts range from disparate interests of residents vs. commercial objectives of redevelopment, to mismatched planning intentions and political will, which manifests itself in a lack of political will to undertake the significant reforms that planners perceive as necessary (Das, 1983). Initiatives such as the Bhendi Bazaar Redevelopment project (Mumbai), Sabarmati Riverfront Redevelopment (Ahmedabad), East Kidwai Nagar Redevelopment (New Delhi) are often cited as 'Disruptive Innovations' to finance and deliver urban regeneration projects. Though they are all cited as being reasonably good in terms of economics, their performance according to socio-cultural indicators is questionable.

The Bhendi Bazaar project (Fig. 1) will raze 250 mostly dilapidated medium-rise housing structures and build 17 high-rise towers in their place. The capacity and expertise of the resources on the planning and receiving ends are fundamental to achieving the most appropriate model of urban regeneration in a city. To add to the points listed above, there are high levels of inadvertent risks associated with such projects. Various fiscal and development incentives such as high FSI, TDR, external development fee/charges waivers, tax exemptions and so on try to compensate private players for the top investments but, for the most part, do not cover the risks arising due to project delays caused by property valuations, value allocations for

Fig. 1: Bhendi Bazaar, before and after the proposed redevelopment. Images Courtesy: SBUT

the future property, and the challenges of temporary relocation of residents. Such conflicts often influence users negatively and limit the benefits of urban renewal businesses from participating private firms. Unless the institutional framework allows for a shared responsibility and risks with a fair degree of autonomy for the executing agency, initiatives will not attract market interest.

In contrast to traditional economic infrastructure, the arrangement that enables private sector participation in urban infrastructure with slow economic returns (for example, in conservation of cultural heritage sites), might require creative revenue and risk-sharing mechanisms which are uncommon in traditional infrastructure and might need to be tailored specifically for each project. Therefore, the practice of PPP in city regeneration must adopt a flexible approach to accommodate the best resources with minimum risks while catering to the needs and aspirations of all stakeholders involved.

For this reason, it is likely that India has not yet been able to develop any successful examples of urban regeneration, even after having embraced PPP-type cooperative working models with the private sector. PPP in India remains dominated by building and operating new infrastructure that can be charged for by the concessionaire for a certain period of time (direct monetary benefit), or trading the share of land for market sale with higher FSI's or similar concessions (indirect monetary benefit).

Countries embarking on city regeneration initiatives have established different practices within the corporate model. These corporations often act as private entities and are empowered under the commercial code. Importantly, they also have a degree of separation from the government. Their responsibilities include land acquisition, infrastructure provision, and releasing vacant land for market sale. They are also tasked with building housing for low-income families, managing properties used by governments, and similar social tasks (Kaganova, 2011). City regeneration carried out by a particular special-purpose corporation often involves the use of special regulatory powers. These powers enhance the project's ability to create development value through project-specific density arrangements, a situation referred to as density financing (Sagalyn, 2007).

As planners, thinkers, and concerned urban citizens of this country, we need to ask ourselves:

- Are the current institutional frameworks innovative enough to accommodate and adapt to the local challenges and constraints to deliver the desired solution to the community?
- Would we necessarily be continuing to view urban development and urban regeneration through the same lens of Governance structures?
- Could there be any other way of championing the most desired change in Indian cities?

Exploring the 'Jugaad way' of city regeneration in India

The Oxford Learners' Dictionary gave the original (literal) meaning of jugaad as an Indian English noun referring to a vehicle made from different parts of other vehicles and used for carrying people, goods, etc., that is usually open at the front and the back and often not very safe to drive. In a generic way, it refers to the use of skill and imagination to find an easy solution to a problem or to fix or make something using cheap, basic items.

The Oxford English Dictionary officially added this slang word to their long list of words in September 2017, as a Hindi-origin noun meaning 'a flexible approach to problem-solving that uses limited resources in an innovative way', as in the example sentence: 'countries around the world are beginning to adopt jugaad in order to maximize resources', thereby permitting its use without italicization.

Wikipedia explains it as an Indian colloquial word that, depending on the context in which it is used, roughly translates to a non-conventional, frugal innovation, often termed a 'hack'. It could also refer to an innovative fix or a simple work-around, a solution that bends the rules. It is also often used to signify creative innovation: to make existing things work or to create new things with meager resources available. The gist of it is to 'make do' with limited resources, somehow make things work, and not in a banal but in a creative way. In that sense it is no longer associated with a vehicle that is "not very safe to drive"!
The exhibition 'Jugaad Urbanism: Resourceful Strategies for Indian Cities, at the Center for Architecture, organised in Feb 2011 (Jordana, 2011) centered around the managing of resources such as land, water, energy, and transportation

from communities in Delhi, Mumbai, Ahmedabad, and Pune, and displayed the power of low-cost creative solutions of "design by the people, for the people". Whilst jugaad is characterised by ad-hoc approaches and modalities in the conceptualisation and execution of the ideas, the outcomes succeed in resolving the critical challenge at hand in sync with the needs and affordability of the target beneficiaries. The most noteworthy factor in a jugaad approach is that the process is driven by people working with people without calling for a significant change in the prevailing systemic environment. In other words, the jugaad approach in urbanism can be seen to be beyond merely quick-fix solutions to a possible model for resolving real-time challenges in a more participatory manner.

How does the jugaad model work in an urban regeneration scenario? What is the impact area that requires innovation? As explained in the previous sections, the conventional institutional frameworks need to loosen a bit to accommodate the best and the right resources on board to 'make things happen.' Institutional arrangements may range from formal to informal, with varying degrees of authority, accountability, and responsibility for coordination, handover, and delivery. Depending on the project requirements and whether it is public or private sector-led, there are several options for the types of vehicles that might be created to guide, monitor, and maintain the regeneration project to ensure coordination and results. These entities might have a range of powers depending on the scale and complexity of what aspect is required to be retained, enhanced and sustained in the specific regeneration project.

In this context, jugaad means finding common ground – the middle path that is more accommodating and adaptive than the conventional formal system, yet is more systematic and organised than completely organic, informal market solutions. The residents, the real stakeholders, become the leaders and changemakers and seek collaboration with supporting agencies offering technical, financial, and advisory services for the specific objective-oriented project or initiative.

We can dub this model "PPPP" (People-Public-Private-Partnership), wherein the people sit on the driving seat, and the government allows this to happen: it does not lead the project as in conventional PPP. The government, in this case, can be seen as one of the parties supporting the initiative instead of the one commanding and regulating the process. The people, in the form of a Community Based Organization (CBO) or Residents' Welfare Organization (RWA), articulate the needs, find suitable experts for designing the project for them, and then look for public or private finance (often much less than otherwise required by conventional PPP) and even crowdsourcing funds to implement the project.

We could define PPPP by paraphrasing the above paragraph as below:

PPPP (People-Public-Private-Partnership) is a process for project implementation where, besides private and public (government) interests, people (the affected citizens) become the lead stakeholders and propel the project forward. The people (henceforth called the clients) sit in the driving seat, and the government lets the project be executed. The clients articulate their needs, find suitable experts for designing the project for them, and only after that seek financial support (from people, public or private sources) to implement the project.

This approach also has the capability to address the issues highlighted in the last section: It can conserve and best utilize resources (money and capacity) and mitigate the risks of Urban Regeneration.

Some experiences so far

In the Indian context, we don't have many trendsetting examples to demonstrate this approach, but that doesn't mean it cannot be tried anywhere. Through the authors, Future Institute has been working closely with communities and state governments in Delhi-NCR to explore this working model through multiple initiatives. There are at least three examples of ongoing projects: one from an affluent society, representing top down jugaad, of public placemaking (the Priya complex, a joint initiative of the Resident Welfare Association, the Delhi Development Authority (DDA), and a corporate partner), one from a disadvantaged village (Zamrudpur, a joint effort of a CBO, representing bottom-up jugaad, searching for a financial partner and government legitimacy), and one from a set of villages in Gurugram district where rule-bound public finance was required to complete the project.

Top down jugaad: Priya Complex redevelopment at community centre, Vasant Vihar, New Delhi

Redevelopment at Priya Complex, in one of the bustling community centres in South Delhi's posh neighbourhood colony in Vasant Vihar that started in October 2019 and is now in the stage of execution, could be very aptly touted as the first demonstration of a PPPP in urban regeneration in Delhi. It is an attempt to discover and reclaim the identity and spirit of otherwise dying planned public spaces as community centres in Delhi. Most community centres in Delhi were developed across the city close to four decades ago with a simple objective: to serve as active neighbourhood recreational centres. Over time, these hubs have gradually turned into dead and gloomy spots of occasional leisure and sometimes, unfortunately, negative spaces which anti-social elements use as well. Lack of maintenance and absence of essential public infrastructure have reduced them to spaces of abject apathy. This itself stems from the feeling that the infrastructure development was 'public' property and so private finance to maintain it dried up over time.

Taking note of the existing situation of one of such community centres in Basant Lok, Vasant Vihar in South Delhi, PVR Limited, one of the occupiers in the complex, decided to fix the problem. The multiplex giant PVR shares an emotional connection with this place as Basant Lok is home to the very first screen that it opened in India. As the economic and social life of the complex was nearly collapsing, the local stakeholders – retail shop owners, Market association and Local Vendors Association, PVR amongst them – decided to take it upon themselves to transform the space.

The collective intent was furthered by PVR in developing an integrated proposal for upgrading the social and street infrastructure and develop the precinct into a 'Thriving Futuristic Public Place' in collaboration with Abaxial design Pvt. Ltd., which is also PVR's architectural consultant firm based in Delhi. The team outlined a creative urban design led action plan in close consultation with all local stakeholders to serve the following objectives:

- Enhancement of public safety, focused on women and children, on the streets and building edges, with adequate lighting infrastructure.
- Upgradation of flooring and paving to improve universal accessibility in focus zones.
- Augmentation and activation of public realm with active greens – parks and plaza – offering multiple use activity spaces for all.
- Installation of appropriate street furniture – benches, waste bins, signage and so on – to achieve clean, green and healthy urban environment.
- Organisation of informal retail and vendors on-site to achieve an inclusive growth ecosystem for all.

In the initial rounds of proposal discussion with the South Delhi Municipal Corporation (SDMC), it became clear that the urban local body could not extend any financial or resource help in executing the proposal on ground. It had already invested in upgrading a part of the precinct and was not able to extend this investment. It was then that

Fig. 2*:* Above visuals highlight the condition of the public complex before the redevelopment a) & b) Dark and shady spaces around the buildings that had become the negative spaces for anti-social activities, c) Neglected open space in the rear side of the building in the complex

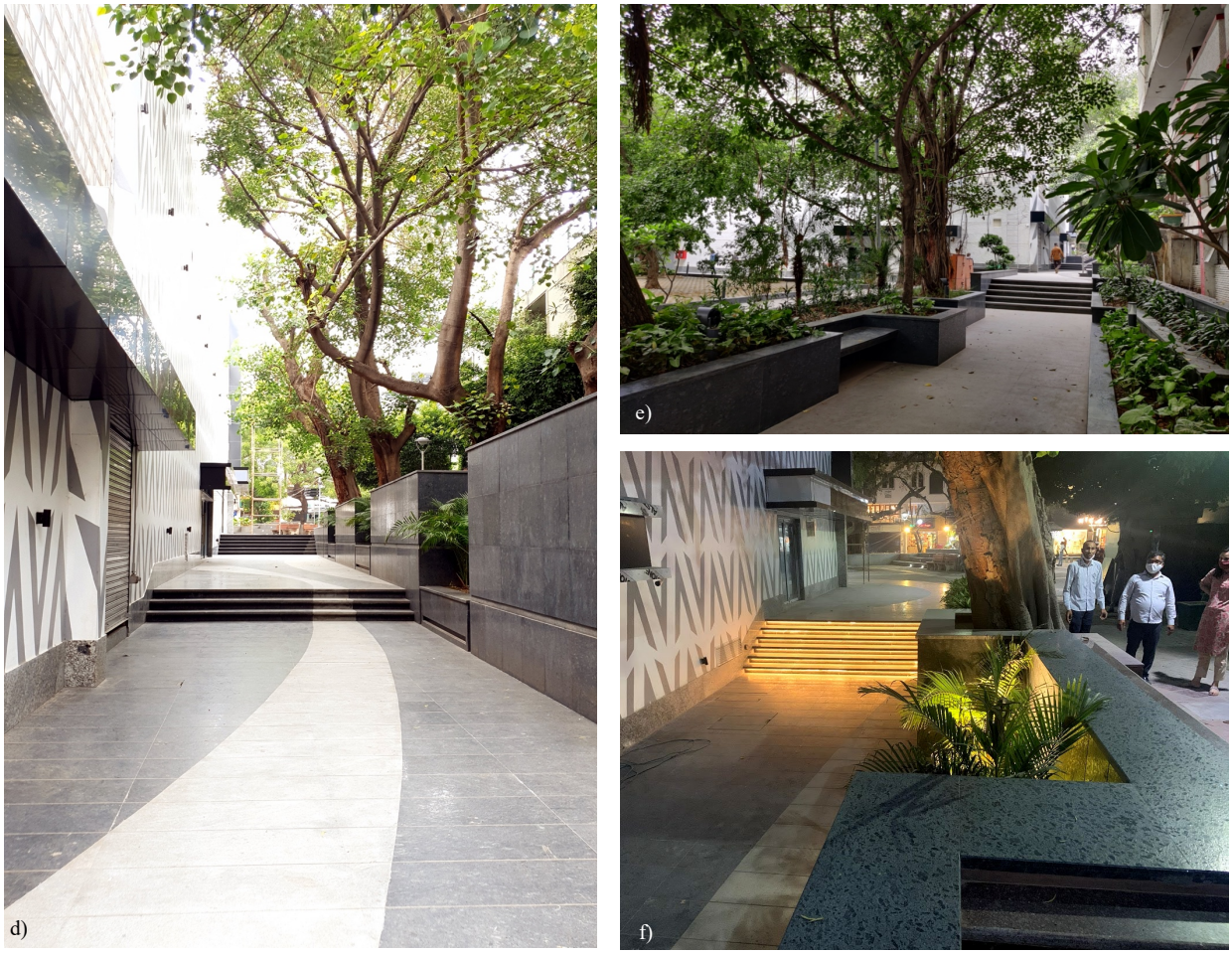

Fig. 3: The visuals (d, e, f and g) of the re-developed scheme illustrate the transformation of the space has achieved through adequate lighting, improved street furniture and enhanced wayfinding though the neglected and negative spaces in the complex

PVR took the onus of funding upon itself and the whole initiative was set on fast-track mode.

The uniqueness of this initiative is that the stakeholders took a collective conscious decision of reclaiming the space and committing to the cause of contributing to the best of their capacities in realizing the proposed scheme. While funding occupies a critical role in the success of any project, the vision, intent, and process are equally important in making it sustainable. That is where the 'P'

Fig.4: Map of Zamrudpur village showing the images of key areas of concern and local youth group in action in a cleanliness drive

for 'People' comes into the picture. In the entire process, right from conceptualising the plan, seeking stakeholder consent, and approaching the government with an Action Plan, people were at the forefront. The government authorities reserved their power to technically whet the scheme and ensure lawful implementation of the project (and to permit the project on public property in the first place). Future Institute (as an active participant, facilitating the initiative with execution) has so far observed that collective and shared action has the extraordinary potential to transform our cities, even in the case of urban renewal. The initiative is still underway but has slowly been recognised and has almost set a precedent for undertaking upgradation of other community centres across Delhi.

Bottom up jugaad: Urban placemaking initiative, Zamrudpur, New Delhi

The second example is that of an ongoing Placemaking initiative in one of the urban villages in New Delhi called Zamrudpur, representing a strong community-led movement. Here youngsters feel the earnest need to reclaim the lost identity of a historically rich place which got lost in the wake of extreme market-led urbanisation. As of now the village stands as an unplanned urban enclave sandwiched between the urban posh colonies of Greater Kailash and Kailash colony in South Delhi. The village that once used to boast of its cultural and heritage assets is now a typical high-density settlement with insufficient basic infrastructure and is home to low-income migrant populations.

The millennial generation, in charge now, is not happy with this version and vision of Zamrudpur. So they took upon the task repositioning Zamrudpur and its identity on the cultural map of Delhi. The residents, including elected representatives of the village, came together and collaborated with architects, designers, and planners from within Delhi and outlined the vision for Zamrudpur. The local youth has voluntarily constituted an action group called 'Zamrudpur Youth Brigade' that can be termed a CBO, to undertake solid waste management in the settlement to begin with; an initiative that has already drastically improved the overall quality of the physical environment. This cleanliness drive is now advancing to the next stage (in collaboration with waste management action group 'Chintan') of reducing the waste at source and also recycling for profit.

The unique feature of this initiative is that the sense of ownership and responsibility lies with the community, and therefore the results are visible rapidly. Residents, witnessing the on-ground change, are willing to pay the extra money per household to continue the positive transformation. The PPPP model here is solely driven by the local people in partnership with the right industry partners with almost no government involvement, except to allow the initiatives to happen. Though the initiative lacks funding, the action groups involved are aggressively reaching out to corporations and exploring options to access Corporate Social responsibility (CSR) funds from Delhi-NCR region.

The action group and local activists are embarking on new frontiers of exploring this PPPP model. Some initiatives include: reclaiming abandoned parks through plantation drives (by reusing the wastewater from a nearby religious institution's toilets); reducing cow dung waste (now dumped on the streets) and converting it into saleable manure; enhancing safety on the streets by mapping the dark streets, and pushing for the installation of street lights from the public development fund of the village; initiating a volunteer-led education program for children from Economically Weaker Sections; getting a local business to outsource stitching tasks to homemakers who have free time and the desire to supplement their income; and so on.

Since urban villages like Zamrudpur have very little or no real-time database of the socio-economics in the government database, the action group here has also decided to develop a first-of-its-kind village census handbook by undertaking a barefoot door-to-door survey. Once done, this survey and analysis would then serve as a strong basis for outlining strategic action plans to improve the quality of life of the people in Zamrudpur, and even more importantly, provide data for measuring success.

Government led PPPP: Rejuvenation of water bodies in Gurugram

While the journey of the PPPP model seems to be on track and presents a hopeful picture, there are some instances where the conventional PPP process overtakes the efforts and synergies invested in urban renewal projects. In one such initiative, Future Institute collaborated with MCG (Municipal Corporation Gurugram) in 2015 intending to rejuvenate, preserve and develop existing water bodies in Gurugram not merely as catalysts of environmental sustainability but also as active urban places of renewing and building socio-cultural capital of Gurugram.
Out of 120 odd water bodies in Gurugram, 20 water bodies were identified with the potential to be rejuvenated and developed as an integrated network of channelising and managing the water crisis of Gurugram. The overall approach presented a unique model of identifying sustainable contextual solutions to complex urban challenges through exploration, research, and participation.

Under this initiative, an urban pond in Basai (sector 9B, Gurugram) was chosen as the pilot project in 2016 to establish and demonstrate the principles and practices advocated through research. The level of participation and interest of the local community in reviving the water body was truly exceptional. Every individual was keen on suggesting the most do-able solutions, according to their needs and aspirations, for improving the quality of water and public space around the pond. These collective efforts synergized into a day-long event marking the launch of the initiative and raising awareness around conservation and maintenance of water bodies organised by the local community. The proposed scheme had adopted an unconventional water remediation solution called bioremediation using more natural plant-based filtering techniques rather than installing mechanical treatment plants.

However, with close to 20% of total development works as civil works and the rest under green buffers and soft edges, the scheme wasn't attractive with respect to standard code of PWD practice. It seemed that the technical government staff wanted a 'harder' (and more expensive) design approach. The negotiation with them was a hard nut to crack.

Nevertheless, with negotiation and persuasion, the proposal got approved and was put to the tender process (the community was not involved with this process). The hope and dream of Gurugram getting its first water body rejuvenated got lost in the hefty and lengthy process of tendering and procurement. The tender that was floated to invite bids for undertaking the site works was called off thrice because of technical or financial caveats. Till today the pond lies in a state worse than it was in 2016. This experience narrates the sad state of institutional affairs in the government system, which tends to convert PPPP into PPP.

Conclusion

In light of the experiences shared in this paper, it is becoming increasingly evident that there exists a higher chance of executing the initiatives with maximum participation at the grassroots and minimum involvement by the government. Often this doesn't happen since many officers in government institutions are incentivised to invest public money on maintenance projects but do not trust either private nor people interests and consider themselves the 'owners' of public space. Only if the government system can support public space initiatives led by a credible people's organization as recognized by the powers that be, can this state of affairs change. PPP can then transform to PPPP.

When it comes to public spaces and land (which is a state subject), there is often a limitation to what the people outside the system can achieve. In conventional practice, such initiatives run into the business-as-usual PPP model and end up either delivering sub-standard outcomes or do not see the light of the day at all.

Some learnings from this work so far are as below.

Cost of PPPP compared to PPP. Most PPPP initiatives are considerably less expensive than PPP initiatives since most people are fairly frugal with their demands (if stewarded with care, with good participation), especially if they are asked to pay even a small share of the investment. Whether affluent or impoverished, beneficiary communities are a self-regulating mechanism and normally do not overreach their requirements such that it becomes affordable for them to contribute a substantial part of the investment required for the project.

PPPP in Affluent communities. Redevelopment of PVR Priya complex exemplifies the power of active participation of local communities can open up new frontiers in social infrastructural development in cities. By bringing people in PPPP at the forefront, the whole process of urban regeneration reinforces the value and worth of local assets in the lives and livelihoods of the real beneficiaries. What would have been just a redevelopment exercise for SDMC with the resource constraints, in this case, is now a symbol of pride and dignity to the community in Vasant Vihar.

PPPP in Impoverished communities. The Zamrudpur case illustrates how the intent and collective efforts play a primary role in realizing the success of a public project where funds and supporting resources are merely the tools that fall in place if the commitment of the stakeholders is strong. The MCG case, however, demonstrates that if projects are performed under an ordinary course of action, the voices of the community can get stuck in limbo forever. There is a need for public procedures to change. Given the need for urban regeneration in the context of Indian cities, it becomes indispensable on the part of government bodies to adopt a flexible modus operandi that allows diverse

stakeholder participation with a high degree of autonomy in making decisions that the people and context demands. Jugaad, as suggested in this paper, offers an intermediate working model between the formal PPP and the unregulated informal approach.

In the opinion of the authors, further research is needed into the processes of facilitation, management of process, budgeting, and ensuring good utilization of resources and mitigation of risks associated with the conventional, PPP mode of urban renewal everywhere. However, it is a jugaad in itself that this method be used whether or not that research is forthcoming or not!

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Keywords

Urban renewal, urban regeneration, urban finance, public private partnership, urban infrastructure, placemaking, participatory planning

In the Name of Housing

Sameep Padora

sP+a, Mumbai, India

Abstract

In his 1925 book *Groszstadtbauten*, Ludwig Hilberseimer talks about the relation of city form to that of the smallest single architectural unit; a room within a house. This commentary is validated by the fact that the residential fabric of any city comprises most of that city's built form. For most people, this means the form of housing. This essay focuses on the history of architecture relating to housing in the city of Mumbai. The tie between Mumbai's form and its inhabitation. Looking specifically at the architectural form of these projects, they become instructive both through the breadth of their variations, as well as the depth of their spatial and formal engagements. Building on the history of housing in Mumbai since the early-nineteenth century the essay presents a typology of housing inhabited by ordinary people and their immediate spatial ecologies which facilitate a specific manner of compressed living. These types are commentaries on technology, lifestyle, and culture are all situated within the particularities of their respective time. Nevertheless, these unique armatures still seem to gravitate around certain emergent commonalities that could provide an armature for the design of collective housing models in the future.

Introduction

The alarming deficit of affordable housing in India has received a fair amount of attention in current and preceding government policy. The most recent central government mandate of the Pradhan Mantri Awas Yojna's (PMAY) 'Housing for All' (Ministry of Housing & Urban Poverty Alleviation Government of India, 2015) launched in 2015, targeted building 20 million affordable houses by 31 March 2022.

This impetus was reflected in successive individual state budgets, backed by a slew of fiscal incentives to promote the building of 'affordable' homes. In the state of Maharashtra, where the city of Mumbai is located, the number of homes needed - as anticipated by government - was close to 1.9 million (Zhang, 2016).

In the city of Mumbai, with limited land availability and minimal state-built social housing, burgeoning real estate prices have exacerbated the shortfall of housing for low-income groups. To ameliorate this bottleneck the state government announced the construction of 1.1 million affordable homes over the next four years in the city (Gadgil, 2015). While these policy mandates speak of well-intentioned bureaucratic and political machinery, there is absolutely no detail provided as to what the physical form of this housing is to be. So, despite there being strong government will and frameworks, there is a danger that real estate pressures will eventually subvert the intent of this policy and adversely affect the quality and diversity of life within these projects. While our research into this housing issue has been centred around Mumbai, the challenges are symptomatic of what other Indian, if not all Asian cities face.

This essay attempts to provide a framework to question this approach to housing, where the top-down prescription of policy has in the past resulted in models like the Slum Rehabilitation Authority (SRA). On paper these models offer parity of space for residents but on the ground result in dehumanising and pathetic living conditions, devoid of socio-cultural fabric and a decent living environment. The SRA, using a public-private partnership model with developers, builds free-sale housing to be sold in the open market as well as free SRA housing for slum dwellers. While the built area is proportioned equally between for-sale and free SRA housing, the land division is skewed. In most cases almost 80% of the land is allocated to the for-sale housing and the SRA housing is limited to just 20 % of the site, resulting in 20-storey SRA housing blocks built as little as 3 meters away from each other. Due to the lack of sufficient distance these projects have compromised access to light and ventilation. Hence the SRA housing units within, which the state provides for free to the urban poor, have an adverse impact on the health of their residents.

A 2018 study on three Slum Rehabilitation projects located in the heart of Mumbai city by planners from IIT and members of the NGO 'Doctors for You' reported that 1 in 10 people living in these slum rehabilitation colonies had TB or other respiratory diseases, and that lack of air and light was seen as a cause (Iyer, 2018). The report further implied that the organization of these buildings, that is, their architecture and planning, caused this drastic rise in diseases.

This situation is not unprecedented in the history of Mumbai city, and in many ways, it constitutes the origin story of building laws and the historic built form of the city itself. More than a century ago when Bombay was a burgeoning trading port, thousands of people migrated to the city in search of work. There were no planning and building laws at the time, and people lived in cramped houses in the dense inner-city without sufficient light, ventilation, or sanitation. As a result, when in September 1896 the infamous plague hit Mumbai, it quickly turned into an epidemic; almost 2000 people died every week for a year!

In response, the then government set up the Bombay City Improvement Trust (BIT) with the specific task of rescuing the city from its derelict condition. To ensure better light and ventilation for citizens, the BIT facilitated two distinct processes: urban renewal which included demolition of the old congested city fabric; and planning new suburban development using building and planning laws.

Fig.1: An example of the courtyard proportions, Bhatia Chawl.

Hence, the first planning laws for Mumbai were designed to create a healthier living environment. They took the form of mandating the 63.5-degree angle. (Fig.1). The rule stipulated that the distance between two buildings facing each other would be such that if a line was drawn from the top of one building to the bottom of the other, the angle would not be more than 63.5 degrees. This rule was designed to ensure that there was sufficient space between buildings to allow for adequate natural light to enter the houses.

This law was applied to all kinds of projects indiscriminately from the privately developed upmarket Dadar-Parsi Colony to the state built industrial worker housing of the Bombay Development Directorate (BDD) chawls.

From 1897 until today, the story has come full circle. We are once again at the point where the architecture of housing needs to be rethought to alleviate the threat of disease and address issues of livability, irrespective of class or income. And for this, we need not look too far.

Researching Historic Housing Types: The case of Mumbai

Following the plague of 1898, through intelligent design and despite the shortage of land and relatively high population density, the city's residents still managed to create living conditions with adequate light, ventilation & social space.

Our housing research through field studies sieved through the historic fabric of Mumbai, excavating some of these forgotten models of housing sutured deep within the city's fabric. We studied these projects through pure metrics, without the lens of nostalgia; comparing them against current models of housing to examine not only how these buildings looked, but also how these buildings worked.

These projects were then compared across metrics of open space, social space, circulation space, built areas and densities. The research focused on documenting the potential of existing and emergent architectural types which were native to our context and presented these to inform new or hybrid models for the design of affordable housing. The research further makes the case for specific spatial housing form to influence the framing of housing policy from the bottom up rather than from the top down as it is currently.

Selection Criteria

The national 'Housing for All' policy defines affordable housing on the metric of unit size; 300 sq.ft (27.87 sq.m) area. This numerical range of unit size was used as the qualifying criteria for the inclusion of most of the projects in the study to highlight and illustrate their relevance and projective capacities. The selected projects were analysed to look for the specific spatial and formal architecture that allows people to effectively inhabit tight interior spaces, which despite being in dense surroundings still had sufficient light and ventilation.

Models of Housing

While there are an incredible number of formal housing types that lie nestled within the city's fabric, we analysed the ones that we considered would have the greatest potential for projective possibilities. The broad typology of housing projects is as follows:

1. Chawls

The Chawls (Fig. 2), a form of early industrial worker housing, built by factory owners or by the state, were intended for labor migrating from their native villages to live and work in city's factories. Most of the chawls studied (except the state-owned BDD Chawls) lie in inner city of South Mumbai and are privately owned. Contrary to the singular image of the chawl as a set of rooms connected through a common corridor around a courtyard, we found many variants within this small geographical area. Many of these Chawls have evolved into family dwellings with spatial modifications to include attached bathrooms and kitchens.

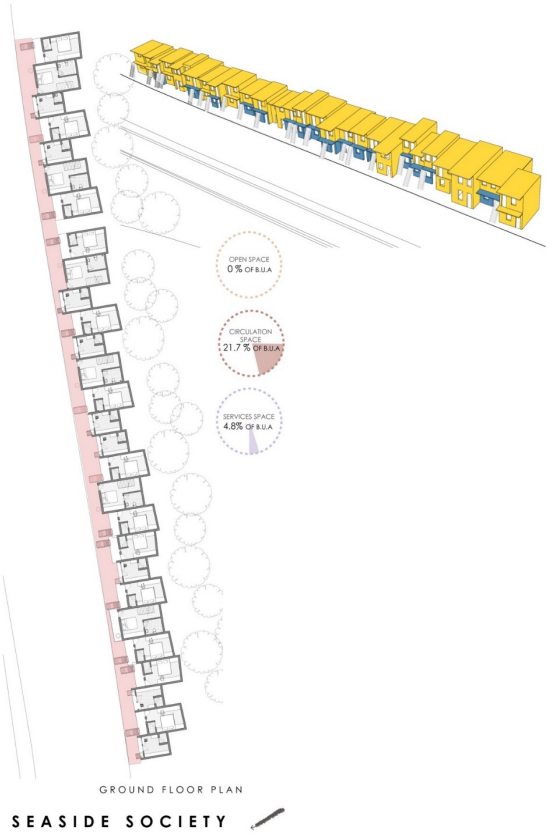

Fig.2: Plan showing the carefully articulated architecture of pavement dwellings at Slim City Seaside Society.

2. Pavement Dwellings

These home-grown slim cities, unlike aggregated slums do not enjoy the benefit of being addressed by state housing policies, in situ. They are slivers of mixed-use work-live fabric that inhabit thin interstitial spaces in the formal city closely linked to symbiotic economic networks that bind them to their location. Built out of sheet metal on mild steel or aluminum frames, from a distance these ground-level and single-storey settlements appear ad-hoc and untidy. (Fig. 3) On closer inspection, however, one can observe a finely tuned logic to program adjacencies as well as an expert articulation of the tiniest available open space.

Fig.3: Site & Services Dwellings at Charkop

3. Site and Services

The only Site and Services project studied was the one in the Northern suburb of Charkop built through World Bank Funding in the early 1980's. The reason for its inclusion is that it marks an alternative approach to housing for the poor and is spatially the most impressive of all the state-built projects (Fig. 4a and Fig. 4b). Closest to the high-density low-rise models of slums or urban villages of Mumbai, it displays a distinct character and scale that is fast disappearing in lieu of the singular high-rise format of the city fabric today. The houses clustered around the courtyard treat the courtyard spaces as a common resource valued as an event space; a fact that was ratified through resident interviews. Even four decades later, despite the small dwelling size, the courtyards remain un-encroached, well looked after, and are the lifeline of the settlement.

Fig.4a: Dadar Parsi Colony Source: Phillip Cala

Fig. 4b: BBD Chawl. Source: Sunil Thakkar

4. MHADA projects

Being the statuary body responsible for providing social housing, a project by Maharashtra Housing and Development Authority (MHADA) was also included in the study. MHADA's mandate is to build social housing in equal parts for both 'economically weaker sections' (EWS) & 'low-income groups' (LIG). Recently however, MHADA invited collaborations with landowners and developers to provide EWS & LIG housing, raising questions about the dilution of the state's social housing mandate and the quality control of these built environments. Most of the MHADA projects operate though an approach where, irrespective of location, there is very little formal change in the architectural plan of the unit/building. That said, open space planning is generally generous and well accounted for in these projects. It remains to be seen if the new MHADA model follows the

route taken by SRA schemes; of compromising the living environment for EWS & LIG housing for free-sale MIG and HIG housing.

5. SRA Housing

The Slum Rehabilitation Authority (SRA) as described earlier in the essay uses a public-private partnership model with developers building free housing for slum developers in-situ, the cost of which is offset by housing usually for the upper middle class or high-income groups (HIG) to be sold in the open market. While the SRA states that both the free houses and the sale component should have an equal amount of area built, the act however does not make an equal division of the land that these are built on. So, in many cases a greater number of rehoused tenants live on 20% of the land while 80% of the land is reserved for luxury housing in which fewer people stay. In our research, we examined two extreme variants of housing SRA housing one, a project of intense vertical compression on a limited site with no open space, and the other with a good proportion of built to open space.(Fig. 5)

Fig.5: Well-ventilated covered internal market streets at Swadeshi Market

Housing Dependencies

The study of the above housing types formed the basis of our analysis into the architecture of affordable housing types. The more time we spent in the field looking specifically at the form of these projects, the more instructive they became, both through the breadth of their variations, as well as the depth of their spatial and formal engagements. The analytical diagrams and drawings further galvanised our belief that these armatures, however unique, still seem to gravitate around certain emergent commonalities. Our study lists these characteristics and argues for them to be viewed as essential benchmarks while designing the architecture of low-income affordable housing. A few of these parameters are as follows:

1. Networks

Global best practices in planning today acknowledge the importance of linkages to transportation networks as housing subsidy. Our study furthers this understanding by bringing to light the interdependencies that these projects share with the city in so far as their design, while influenced by the larger site context, also impacts the surrounding city fabric.

One such project is the Swadeshi Market. (Fig. 6). Programmed like many developments one sees across the city with commercial below and residential above, this project is roughly three quarters of the size of a Manhattan city block. Its market is not at the edge fronting the street creating the traffic snarls so common in Mumbai, but rather, there is a market street that extends through the building, literally connecting you from one part of the city to another. Moreover, the city does not stop at the building but extends through it in well-ventilated covered internal market streets. These streets are used by people as shaded shortcuts through the neighbourhood and hence also end up increasing foot traffic for the shops.

Fig.6: Courtyard proportions at Bhatia Chawl.

Above these streets and shops lie linear residential units, separated by aerial courtyards designed for social interaction. Swadeshi Market and other projects like it are networked within the urban landscape rather than being isolated housing blocks. These projects within various degrees of adjacencies to street networks show how their built forms accommodate linkages to the adjoining urban fabric, allowing for the city to permeate though their private domains. Such systems are not limited to physical connectivity alone but are also part of socio-economic networks as seen in slim city, Seaside Society. Symptomatic of all such settlements, residents of Seaside Society work within proximity of their homes and are enmeshed in various activities servicing the formal city, while also being serviced through its various mechanisms.

2. Social Infrastructure

The importance of social cohesion has been a critical paradigm for the sustenance of these housing types. The role played by elements such as courtyards, corridors, and staircases in the generation of social connect is significant. This condition challenges the assumptions of regulatory frameworks in a city like Mumbai, which are designed to segregate common space from living space in fear of the former being encroached by the latter.

Bhatia Chawl's intimate height to width ratio of the courtyard facilitates communication across its volume,

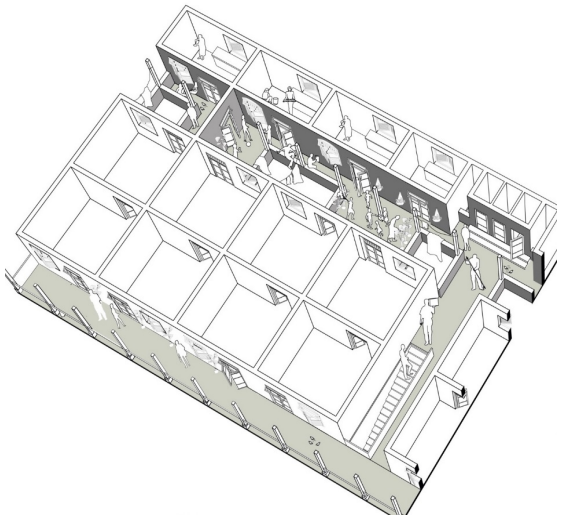

Fig.7: Atmaram Chawl repeating corridor space

resulting in an extended social fabric that is embedded in the architecture (Fig. 7). Residents of the society here speak with great pride about their housing and how many of them were born and grew up in the building. While they wouldn't mind more area being added to their individual units, they are clear that it cannot be at the expense of the common spaces that they share. In buildings like these you witness first-hand the much-eulogized sense of community. One of the residents told us how despite having arthritis and living on the 4th floor of this walk-up she still preferred living here instead of an apartment building with an elevator because of the sense of bonding and security she feels. She added that if she needs help for anything, not just her immediate neighbour but the entire building comes to her aid. We found this sense of community in other buildings also, the common link being the corridors were a heavily used social space and the x by 2x courtyard proportion creates an intimacy where the courtyard functions like a giant common living room, fostering this sense of community.

This case lies in direct contrast to the SRA project in Lower Parel where corridors, devoid of light and ventilation, are no more than conveyors of people – circulation that offers little potential for community interaction (Fig.8).

2. Open Systems

The idea of a systemic framework instead of a fixed planning logic creates the possibility of an architecture responsive to variation and flexibility. This open system allows for changes in unit size, design and programme responding to a resident's changing needs over time.

In projects such as RK Chawl (Fig.9) the ordering of units is based on a staid repeating grid despite which the system by rearranging the corridor still allows for four units of varying sizes. The architectural planning hence accommodates residents belonging to different socio-economic segments all within the same building without compromising on structural efficiencies.

Fig.8: Corridor space used as common space in RK Chawl Chawl

At the Atmaram Chawl which was modelled on the British bungalow type, with everyone's kitchen separated from each unit's living/bedrooms there is an alternating plan configuration of access corridors and programme. (Fig.10). This tartan grid like plan of public corridor-program-corridor-program has allowed people to modify their units for where the kitchen part of the unit is rented out as a room for paying guests to function independently, creating avenues for expansion or additional revenue for the owners.

Fig.10: UDAAN corridor space as communal space

4. Appropriations & Shared Space

The previous point segues into one of the most pertinent aspects of design of affordable housing, that being the notion of shared space which challenges the traditional binaries of public and private space. It was found for

Fig.9: RK Chawl plan showing variety of unit types

instance at the RK Chawl (Fig. 11) that people heavily relied on the area in between their houses for use as dining spaces, storage and social spaces, using them almost as extensions of their private interior space.

Fig.11: SRA Housing with intensely compressed space

While internal reconfiguration of space – such as the conversion of the mori (pot wash area) to a bath area or insertion of a loft level – was seen to be the norm in all the projects, the natures of spatial appropriation differed from project to project, contingent on the shared values of the community as in RK Chawl, or because of its absence as seen in the BDD project.

5. Detail

It was instructive to see the sophistication of construction and technical detail within these projects. Indeed, the ingenuity of their construction was pivotal to producing extremely livable spaces. In other words, tight interiors and high densities have given rise to a range of inventive architectural details at every scale, as seen in the louvered stack ventilation of towers of Swadeshi Market Chawl, (Fig.12), sophisticated structural engineering in the cantilevered room additions at the BDD chawls, and tripartite windows for natural cooling at Bhatia Chawl. And at the smallest scale, that of furniture; an indigenously developed collapsible ladder would make even IKEA

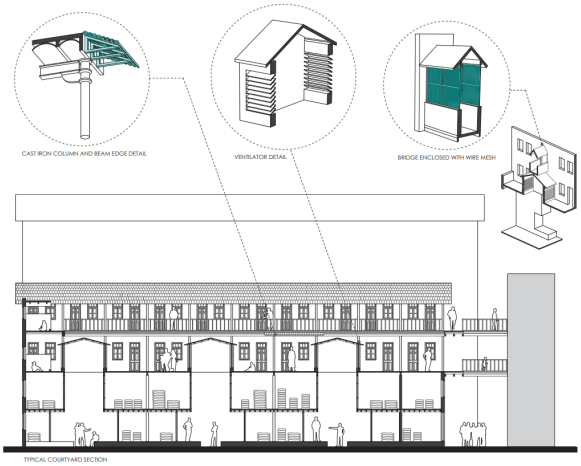

Fig.12: Louvered stack ventilation Towers, Swadeshi

proud. The ladder flat packs against the wall of a thin corridor allowing one to open it up to access the mezzanine above. Such innovations help position the design of affordable housing projects, not merely as receptacles of people, but as well thought out intricate functional systems at multiple scales that hold clues for the design of housing in today's context.

The Design of Udaan Results

The above five points are but a few of the many paradigms that can inform the design of affordable housing. Throughout this essay we have argued that the design of affordable housing needs to consider among other factors: access to light & ventilation, expandability, systemic openness, live-work scenarios and socio-cultural space. However, what gets built on the ground in the name of housing are largely boxes of concrete that acknowledge little else than the quantum of real estate they enclose.

So, when we were offered an opportunity to design an affordable housing project, we mobilised our research as a basis to inform its design. The project site was in Karjat, on the outskirts of Mumbai city which, while far removed from the geographical and real estate pressures of Mumbai, provided fertile ground for us to test the projective capacity of our learnings in real time and an authentic context. The project called Udaan, though on the outskirts of the city, lay within a 1.5 km radius from a new railway link into Mumbai as well as near the new economic centre of the upcoming Mumbai International Airport. This factor ensured strong links to economic and transportation networks and hence possible access to sources of livelihood for the residents.

The developer's initial brief involved making separate towers for studio units and for one-bedroom apartments. Instead of making this separation, we overlaid the two different units one on top of the other linked together by a common terrace space. This terrace space included different activities such as terrace gardens, children's play areas, and social gathering spaces all integrated into the people's daily movement routines. To this mix we added two more kinds of units. First, a unit on the uppermost floor with greater ceiling heights to add a mezzanine to fulfil the need to expand space for a family; and second, a live-work unit at ground connected to a balcony such that small home industries were possible.

In keeping with the paradigms of the 'Housing For All' policy and to accrue the linked tax benefits, the developer pegged the size of the apartments at 300 sq feet. In our research, we had observed that when people live in small spaces, they depended heavily on the common space outside their houses. We carried this idea forward into the project by designing porous edges between housing units and corridor spaces, with collapsible doors so that the interior functions could potentially spill over into the corridor. The corridor hence mimics a community living room.

Learning from the sophisticated passive ventilation systems in projects like the Swadeshi Market, we designed

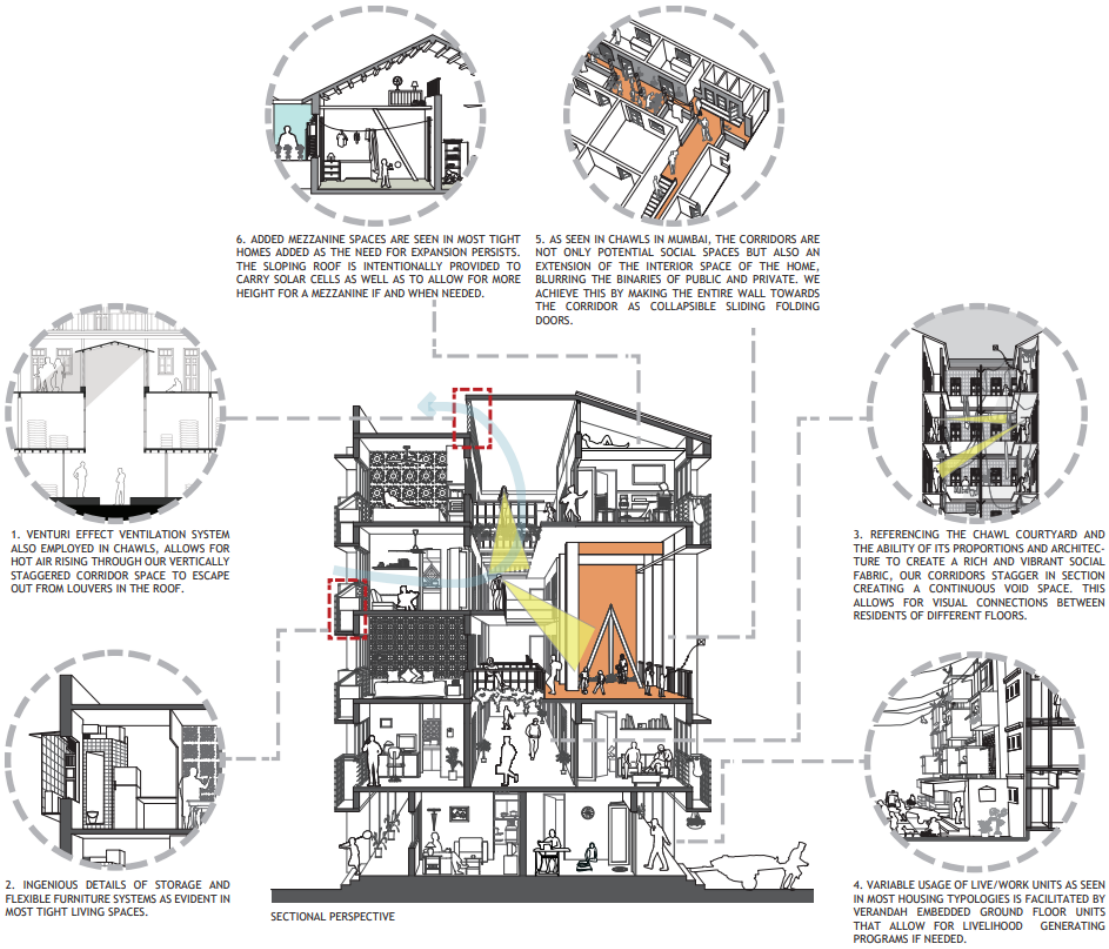

Fig. 13: **'**Housing For **A**ll**'** – Cross-section of the building for cross ventilation to ensure comfort in our humid climate

the cross section of the building for cross ventilation to ensure comfort in our humid climate (Fig. 13).

The apartments were designed with two sets of windows to enable the Venturi Effect; one set of windows along the external walls let in cool air, and a second set along the corridor allow hot air to rise and escape through the funnel like lobby through ventilators built into the roof. The inner windows also allow for interaction between residents and create a sense of security across the corridor should they chose to leave their windows open (Fig. 14).

Fig. 14: Inner windows allowing interaction and added security.

Conclusion

The architecture of low-income affordable housing whether state-built or state-enabled developer housing, in most cases lacks imagination and is usually just a mathematical exercise to maximise real estate profits. A recent 30-storey affordable housing project being built for free-sale by a private developer has rooms only big enough to fit a mattress with light and ventilation from a 30-floor high duct of 10 feet in width (Padora, 2019). So, whether it is 300 sq ft apartment in the state built free SRA or a 5-7-million-rupee apartment, we are inhabiting an architecture that is designed to make us sick. So, the question to be asked is this: what enables such architecture? Bad building & planning laws or just bad Architects?

The focus of the planning laws has clearly shifted from the emphasis on quality of life from the early 1900's to quantity of real estate today. With the primary concern of the DP & DCR being to maximize monetary gain, buildings can be taller and closer together irrespective of their access roads, infrastructure, and more importantly the light and ventilation inside these buildings. Through our research and its application in the design of Udaan, we are advocating an urgent need to change the focus of the building code from being purely quantitative (concerned

only with real estate and its linked profits), to being equally concerned with the quality of life that architecture produces and the health of its residents.

Through our research and this essay, we propose that the way forward is to look back and learn lessons from history; to contextualize some of these ideas that introduced healthy architecture into the DNA of our building & planning codes.

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Keywords

Mumbai housing, architectural history, spatial and formal engagements, spatial ecologies

Cultural Jugaad in Historic City Transformations: India

Shikha Jain

DRONAH, New Delhi, India

Abstract

Several historic Indian cities have managed to retain the original urban character by using readily available materials, craftspeople, and cultural traditions despite increasing urban transformations. This notion of sustaining/preserving/continuing certain cultural elements and rituals has survived in various forms in the last two centuries. Historic cities showcase their living heritage at the global level and are exemplars for studying the strong linkages within traditions and indigenous modes of preservation. In such situations where stakeholders have centuries of association with the site, it is essential that professionals look beyond conventional solutions to better understand local perceptions and thereby establish the appropriateness of any urban level interventions.

This article draws from various urban conservation works carried out in the historic cities of Rajasthan over the last two decades. It illustrates the discoveries and challenges in understanding the traditional local mindset for working in such areas. The indigenous methods practiced in these historic living cores are often at variance with the norms and logics of Western city planning being followed in post-colonial India. Examples in the cities and settlements of Jaipur, Udaipur and Ajmer, feature in this article, highlighting the urgent need to understand the local community mindset and the Indian approach to solutions for rapidly modernizing historic urban centres.

Introduction

In a country like India, where national highways often transform into pilgrim routes, urban streets and squares corroborate as ritual spaces, stones on pavements evolve into living temples and temporary infrastructure for the mega-scale Kumbh Mela organization. This diversity has come to be accepted as an international solution to city planning; clearly, such examples of local innovations which often defy all norms of conventional urban planning need to be acknowledged.

The north-western state of Rajasthan in India is equally rich and diverse in showcasing such innovations in its historic walled cities. These medieval period cities have sustained centuries of developmental changes and retained their historic character to a large extent. In various sub regions in Rajasthan these cities have managed to retain the local character and urban vocabulary pertaining to available materials, craftsmanship and the cultural traditions of that place. The cities and towns of Rajasthan thus present some interesting cases of urban adaptations in historic city areas that can be termed as a 'cultural jugaad', in which modern technology or urban planning is molded to accommodate local cultural tradition. This essay draws from various heritage planning and urban conservation works carried out in the historic cities of Rajasthan over the last two decades to illustrate the discoveries and challenges in understanding the local traditional mindset for working in such areas. The indigenous methods practiced in these living historic centres are often at variance with the norms and logics of western city planning. Using examples in the historic settlements of Udaipur, Jaipur and Ajmer, this essay aims to address the crucial need for understanding the local community mindset and the Indian approach to solutions for living in rapidly modernizing urban historic centres.

Strategically located amidst a saucer shaped basin and surrounded by hills of Aravalli Range on all sides, Udaipur lies in eastern Rajasthan. The entire city area serves as a good catchment facilitating a network of lakes in the city. Founded in the mid-16th century, it was formerly surrounded by a circular defensive wall from all sides - except at the western side which was bound by lakes (Jain and Arora, 2017). Udaipur possesses a unique local landscape including spectacular views and a vulnerable watershed, outstanding built and urban heritage with urban villages, public spaces, historic houses, palaces and temples, traditional crafts, and a great deal of potential for development as a destination for sustainable cultural tourism.

During a survey of the lake city of Udaipur in 2005 when it was suffering from a drought and the lakes were dry, our work team observed an interesting phenomenon. A group of women stood on the dry lakebed forming a circular enclosure while a municipal water tanker parked close by supplied them with water. After inquiring with the locals, we gathered that this is a usual phenomenon in the case of any deaths in the family. As part of their traditions, the women must take a communal bath in the lake after any death ceremony in the family. Although their houses now have modern bathrooms with tap water, this venerated spot

Fig. 1: Udaipur City – Lakes and Rituals Picture Credit: Shikha Jain.

of the lake should be used for this ceremony. Even when the lake is dry, they order a municipal tanker and take the communal bath on the lakebed to complete this ritual (Fig. 1). It can clearly be seen that the local traditions are inherent in the people's mindset, and often new technology is adapted to cater to traditions rather than shedding them. Another case from the 18th century planned historic city of Jaipur is associated with the simple innovation in parking systems used by the local vendors for inner streets. The planning of Jaipur is world renowned and has recently been recognized on the World Heritage List in 2019. While the main bazaars are still able to take the traffic of a 21st century urban capital, the situation is much worse in the inner streets. While designing a heritage walk in the inner city area, we came across traffic as a major issue – interestingly, however, we observed that some solutions were already in place through the local 'cultural jugaad' of the thelawalas (Vendors with 4 wheeled wagons); who parked their wagons against the walls when not in use, thus helping to save space. Significantly, it was observed that similar parking systems were being designed for cycles in the western cities for space saving (Fig. 2).

In the case of Ajmer (Fig 3), another historic city of Rajasthan, we came across the challenge of designing for the various multifold activities such as drying of sarees by textile shops in a bazaar while providing solutions for the sidewalks and façade conservation.

One needs to understand these inherent associations that govern the functioning of an average Indian citizen and realize that planning is more cultural than technical. In India, (even in this day and age) we find several pockets of living historic cities that continue to function with inherent traditional knowledge systems ensuring sustenance of socio-economic and environmental aspects often grounded in the locals' religious beliefs. The roads and public spaces of most historic cities are often congested with processions of such a kind, oblivious to any traffic congestion. But the question is: Can conventional western urban conservation solutions respond to the needs of this living heritage in the cities in Rajasthan or India?

Our case studies made us realize the need to advocate for value based (Marta de la Torre; 2002), process-oriented conservation planning that balances theory with practice. In such situations, where stakeholders have centuries of association with the site, it becomes essential for

Fig. 2: Contemporary Western bike storage facilities juxtaposed with local 'cultural jugaad' by the thelawalas

professionals to first engage with the site and understand it in its entirety, before deciding the extent to which the proposed theory (plans, frameworks, guidelines) needs to dialogue with the on-the-ground situation (stakeholders, use and centuries old traditions).

Conclusion

Today, Indian cities display the greatest capacity to react, withstand, adopt, accommodate, include, use, and benefit from contemporary challenges, while continuing to retain an indigenous mechanism for these adaptations. Indian cities present dual development strategies; clearly demarcating post-independence archaic colonial planning

Fig. 3: Challenges in designing for informal activities in Bazaars, Ajmer.

norms and local cultural aspirations that determine the design of improvised urban spaces. It is evident that history, culture, religion, and faith play a proactive role in urban planning at an informal level in India. Therefore, there is a need to understand, record, and capitalize on such locally adapted solutions within planning frameworks for historic city areas in the future.

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Keywords

Urban conservation, Rajasthan, indigenous, traditions, community

Water Culture Connection: A Conservation-Led, Integrated Development Strategy for Water to meet SDG 6: Clean Water and Sanitation

Poonam Verma Mascarenhas

Archinova Environs, Goa, India

Abstract

The increasingly frequent natural disasters in the last decade, are not only symptomatic of climate change, but indicate the critical importance of a holistically overhauling our lifestyles and sympathetically engaging with our built and natural environment. There is an urgent need to actively engage with and analyse the pre-industrial era traditional settlements, as they constitute a three-dimensional record of past wisdom embodying a holistic way of life that reflects a synergetic relationship with nature. The essay explores connect of water and settlements in Indian subcontinent from the Indus Valley civilization to mediaeval times to the colonial and then Independent India. Traditionally in India, land, rivers, fields, groundwater, and forests were all valuable resources and not commodities. Each of the states of India and their traditional settlements are a repository of such knowledge systems for respective climate. By combining 21st Century mapping technologies and regional traditional knowledge systems of water harvesting and management, it is possible to effectively synergise the top-down and ground-up planning policies. Citing examples and experiential learning's, the essay espouses for conservation led development as preferred planning policy to achieve an equitable, stable, self-sustaining, compassionate, and humane future, as continuum of three thousand years of nature-culture journey.

Introduction

Water constitutes sixty percent of a human body and covers approximately seventy-one percent of the earth's surface, of which, about ninety-six percent is saline. India has just four percent of the world's freshwater for sixteen percent of the global population (ide-india, 2020). Murthy and Kumar (2020) note that almost seventy percent of India's surface water resources, including eighteen major rivers and a growing percentage of its groundwater reserves, are contaminated by biological, toxic, organic, and inorganic pollutants. Fortunately, water is a renewable resource and becomes polluted only when polluting loads exceed the natural regenerative capacity of the water resource. Thus, we have a role to play in ensuring water security.

The evolution of life on earth is a transformative story of water in continuum. Water is central to all aspects of human civilization, from its role in agriculture and industrial development to the embedded social, cultural and religious values with which it is imbued. The sentiments of cultural connection are recognised as the lynchpin for developing water security solutions. This approach was formally adopted at the 3rd World Water Forum through the following statement:

> Due to its fundamental role in society's life, water has a strong cultural dimension. Without understanding and considering the cultural aspects of our water problems, no sustainable solution can be found. (WHO, 2005-2015)

Fig. 1: Upper and Lower Sagar site at Amber. Source: Ashish Srivastav, (first published in The Art of Conserving Indian Cities, My Liveable City, Oct-Dec 2019.)

In 2001, while working as a Conservation Architect Consultant[3] at the 12th century CE settlement of Amber, the cultural concept of planning and designing with nature became tangible to me. Essentially, the Upper Sagar site, located in the northern outskirts of Amber village, is a reservoir created by a dam-wall spanning the two adjacent hills of Aravalli range at the closest point. Designed as a blind wall, the dam holds water on the catchment side. There is a three-level terraced building on the other end, with rooms at the lower levels for services. A pavilion is situated on the top and thus serves as a short stay royal lodge. The site has another check dam wall on the lower

[3] I was working as a consultant for the INTACH Jaipur chapter for building-conservation projects under Asian Development Bank funded Rajasthan Urban Infrastructure Development Project, Jaipur, India. Phase- I, 2000-2005),

end of the valley, with a walkway and a yard which created another reservoir called the Lower Sagar. The resultant two reservoirs, along with the Panna Miya ka Kund- a stepwell, in the valley at the village center, are design interventions from an era of experiential understanding of

Fig. 2: Restored Panna Miya Ka Kund at Amber. Picture Credit: Poonam Verma Mascarenhas.

topography and water connection. While conserving these sites, the reservoirs were de-silted, and the dam walls were repaired using traditional materials. The stepwell was emptied of all the solid waste that had collected in it over decades, and the built fabric was restored. The sight of water trickling from the north-rock-face, at a depth of 35 feet, right at the bottom of the square kund is a cherished memory and an experiential learning of water tables and underground water channels.

Two seasons of failed monsoons had reduced the number of wells with water to twenty-six in Amber village. Following the completion of conservation projects, coupled with a year of a good monsoon, the project teams were delighted to find that all the seventy-five wells in the valley had been revitalized. Thus, conservation of historic built elements and surroundings of the two reservoirs had recharged the water table which serendipitously revived the ancient water distribution and management system. Thus, ensued a personal engagement by observation and enquiry into the pre-colonial settlements vis-a-vis planning and water management systems (Mascarenhas, 2020).

Dholavira

The ancient civilization of the Indus Valley, comprising Harappa and Mohenjo-Daro and dating to 3000 BCE, remains an enigma as the script of that era is still not deciphered. The archaeological sites of Mohenjo-Daro and Harappa in present day Pakistan have been extensively documented and many insights into that era are astounding with respect to planning and resource management along with trade and agricultural practices. The archaeological site Dholavira is the fifth-largest of the eight major Harappan sites. It is located in present-day Rann of Kutch, in the northern part of Gujarat state in India. Discovered in 1967-1968, the site has been under excavation since 1990 by the Archaeological Survey of India. The findings and analysis assert that the site was occupied from c.2650 BCE, declining slowly after about c.2100 BCE, being briefly abandoned, but then reoccupied until c.1450 BCE. Understanding the site as a whole has continued with scholars coming together at the Indian Institute of Technology, Gandhinagar, Gujarat, under the umbrella of the Archaeological Sciences Centre. Some of the findings were showcased at a lecture series by Michel Danino (2014), which I summarize here:

Dholavira was an important city for trade, primarily to control the movement of goods from Gujarat to Sindh, Punjab and Western Asia. In ancient times, it was an island. Managing water for humans was as much of a challenge then as it is now. A rivulet, on the southeast of the site was dammed, using wooden palisades to force the water to flow into the city. Twelve hectares of the forty-eight hectares of the city area was identified for the management of water as storage. No grand dwellings were un-earthed, nor were any specifically religious. All habitation appeared to be similar, and it was only by location on-site that some social hierarchy was perhaps observed. The top of the hill has been identified as a citadel by archaeologists and another rectangular building footprint with thick walls as a granary. The most important of all the discoveries are the stormwater and wastewater drains of varying depths. Stormwater drains of up to human height, hint at a spate of torrential rain experienced by the region, and for which it was planned. Two spectacular reservoirs that form the south-east boundary to the city are interconnected with steps hewn on the sides to access the lowermost parts. It also has systems for drawing water out, and the drains empty into these reservoirs at several points.

Fig. 3: Dholavira – water reservoir. Picture Credit: Poonam Verma Mascarenhas.

The city is said to have sustained life for 600-700 years. This is significant, as even today there are no such habitations in the region largely due to the lack of palatable

water; the water table too is saline which also leads to poor agriculture in the region.

Fig. 4: Stepwell, Modhera Surya Kund, Gujrat. Picture Credit: Poonam Verma Mascarenhas.

Today, the inhabitants of the Indus valley are believed to be the first climate-change-migrants of the subcontinent. Historian Thapar (2002, p.xiii) records the Vedic period (c.1500 - c.500 BCE) of Indian culture as the period of history between the end of the urban Indus Valley Civilization and the second urbanization in the central Gangetic Plain post-migration. It is the later Vedic period (c.1100 – c. 500 BCE), that is credited with the development of the Sanskrit language, script, and several treatises for planning, social governing systems, spiritual and physical health along with ritualistic Hinduism. Many of the treatises were a part of the oral tradition prior to the writing of the Vedas. The Rigveda is considered to be the oldest of the four Vedas, and many scholars and historians have traced the development and records of mathematics, astrology, astronomy and building/planning guidelines, known as the Vastu Shilpa Shastra, to this period through the many treatises.

Vastu-Shastra, literally, the science of dwelling, is an ancient manual of architecture in Sanskrit. These contain Vastu-Vidya, meaning knowledge of dwelling (Dutt,1925). Several Vastu-Shastras exist; the Sutradhara Mandana's Prasadamandana is a manual discovered in Rajasthan for planning and building a temple which includes chapters on town building; the Manasara Shilpa and Mayamatam are guidebooks on South Indian Vastu design and construction which are estimated to be in circulation by 5th to 7th century CE; the Isanasivagurudeva Paddhati is yet another Sanskrit text from the 9th century AD, describing the art of building in central India; finally, the Brihat Samhita by Varāhamihira is a widely cited ancient Sanskrit manual from 6th century CE, describing the design and construction of Nagara style of Hindu temples. These ancient Vastu Shastras often contain descriptions and discussions of the principles of a Hindu temple as a holistic part of its community. They illustrate various principles for being in harmony with nature and provide a diverse range of alternate designs for house, village, and city layouts, along with temples, gardens, and water bodies (Silverman, 2007).

Medieval India saw subsequent centuries of demolition and material reuse for new construction. Additionally, the pattern of assimilation, appropriation, adaptation, adoption, and fusion has continued to shape the built environment through the subsequent Mughal and Colonial periods (Mascarenhas, 2019 a).

This linearity of time study into the evolution of architecture and planning in the subcontinent reveals how in pre-colonial India the political boundaries were partial and far more permeable to both trade and knowledge systems. The adherence to Vastu Shastra principles in design and construction of temples, as witnessed at Himachal Pradesh, Rajasthan, Kerala and from Tamil Nadu to Bengal, establishes the rigor of the treatises; one that encouraged regional thought and material prowess, which had its genesis in the symbiotic relationship between the built and the unbuilt. The diversity in styling the template is credited to the ingenuity of the respective indigenous communities.

Fig. 6: Traditional water mill for irrigation near Kumbhalgarh, Rajasthan. Picture Credit: Poonam Verma Mascarenhas.

The study of the only medieval living fort at Jaisalmer, c.1156 AD, Rajasthan, reveals it to be an example of 'traditional passive cooling' characterized by the use of thermal mass, controlled openings in the building, sun shading of building's surfaces and fenestrations, flexible building envelopes, controlled ventilation, and the use of night radiation cooling and flexibility of spaces (Gupta, 1990). While ASHRAE measures temperature and humidity; historic cities work on radiant temperatures felt by the body. Water systems (involving collection, storage, and maintenance) were a necessity in the arid areas of Rajasthan and Gujarat. Houses in the fort city collected water and stored it in an underground tank in the courtyard.

Other systems included man-made catchments lined with temples and other structures, rendering them sacred and thereby conveying that the space be treated with reverence, and kept free of defecation and garbage.

Fig. 6:. Rain harvesting and accessing systems, Mandu Fort, M.P. Picture Credit: Poonam Verma Mascarenhas.

Engineering and artistry were combined in the walls of the dam which lined the catchment. Animal figurines at different heights were not placed randomly but formed definitive markings for the measurement of collected rainwater each season. This subsequently informed water usage for both domestic use and husbandry by the polity. It was thus part of the residents' shared experiential knowledge system which had been developed and maintained in a continuum for centuries. Additionally, the old society had designated families as important community members who maintained the waterworks. The design incorporated sacred themes, pillars, pavilions, etc. to remind the users to be mindful and reverential of the watershed area. This sacred value ascribed to water was practiced throughout the subcontinent with rivers being given the stature of goddesses. Temples adorned with water tanks were an essential design feature in settlements which survive today.

So how did this consciousness change so drastically in the last 100 years? Today, all rivers, lakes, and ponds in India are being discussed for all the wrong reasons. The water table in most towns and cities is alarmingly depleted and our coastal belt is extremely vulnerable to saltwater ingress due to bore-wells.

Imperialism and Independent India

One point of departure is perhaps the advent of the colonial management of social disruption. All community-based systems were systematically dismantled to be replaced by colonial administration. The Public Works Department (PWD) was constituted in 1854 to undertake civic infrastructure works such as roads to carry goods to the port for shipping to England and for the movement of imperial armies; irrigation canals to increase the production of cotton and grains to be shipped abroad; and barracks and defense stations to house the soldiers of the imperial armies and other residential establishments for ruling the colony. In 1911, with the decision to shift the capital from Calcutta, a department was set up exclusively for building the new capital - New Delhi. Transformed into the Central Public Works Department (CPWD) in 1930, it then primarily oversaw the vast office and residential campus of the Central Secretariat and allied offices.

Independent India had no choice but to continue with the established systems: regional PWDs grew state-wide as the primary institutions for Nation building. In the early 1970's, the departments were segregated based on types of infrastructure, namely, for highways, bridges, buildings, irrigation, sewerage, electricity, industrial sites etc., while town-planning departments took up land-use policy and planning. However, the hoped-for efficiencies used to justify the reforms came at the cost of coherence.

The fragmented and over-arching mismanagement that resulted is well analysed by Baig (2017) who presents the 12th century Jaisalmer fort as one of her case studies. Being a border outpost after independence, this World Heritage Site became relevant once again, both for the tourist industry and for the nation; leading the Central Government of India to invest in bringing the Indira Gandhi Canal close to town to sustain the growth. The fort, with its existing inbuilt water storage systems, was also furbished with underground water tanks placed in the bastions, and a supply of piped water to households was seen as a sign of development. Unfortunately, it was not accompanied by a wastewater management plan for drainage, and by the time the need became obvious the historic fort was in distress! Not only had seepage led to the collapse of a couple of bastions, but some of the historic buildings within the fort as well! Users who were mindful of not wasting water also became complacent, and soon the fort was put on the World Monument Fund's endangered heritage list in order to provide expert advice and investment. Although many private organisations continue to engage in canvassing, re-building, and restoration of the heritage fabric, multiple Government agencies, including the Archaeological Survey of India, the Public Works Department, the Electrical, and Public Health departments, etc., also continue to work unilaterally. Participation by residents is negligible, and not surprisingly, it all has led to multiple detrimental effects on India's only living fort and its surrounding ecology.

The scenario is similar in every city, town, and village, almost all of which are on the continuum as living cultures in India, existing at various stages of decline vis-a-vis livability due to callous planning. Moreover, water - the primary source of life - is being appropriated and commodified increasingly every day by the privileged.

Neo-Liberalism and its impacts

Economic liberalization in India has increased urbanization which often correlates to higher national incomes (GDP) as availability and consumption go together. The expansion of urban areas is also socially significant as cities provide anonymity for those seeking to earn a living within a caste-ridden Indian society. Accordingly, unplanned development and severe environmental degradation are a feature in all our cities. Studies have shown that 19% of air pollution in Mumbai is caused by the open burning of landfill waste: producing carbon-monoxide, hydrocarbons, and other particulate matter. They are also the source of the leaching of heavy

metals into the water table, resulting in serious health concerns for the those residing in the area - both directly through water consumption and indirectly through the contamination of food grown in the area. These are irreversible impacts as water table contamination is almost untreatable within the living time frame of a generation or more.

To make matters worse, increasingly frequent natural disasters in the last decade, including floods, droughts, hurricanes, and flash floods, are not only symptomatic of climate change, but indicate the critical importance of a holistically overhauling our lifestyles and sympathetically engaging with our built and natural environment. There is an urgent need to actively engage with and analyse the traditionally constructed buildings and settlements which have survived for centuries. They constitute a three-dimensional record of past wisdom embodying a holistic way of life that reflects a synergetic relationship with nature.

New imaginings and approaches

Let us now imagine that each government department worked in collaboration and followed the historic layout as a guiding principle wherein each lake, pond, tank, watershed area, etc., was regarded as a life-giving source, to not only be protected and cared for as a priority, but to be used for ascertaining the carrying-capacity of regional developments. This could then become the foundation of a holistic approach for managing agricultural needs and ensuring the water-feed to the water table. Based on the participation of an inspired resident-community, a long-term symbiotic relationship could be created; instead of the endless firefighting scenario in which we currently appear to be caught.

Such was the approach taken to address the worst water crisis in Chennai in 2019 by Shri A. Vikranth Raja - the then District Collector and present Secretary to the Chief Minister, Puducherry. The following excerpt from an article by Rajesh B. Nair (March 2020, pp.) sums it up:

"It all started with a query raised at the meeting. When someone asked if Karaikal had the capacity to store 7 tmcft of river water allotted by the Cauvery Water Disputes Tribunal the response from officials was an emphatic 'no'," says M. Selvaganesh, Assistant District Collector of Karaikal. This was when the then District Collector and present Secretary to the Chief Minister, A. Vikranth Raja, stepped in with the idea of digging into revenue records to locate the region's traditional waterbodies.

"To our surprise," says Raja, "we found 549 ponds within a small territory spread over 157 sq. km. However, we found that 40% of these water bodies were in various stages of extinction. Most of them turned out to be dumping yards." The biggest hurdle, the young officer says, was to figure out a way to bring these water bodies back to life. "When people depended on ponds, they took care of them. When wells came up, they forgot about ponds; then when hand pumps arrived, wells were neglected. And, finally, with piped water, hand pumps went into disrepair," says Raja.

The article further informs us of the adopted approach, which identified community awareness and participation as crucibles of the venture that succeeded in rejuvenating 178 ponds in just four short months! Not only has the winter monsoon filled the desilted and cleaned ponds, but it has also been made into a veritable habitat for flora and fauna through a planting drive undertaken by the community living in the vicinity; an initiative of the Collector who provided saplings of the local trees. The participation of the community has cultivated ownership and thus, long term caretaking. Moreover, now the remaining ponds and tanks are being similarly revived.

A depleting water table woe, recurring urban flooding and the temporary solution for the release of more water from river Cauvery - to meet the demand of the Chennai city -, serendipitously led to revival of an ancient system of capturing and recharging of water table: a set of tanks which had in the past (and traditionally) served the city as water banks. This system exposed the inadequacy of the planning department who continue to work on paper in cahoots with politicians and builders in short-term monetized landgrabs and with a total disregard for the terrain. Indeed, it is high time we move beyond our apathy towards the ancient treatise in our practice and in our education system. As Doxiadis (1970) argued:

> The static plan. Another myth which still prevails is that we can solve the problems of our cities through the conception, and official recognition, of a physical plan expressed by a two- or three-dimensional drawing. But our cities are growing organisms. They need a development policy leading to a development program which is expressed, in space, by physical development plans, but they also need economic, social, political, administrative, technological, and aesthetic programs. (1970, p.13)

The Indian sub-continent has an enormous repertoire of traditional water harvesting, holding, and tapping systems, such as: stepwells, temple tanks, Kattas - the temporary check dams built across streams and rivulets which were a common sight in the districts of Kerala and Karnataka till two decades ago, Madakas – the traditional water harvesting system in an area of natural slopes that comprised a check dam built at minimum width in the slope that would then help to impound crores of liters of rainwater into the ground below which would otherwise go into the sea and cause erosion of top soil too, along with lakes, ponds, village water mills, monsoon fed rivulets that had low height check dams to help retain water and to check the soil erosion.

Unique to Goa, the Khazan system comprising sluice gates and low-lying lands that are flooded periodically with brackish water is an even more complex system from yesteryear that not only supported Pisciculture, but also enabled a unique variety of rice-growing. In practice for centuries, the Khazan systems of food production are now threatened by disrepair, ignorance, derelict Government policies and unscrupulous land mafia. To achieve equitable livability in current Anthropocene induced climate crisis era, alternative strategies must be developed: The relationship between caretaking of natural resources and their commodification should be explicitly balanced, and our past cultural practices need to be acknowledged

and studied as a repertoire of techniques for recovering such a mindset.

Land, rivers, fields, groundwater, and forests are all valuable resources and not commodities. For all life to survive, sustainability is fundamental and not just an 'alternative' lifestyle. Each of the states of India and their settlements are a repository of knowledge systems for respective climate and resources to support life and the living. Human sustenance needs to align with the natural laws of cyclic and closed loop evolution. It is time for Planning to become collaborative and for the developmental agencies to recognize and unlock this potential for sustained progression.

Conclusion

We in India urgently need to revise our development model and adopt a 'Conservation-led Integrated Development' strategy (Mascarenhas, 2019b), consisting of the following approaches:

Development oriented conservation: The study of built character should dictate the formulation of building by-laws in respective areas. Conservation and re-use of buildings should be incentivised. New buildings should be spatially appropriate to the existing structures/area.

Ecologically appropriate development. Traditional settlements characteristically featured ecological equilibrium, its destruction by insensitive contemporary interventions must be prevented.

Development using locally sourced materials, skills, and technology: The distinctiveness of historic towns is mainly due to the creative use of the local materials. The revival of traditional building methods with locally available materials is both necessary and beneficial for the planet.

The time for working in silos is over: The government needs to revamp its administrative structure to creatively harness the potential of all its employees, to curtail all duplication and bridge any remaining gaps. The Constitutional 73rd Amendment Act (1992) came into force on April 24, 1993. It provides constitutional sanction to establish "democracy at the grassroots level as it is at the state level or national level". Amongst other key objectives, the legislation aims to promote bottom-up-planning. To do so, the District Planning Committee (DPC) in every district has been accorded constitutional status with a clear mandate for inclusive, integrated, and participatory planning for both resource management and spatial development. The 74th amendment made similar provisions related to Urban Local Governance - the Nagarpalikas.

These amendments to the Constitution of India have paved the way for activating the potential of community participation at both the rural (village) and urban (town) levels. Community-based initiatives in responsible planning and mindful caretaking should then inform the States' regional planning policies. The resistance to this move by respective politicians all over India, except Kerala, is detrimental to developing resilience in the face of a climate crisis.

By combining 21st Century mapping technologies and regional traditional knowledge systems of water harvesting and management, it is possible to effectively synergise the top-down and ground-up planning policies. Adopting this holistic approach is now urgently needed. Not only will it enable our sub-continent to achieve an equitable, stable, self-sustaining, compassionate, and humane future, it will protect and prolong the continuum whose legacy is reflected in our three thousand years of nature-culture journey.

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Keywords

natural disasters, planning with nature, water and settlements, traditional knowledge systems, conservation led development, continuum of nature-culture journey, community participation in planning

Accessibility in Urban Spaces: The Potential and Limits of Jugaad

Ganesh Nayak

Principal, Metier Inc, Atlanta, GA, USA

Abstract

Sustainability in the urban context, besides the planning and environmental aspects, also includes making it equitable to people with differences that extend to class, colour, race, caste, gender, disability. Truly sustainable spaces are also accessible spaces. Urban resilience which, by definition, encompasses sustainability is an opportunity to include the agenda of accessibility. If the concept of 'jugaad' understood as indigenous innovation fits in with urban resilience in the context of Indian habitats, it needs to, by extension, be examined with respect to accessibility. The essay delves into the perceptions and conditions of accessibility in Indian cities and examines where jugaad figures when urbanism is viewed through the lens of accessibility, and the potential and limits of jugaad in this context. It examines the possibility that jugaad is a negotiation of everyday living in the city, as is accessibility, and it is here that the jugaad mindset can be an ally to accessibility. It is an open-ended enquiry into the subject, and attempts to weave different strands of sustainability, resilience, jugaad and accessibility.

Introduction

Sustainability in the urban context means much more than environmental and planning efficiency. To make cities sustainable is also to make it equitable to people with differences, and to maintain and foster rich cultural connections and relationships. The differences extend to class, color, race, caste, gender, disability. Truly sustainable spaces are also accessible spaces. Urban resilience which, by definition, encompasses sustainability is an opportunity to include the agenda of accessibility. This is more so in the Indian context where urban development is more often than not inconsistent in adopting accessibility; accessible spaces are thus patchy and disconnected.

Fig. 1: Person in Wheelchair helped by friends, Marina Beach, Chennai
Source: Geraint Rowland Photography

If the concept of jugaad as indigenous innovation fits in with urban resilience in the context of Indian habitats, it needs to, by extension, be examined with respect to sustainable and accessible environments.

This essay examines the question: where does jugaad feature when urbanism is viewed through the lens of accessibility? What are the potential and limits of jugaad in this context? We attempt to weave different strands of sustainability, resilience, jugaad and accessibility into this essay, whilst leaving some untied, so as to remain an open-ended enquiry into the subject.

Disability and the question of Accessibility

Disability is a significant subset of the diversity group in any habitat, along with other forms of Otherness such as race, color, caste, class, immigration status, and gender. It is probably not the first issue that comes to mind when we talk about diversity. However, language so often gives cues that nudge us to think in certain ways: the term "differently abled" to describe people with disabilities itself calls out its Otherness.

In India, an estimated 2.2% of the population is deemed to have some form of disability, with the percentages broadly the same in urban and rural areas (The Economic Times, 2019). There are some estimates which put the figure at 60 million, or over 5% of the population. When accounting for temporary disabilities, it is a good bet that most of us will experience some form of disability in our lifetimes.

In Indian cities, people with disabilities have historically been relegated to interiors - be they of homes or institutions. Social orders that privilege the regular and the normal have conferred a stigma on people with disabilities that is difficult to shed. Even within the subsets of Otherness, disability is at the lower rung of the hierarchy - This is even more pronounced in rural areas. Moreover, being portrayed patronizingly or unflatteringly in popular cinema as figures of ridicule does not help with the stigma (Film Matters Magazine, 2019). Combined with a lack of opportunity in education, employment and social

interaction, the life of a person with disabilities is lived out in smaller, darker spaces with an interiority defining them.

However, this has been gradually changing over the past couple of decades, when urbanization and economic progress support an egalitarian ideal that flattens social hierarchies ever so gradually, and reduces the gap with Otherness. More realistic and empathetic portrayals of special needs in cinema, and schools opening up to special education have softened perceptions of disability, which has in turn translated into policy. In 1995 with the Persons with Disabilities Act, and in 2016, the Rights of Persons with Disabilities Act were passed. Implementation has been a work in progress, but a framework has been established.

Fig. 2: Implementation of the Persons with Disabilities Act is a work in progress, but a framework has been established.
Source: Martin Heng

There is a need in the disability world for visibility: the main aspect of "normalcy" that people with disabilities cherish, as many express, is being visible in the public space, *a shift away from interiority to exteriority.* While social behavior is gradually changed with time and by policy, the challenge that remains however is the accessibility of public spaces in cities. Accessibility, as the UN defines, "is a precondition for persons with disabilities to live independently and participate fully and equally in society" (The Inclusion Imperative, 2016, p. 6). The definition firmly places equity as the prime driver of making communities and cities accessible, hence truly sustainable.

Jugaad vis-a-vis Accessibility

How does jugaad, defined as "an innovative fix, an improvised solution born from ingenuity and cleverness" (Ekistics, 2019), fare as an approach to creating accessibility in Indian cities? Jugaad is a local, ad hoc response to a perennial lack of resources in everyday urban living. It is a sort of hacking a nameless "system" - which is a placeholder for any combination of political, state, institutional or legal framework – which does not work in the here and now, both in perception and in reality. Accessibility codes which ought to provide a minimum standard of safety for people with disabilities are a product of the "system". There is an element of subversiveness in jugaad which can be employed in a limited manner to creatively interpreting the code, which is a standard, but on no account to compromise on safety. The areas of health and safety – both at individual and community levels - are where jugaad gets a bad rap from detractors, and with good reason (Joseph, 2018). The jugaad mindset constantly compromises, sometimes at the expense of health and

Fig. 3: The jugaad mindset constantly compromises, sometimes at the expense of health and safety, which cannot be compromised in the case of accessibility.
Source: Shankar S

safety. There are any number of products and processes that are creative often awe-inspiring hacks; however, health and safety may not be a high priority. Sometimes there is a class element that tinges our perception of jugaad: we enthuse in elevating the ordinary, the eking out of efficiency through enterprise, but may not use it ourselves – what is good for them (or the Other) may not be right for us.

But the compromise of jugaad is a sort of negotiation of everyday living in the city that consists of a million adjustments: negotiations which are sometimes small acts of jugaad that remind us of our interdependence in dense communities and cities. Accessibility is also a negotiation of the literal and figurative terrain of the city. Accessibility requires more space than may be available or planned in the built environment. While the code is supposed to ensure a certain minimum standard, it is itself the result of compromises between the various interests that shape it. Sometimes this leaves gaps that may either take a either a long time or sometimes never to get filled. People with disabilities constantly negotiate these gaps in everyday life; in a sense, then, jugaad is also the bridging and repairing of the gaps and holes to form a patchwork that stands-in for the whole.

In the recovery of Indian communities and cities after a natural disaster such as floods and earthquakes, jugaad is a sort of first responder. It is here that the full dimensions of jugaad – ingenuity using little resources – sparkle brightest. However, it aids in resilience in a reactive way, and hence its influence is restricted. Resiliency is proactive, "the ability to prepare for anticipated hazards, adapt to changing conditions, withstand and recover from disruptions" (NIST, 2015, p. 9), as defined in the context of cities. Cities experience chronic stresses such as water shortages and strained infrastructure, and unless communities are resilient enough to these chronic stresses, the shock from a disaster can undermine their recovery. But any recovery – long or short term – also hinges on the resiliency of the spirit, which this prosaic definition excludes. Indeed, it is the can-do mindset of jugaad that lifts communities during those times. It is also the spirit of resilience that that defines the journey of disabled people from interiority to exteriority, from invisibility to visibility, when spaces are made accessible.

Fig. 4: Like jugaad is a sort of negotiation of everyday living in the city, so is accessibility, which is also the negotiation of the literal and figurative terrain of the city. Source: Martin Heng

It is intriguing to explore jugaad as bricolage, in Claude Levi-Strauss' dichotomy of the bricoleur and the scientist or engineer. The bricoleur improvises out of random materials, "is adept at performing a large number of diverse tasks; but unlike the engineer, he does not subordinate each of them to the availability of raw materials and tools conceived and procured for the purpose of the project…the rules of his game are always to make do with 'whatever is at hand'..." (Levi-Strauss, 1966, p. 17) The engineer-planner-scientist works with a few central principles (which may be uncompromising) to articulate a vision. The realm of codes and standards that address accessibility (and mandate health and safety) fall within the "central principle" of the planner, not of the bricoleur. The architect-artist arguably employs both modes of thought depending on the specifics and politics of projects (Rowe and Koetter, 1978).

Modern Indian cities, or the newer parts of old cities, are mostly based on Kevin Lynch's model of the "practical" city – the simplicity and functionality of the grid that does not conform to an overriding guiding principle (Rybczynski, 1996). It is tempting to think that the pragmatic, perhaps mechanistic nature of the grid is akin to the pragmatism of the jugaad mindset, but ideally equipped with standards. The uncomplicated gridded layouts are the least resistive to a working accessibility standard, as compared to Lynch's model of "organic" cities that describe older parts of Indian cities. The space that accessibility needs is largely not possible; the gradual accretion of spaces and elements mostly by ad hoc methods resembling jugaad that became permanent gives short shrift to accessibility. Arguably, the sense of community that organic neighborhoods traditionally foster is a source of succor and support for people with disabilities, while still limiting accessibility and exteriority. A truly equitable and sustainable community provides both.

In the final analysis, jugaad cannot and should not substitute the standard of accessibility in communities and cities. The temporariness and ad hoc nature of jugaad to deal with the present unfortunately achieves varying degrees of permanence as a future permanent intervention may not come, and compromises in safety become solidified. However, beyond the basic infrastructure that ensures minimum safety for people with disabilities to engage with the city, it is in the incremental 'spreading out' and everyday negotiations with the city that the jugaad mindset can be their ally.

Epilogue

The poet Ashok Vajpeyi's poem (written for the artist J. Swaminathan) 'Bird Still On A Soaring Rock' (Bahuvachan, 1988) can be read as an allegory in the context of this discussion:

> The rock wants to fly/ like the bird/ In the sky/ across the valley/ and see and frolic/ and touch the world/ over there.
>
> But the bird doesn't want/ to change places/ with the rock and/ stay still for centuries/ gazing at the blue sky/ and other rocks.
>
> And yet the bird is/ still/ like the rock.
>
> The rock is soaring/ like the bird.
>
> A bird in flight/ is and is not/ sitting still/ on the rock.

Rock and bird, disability and ability, us and the Other, are different and yet, in more ways than we can imagine, similar. It is in truly sustainable and equitable communities and cities that intertwining and codependence, the simultaneous condition of uniqueness and similarity exist.

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Keywords

Accessibility, Disability, Jugaad, Sustainability, Resilience

A People's Process: Post-Tsunami Self-Build Housing in Tamilnadu (2005-08)

Durganand Balsavar

Architect and Dean-Saveetha, College of Architecture and Design, Chennai, India

Abstract

This essay elucidates some of the lessons learnt from the community participatory process adopted by Artes, in the Post-Tsunami housing reconstruction project at Nagapatinam, Tamilnadu (2005-08). The program was a self-build process, respectful of gender. A pragmatic assessment of regional technologies, materials and skills was undertaken. The technological assessment was conducted by the community, in collaboration with structural engineers. Projects under consideration are in Sirkazhi Taluk and Akkaraipettai, Nagapatinam region in Tamilnadu, which had been adversely affected.

The projects were nominated as best practices by the UNDP, India (2008) for community participatory processes. It inspired a new sense of belonging and confidence in the community. Besides indigenous construction practices, the community was provided an opportunity to learn new construction skills that they desired, which were beneficial in the longer term. The new construction skill sets ensured the community was independent to build their own dwellings incrementally in later years. The community was no more at the mercy of external contractors. The design of the dwellings also enabled future incremental growth. This research highlights some of the lessons in capacity building of communities; using construction skills to enable them to rebuild their own homes, as well as be self-reliant in future extensions and additions.

Introduction

In the aftermath of the Tsunami that devastated the coasts of Tamilnadu, India on 26th December 2004, the government was swift in issuing guidelines for rebuilding. This essay highlights the potential of a 'people's process' where communities are empowered to re-build their own homes. It documents the resilience and spirit of innovation, as communities restore their habitat after a natural disaster. It refers to self-build housing projects in two locations: one in Sirkazhi Taluk and the other at Akkaraipettai, Nagapatinam. The process was formulated by architects of Artes-Human Settlements Research Collaborative, Chennai.

The communities at Sirkazhi preferred to build on their existing plots. The project was funded by Association pour le Development Économique Regional (ADER) and Instituto Sindacale Di Cooperazione Allo Sviluppo (ISCOS) with The Institute for Social Education and Development (ISED) being the local, social partner. 300 dwellings were rebuilt in this process. In Nagapatinam, the coastal community consented to shift inland. The Tata Relief Committee funded the rebuilding of 760 dwellings on a 14-acre site, along with social amenities like a health centre, community hall and Village Knowledge Centre. Several international organizations were engaged in the reconstruction process (Collins, 2006).

Several projects in the past have attempted similar processes, though in different contexts, diverse typologies with differing outcomes. The community-driven housing projects by Laurie Baker (Bhatia, 1991) and B.V. Doshi (Steele, 1998) have addressed incremental housing.

Methodology - Crafting the community participatory processes

Artes evolved a self-build, participatory process through constant dialogue with community. The architects transformed their own role from designers to facilitators. The process addressed larger, socio-cultural aspects, beyond drawing of plans and providing engineering solutions. The process started with a documentation of indigenous building practices. Simultaneously, these skills needed to be complemented with alternative technologies,

Fig. 1: Self-build dwellings, Artes-ISED-ADER-ISCOS project, Sirkazhi Taluk. Source: Balsavar

to ensure safety, durability and respond to the changing context.

Documenting Indigenous building practices

In the first stage, detailed documentation of local skills and locally available materials was undertaken and assessed. The community had carpentry and masonry skills. At each stage, women in the community led the process and displayed resilience to confront scarcity of resources. Women contributed innovative solutions to both design and construction. Based on these considerations, it was appropriate to engage in a self-build participatory community process, rather than inviting external contractors. The spirit of 'jugaad' was experienced in the face of adversity. 'Jugaad' is a popular word in Hindi that implies an innovative, improvised design solution. It reveals a localized form of lateral thinking.

Community Capacity-building Program

During the mapping of indigenous construction practices, the capacity building program in alternative technologies was initiated. Communities were introduced to rat-trap bond brickwork and filler slabs innovated by Architect Laurie Baker and The Centre of Science and Technology for Rural Development (Baker, 2014). The architects had the opportunity to interact with Laurie Baker during this stage. Engineers from Orissa Development Technocrat Front mentored this stage of masonry training program along with Artes. The program also included carpentry, roof tile laying, plumbing, stone flooring, and electrical applications.

Alternative technologies like ferro-cement and stabilised earth blocks could not be adopted given the soil quality and several other factors. Through a systematic process, the community innovated a new synergy that combined indigenous skills with newly acquired alternative technologies.

The significant lessons were the pragmatic manner in which communities adopted and appropriated new technologies whilst integrating them with indigenous construction skills. These were not merely based on engineering skills, but also on responses to a wide range of issues such as availability of local resources, concerns over durability and the cost of construction and maintenance. The Artes team focused on facilitating communities' self-reliance and subsequent independence from external contractors.

Catalysts of design: the key role of women

A wide consultation was organised over a two-month period involving intensive training in construction. As a parallel process, researcher Ms. Aneela Rao created a program for women in the community to express their aspirations and experiences of the design of the home, the organisation of rooms, amenities, outdoor spaces, notions of privacy and sanitation (Parr, 2012). These discourses enabled the creation of a broad outline for design suggestions for the dwelling and the clusters. (Parr and Zaretsky, 2011).

The learning during this stage recognized the role of women in decision making and the need for empowerment

Fig. 2: Street view, Artes Architects Impression, Nagapatinam, Source: Artes

and expression as an integral aspect of 'jugaad'. This intervention transformed the project, with due recognition to the significant role of women, in an otherwise patriarchal community. It also substantially enriched the design. Suggestions ranged from location of windows to ensure greater privacy, need for toilets in proximity to dwellings to ensure safety, suggestions on clustering dwellings, and the designation of children's play areas.

Lessons derived through a people's process

There were several significant lessons derived from the community-participatory rebuilding process. The integration and recognition of indigenous building practices, which continued to be relevant, created a strong continuity despite the drastic impact of the tsunami and the destruction of the entire settlement. Continuity was an essential aspect in restoring self-reliance. Simultaneously, the introduction of alternative technologies to reinforce indigenous construction enabled the habitat to embrace contemporary changing conditions. Judicious use of materials and thermal comfort enhanced sustainability, with building practices inspired by Laurie Baker.

The significant role of women transformed the habitat. Not only did the design contributions of women address core aspects of privacy, but they also broadened the framework to provide a deeper sense of participation and belonging. Further, the self-build process and deliberations at each stage, consolidated community resilience for dealing with possible future unpredictable situations.

Fig. 3: Street view 2018, Incremental growth, Nagapatinam. Source: Erioseto Hendratta

Conclusion

In summation, the benefits of a self-build community process far outweigh those of a contractor driven process, especially when communities have the inherent capacity and skills to build on their own. By respecting indigenous traditions of construction, a sense of continuity and belonging is instilled in the rebuilding phase after a natural disaster. The enhancement of skills through capacity building programs that integrated alternative technologies, further reinforces the resilience of communities. The Artes project was commended by UNDP for its best practices (UNDP,2008), and the capacity building program recognized the significant role of women that enriched the design of habitat. The capacity building program also reinforced and retained construction skills within the community and as a result, the self-reliance of the community increased. The innovative jugaad, which synthesized indigenous construction skills with alternative technologies resulted in a settlement form that responded to both continuity as well as change. The new construction skill sets ensured the community was independent to build their own dwellings, incrementally in later years. The community was no longer dependent or at the mercy of contractors. Significantly, the process has the potential to be scaled up in the future, to address larger and more complex issues of social housing in India.

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Keywords

community participatory housing, indigenous, tsunami, Tamilnadu, incremental housing, local construction skills, self-build, gender sensitive construction practices.

Against Jugaad

Neema Kudva[1] and Deepa Kamath[2]

[1] *Cornell University, Ithaca, USA*

[2] *Amplify Digital, Hong Kong, China.*

Abstract

This paper examines jugaad through the lens of design as problem-solving and a driver of innovation. We include a range of design disciplines that have spatial and material impacts from architecture and urban planning to product design. The paper starts with a brief description of the ways in which jugaad is currently understood, and then proceeds to make the case for why jugaad is neither quality design nor frugal innovation. Our argument draws on a wide-ranging survey of jugaad as an idea across several fields, a series of in-depth interviews where we asked our interlocutors to use examples of work to situate their responses, and our engagement with Charles and Ray Eames' ideas on design process and pedagogy in *The India Report* [1958] (1997). In doing so, we wish to not just be against jugaad but to go beyond it, reading it as a crucial component of the design and innovation process but not the design solution or innovation itself.

Introduction

Jugaad is woven into the fabric of everyday life in India. The day we started writing this paper, one of us withdrew cash from a State Bank ATM while standing under a giant poster on 'Missed Call Banking'[4] a service innovation by Indian banks to benefit their customers who use the 'missed call' jugaad to avoid call charges. They then hurried home, walking past innumerable street poles, each with its unique hanging jugaad nest of wiring. The cash was to pay Sharan, the handyman, who had arrived to figure out why there was no water flowing in the pipes despite a full overhead tank. Sharan squatted below the lowest pipe in the house, with head bent and awkwardly twisted he put his mouth to the tap, sucked on it, turning away to spit out the water, repeating the action again and again till the air bubble in the pipe was dislodged and water began to flow noisily. Some weeks later, as we completed the paper, the coronavirus had shut down cities, societies, and economies across the world. On Zoom, we discussed coping with the pandemic, as we made face masks sharing a simple pattern using an old T shirt (preferably Men's Large), a scissor, and a coffee filter (optional).

Despite the wildly different practices and contexts, this small universe of cases highlights the commonsensical view of jugaad as a resourceful ingenious hack using whatever is on hand, highlighting creativity and humour, as well as smart workarounds in resource scarce environments. The bigger question of whether jugaad can claim to be a uniquely Indian form of design and frugal innovation offering effective solutions to a host of problems remains open. Indeed, it is the focus of this paper which examines jugaad through the lens of design and innovation. To do so, we start with laying out jugaad: as a concept, a word and deed.

Fig. 1: Poster of SBI missed call banking
Source: Author's images.

The concept of jugaad, which has settled into the Indian consciousness, perhaps even a global one, travelled out from northern and western India to become ubiquitous by

[4] For more information on SBI's missed call banking, go to https://sbi.co.in/web/personal-banking/information-services/kyc-guidelines/sbi-quick-missed-call-banking. There are numerous instructional articles and YouTube videos available. A quick web search (24/2/2020) for "SBI missed call banking" using a Google browser produced 225 million hits in 0.61 seconds.

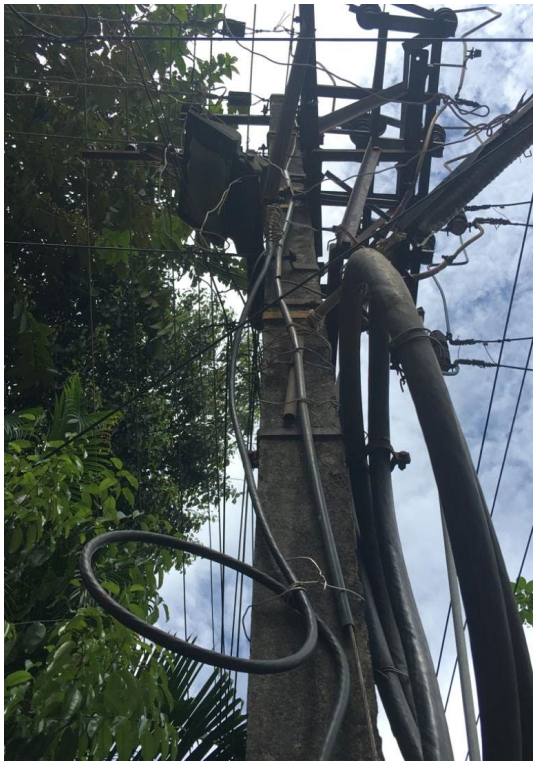

Fig. 2: Electrical pole with wiring
Source: Author's images.

the early 2000s. It is uncritically celebrated by many, particularly those in business school and MNC (multinational corporation) circles, as well as by a virtual public in the world of social media where there are millions of posts that are sometimes helpful, often tinged with nationalistic pride, occasionally marked by dark humour, but always descriptive of a distinctive Indian reality.

Jugaad innovation has produced and continues to produce many objects. These include well known forms of jugaadu vehicles for all forms of transport that are legal but often dangerous in practice. They are assembled by joining together parts from different vehicles, engines from one vehicle (often a motorcycle or tractor), wheels from another and a bed that is manufactured cheaply in an assembly shop. Making cheap wheelchairs combining plastic chairs and cycle wheels is another example of quick jugaad invention. Jugaadu objects can also involve finding new uses for existing machines: making lassi in a washing machine was a popular meme in Indian social media or the use of car rear view mirrors to design a security system to watch a godown by a shopkeeper, Prakash, on Lamington Road in Mumbai.[5] As described to us, Prakash's jugaad executed with 'much majaa' did not involve acts of 'repair', neither did it engage in questions of jugaad as piracy, danger or illegality (Badami, 2018). There are thousands of other examples of jugaad innovation that don't get patented, or never get manufactured at scale – and why that is so is precisely one of the questions that we explore in greater detail in this paper.

Three years ago, "jugaad, noun" joined 916 other words to make its way into the Oxford English Dictionary, the Definitive Record of the English Language. In the etymology of jugaad, now an "In-glish" word, was an interesting entry: "Perhaps popularized by Hindi Kabāṛ se Jugāṛ, lit 'useful things from rubbish', the title of a book of science experiments for children (c1990; the English version is called Little Science)."[6] The author Arvind Gupta's explanation of the title reinforces some core ideas. He wrote:

> "One rich relative once gifted me a Mecanno [sic] and I played with it for years, designing newer and newer models which were not even listed in the brochure. As children we picked up cigarette boxes and old matchboxes and kept making toys from them.
> To improvise, do more with less, toys from trash all these were rooted in my childhood experiences.
> My mother was very wise. She never bothered about schools, tests, homework or exams. She let me play.
> So, it was natural for me to title my second book KABAD SE JUGAD. For I was essentially picking up very ordinary things and doing extra-ordinary things with them."
> (Arvind Gupta, pers. comm., via email, February 2020, italics ours)

While improvisation and ingenuity in the context of scarcity is central to the idea of jugaad in all contexts, how exactly the word, the deed, the practice, or the thought became popular remains a matter of debate. The origin of the word also remains unclear.[7] The anthropologist Beatrice Jauregui drawing on McGregor's Oxford Hindi-English Dictionary (2002) has explored the etymological link of jugaad to the Sanskrit idea of *yukti*. She writes that *yukti* "insinuates not only a clever stratagem or gambit but also dexterity and discovery" denoting a "broader cultural valuation of ingenuity and the probability—though not the inevitability—of invention through making connections" (Jauregui, 2014, p.84). For Jauregui, jugaad emphasizes provisionality, from which she derives the concept of provisional agency in an ethnography of police practice in Uttar Pradesh. Other scholars have explored jugaad

[5] Interview, December 26, 2019. Also see, Gupte, Rupali and Prasad Shetty. 2015. 'It Takes So Much for a City to Happen' Available at https://bardstudio.in/the-art-of-muddling-through-and-beyond/ Accessed December, 2019.

[6] Oxford English Dictionary. https://www.oed.com/view/Entry/54189995?redirectedFrom=jugaad#eid. Accessed on February 21, 2020.
The book is published by the NGO, Eklavya, which is based in Bhopal, Madhya Pradesh.

[7] An anonymous reviewer said that they thought the origin of the word jugaad lies in Punjabi with a clear link to the word "jug". We cannot find clear evidence to corroborate this claim. Joshi (2009) in Punjabi English Dictionary: Panjabi Yuniwarasiti Panjabi-angarezi Kosha defines jug as "age, period, epoch, time." While the word jugaad does not appear in the dictionary, it does appear in the Mul Mantra said before every prayer (B. Singh, pers. communication, via email July 2020).

practices as involving dirty workarounds and corruption in land deals, bureaucracies, and politics in the contexts of democratically elected 'Mafia Raj' (Hoque and Michelutti, 2018); jurisprudence applied to circumvent the mandate of the Constitution (Hegde, 2017); and the illegal slaughter of cows on an industrial scale in an informal economy (Narayanan, 2019).

In this paper, however, we explore jugaad through the lens of design as innovative problem-solving, which operates at the scale of the object or practice at a local site, to systems that can span cities and societies. We include a range of design disciplines with spatial and material impacts from architecture and urban planning to product design. John Heskett's observation (2002: 5) that "design, stripped to its essence, can be defined as the human capacity to shape and make our environment in ways without precedent in nature, to serve our needs and *give meaning to our lives*" (italics ours) provides a core definition for design. Here, however, we are interested in how jugaad stymies or supports our work as designers. We are not arguing for a form of design activism (Thorpe, 2012, 2014 among others) but rather for understanding jugaad in relation to design as a driver of innovation.

Methodology

We started by systematically documenting the many ways in which the term and the concept is being used across social media, as well as in texts, videos, and materials available widely or curated for us by designers and architects within our networks. Our exploration included academic work on jugaad and innovation in various fields: business, anthropology, sociology, economic geography, design as well as science technology studies. As we interrogated these materials, we conducted eleven 1-2 hour long in-depth interviews with practicing product designers, architects and urban planners, as well as two VCs who focus on funding social enterprises, and have an organizational perspective on social innovation to meet India's many developmental challenges, especially in its fast-growing cities and towns.[8] We were interested in understanding how they viewed jugaad and its relation to design and innovation. Our analysis is also informed by our combined previous research into design thinking, innovation, and pedagogy, as well as a range of issues around planning and development in Indian cities. In doing all this, we also found ourselves in conversation with, and pushing up against one of independent India's first, and many would argue, still clearest, design manifestos: Charles and Ray Eames' *The India Report* [1958] (1997). What emerges is an argument against jugaad as quality design or frugal innovation. We suggest that designers, architects, and planners must harness the ingenuity, resourcefulness, and pleasure that jugaad brings but move purposefully beyond it to facilitate change by taking up questions of value (for what purpose do we design?), benefit (who does the design help?) and voice (who does the design represent?) at scale.

The Eames's India Report, written in a modernist, imperialist, even paternalistic moment when expertise ruled, considers questions of value, benefit, and scale. It remains relevant in many ways and brilliantly brings the experience of two designers, who themselves "learned by doing", to bear on the projects and pedagogic methods they propose. Yet, in privileging design expertise as the Eames's do, *The India Report* remains largely silent on the question of operationalizing how to bring in the voice and experience of the varied people, communities and interests designers serve. Another open question is how a broader understanding of innovation would help better explain the role of design as innovation. This is where our argument against jugaad and for a design method to address India's many challenges emerges.

One critical challenge that shapes both jugaad and design in the Indian context is the environment of scarcity. Poverty continues to be a persistent problem and the Government of India estimates that despite recent gains, about one-fifth all Indians continue to live in abysmal poverty.[9] Deprivation, marginality, and other outcomes of persistent poverty make meeting every challenge harder, whether it is finding gainful employment and non-precarious work for *all* Indians across rural and urban areas,[10] fighting the pandemic that is sweeping through, or adapting to the climate emergency expected to hit India hard across every sector.[11] While meeting these challenges and working to mitigate their impacts is the work of many across several fields of policy and practice, we are interested in the role the design professions play.

This paper is structured in two parts.

In Part 1 we explore the concepts of innovation and design. We start with the idea of innovation and how the drivers of innovation (technology, organizational practices, design) have been understood to see how jugaad fits these

[8] Interviews were conducted in person or via video-calls between December 20, 2019 and January 15, 2020 by either one of the authors.

[9] The 2011 Indian Census estimates that 21.92% of all Indians live below the government established poverty line (25.7% for rural areas, and 13.7% for urban). (NITI Aayog/Planning Commission, 2016). Inequality is also sharply on the rise (see Kudva, 2015, for more detail on poverty and inequality in Indian cities).

[10] The percentage of unemployed youth in Indian labor markets is very high (and growing). In 2018, unemployed youth between the ages of 15-24 comprised 22.5% of the total labor force, up from 9% in 2012 (International Labor Organization (ILO), 2018).

[11] The situation with regards to water helps illustrate this point. Climate Change will result in chronic water shortages across India even as some people get displaced due to increased flooding and others due to sea level rise along the coastline. The GoI estimates that 600 million Indians will face high water stress due to droughts. By 2030, the GoI also projects that the country's water demand will be twice its available supply, likely leading to ~6% loss in GDP (NITI Aayog, 2018). An independent estimate suggests a much higher number, about 54% of the total population or 745 million people will experience extremely high-water stress (Shiao, et.al, 2015). Estimates for numbers of Indians expected to be displaced by sea level rise is around 36 million, behind only China (67 million) and Bangladesh (37 million) worldwide (Climate Central, 2019).

descriptions. We end Part 1 with an exploration of design thinking and its relation to innovation. The pedagogical principles best illustrated, we argue, in *The India Report* allows us to explore the design process itself and establish an analytical frame to assess jugaad as design driven innovation.

In Part 2 we present four narratives from our interviews that discuss jugaad as well as design driven innovation. Each of our interviewees illustrated their claims with examples and traced the expansion of each example into other geographic scales. Each narrative is built around our analytical frame and combines our questions on value, voice, and benefit with the Eames' operational approach, using a four-part typology of projects and methods. This analytical frame allows us to situate jugaad within a design driven innovation process, even as it allows us to argue that jugaad itself does not meet our definition of innovation that can produce the kind of change that a country of India's size, scope and complexity requires.

Part 1: Two Concepts: Innovation, Design

We lay out two concepts central to our exploration of jugaad here. The first allows us to question the claim of jugaad as innovation, while the second allows us to think more deeply about design as problem-solving and a driver of innovation. Together, they allow us to go beyond jugaad, as opposed to just being against it.

A. The Idea of Innovation

In *Innovation: A Conceptual History of an Anonymous Concept,* Benoît Godin notes that innovation is a future-oriented concept that "everyone understands spontaneously—or thinks he understands—that every theorist talks about and every government espouses" (2015: 3). For Godin, steeped in the methods of Science Technology Studies, the intellectual history of innovation starts in antiquity and makes its way to the twenty-first century through major shifts that are tied to different actors and institutions like the church, the state and the firm. Godin argues, persuasively, that our current positive take on innovation as progress (political, social, and material) as well as the tight tethering of innovation to economic instrumentality and technology is recent, dating back to the nineteenth and twentieth centuries. Before that, innovation was not always seen as positive, particularly as it was associated with questioning the established order, or political rebellion and revolt.

There is wide agreement that the current focus on technological and organizational innovation as the driver for increased economic productivity and change has grown out of economist Joseph Schumpeter's insights. Important, then and now, is the broad conviction that science and basic research should translate to socioeconomic progress. Building on this, the influential linear model of innovation simplified in the diagram below emerged. It captures the core relationships we still continue to explore.

Basic research → Applied research → Development → (Production and) Diffusion

Fig.3: Linear Research Model
Source: Benoit, 2006: 639

Understanding this model as encompassing an entire system for success was also important. Various communities of practice in the disciplines,[12] as well as state agencies and administrators, and commercial interests came together to develop several iterations of this simple but powerful model starting in post-World War II United States. They helped spawn an entire body of work and establish a system of governmental entities, private entities (and their R&D functions) and managerial/bureaucratic practice to take products to market and to produce goods and services more efficiently. Over the years various cases of successful innovation have been analysed to understand the key variables that drive success in specific areas (products, organizations, technologies) at specific scales (cities, regions, nations), with the intent of replicating innovation elsewhere.

One important distinction is worth mentioning in this highly abbreviated description of innovation as a concept: this distinction is focused on whether innovation is deeply disruptive, competence-destroying and radical, implying a break with the past or incremental, "a continuous modification of previously accepted practices" to improve products through small changes through use, experience, and in keeping with ecosystem needs (Norman and Verganti, 2014, p. 82). This distinction is critical to understanding the relationship between design and innovation, which we will return to later.

More recently, as inequality and social challenges explode worldwide, the narratives around innovation have shifted to include renewed concerns with expressive adjectives that capture attributes such as BOP (bottom of the pyramid which have produced the shampoo and panparaag sachet products), reverse (south to north), jugaad and so on. Most of these tend to be associated with particular personalities in MNC and business school circles (Prahalad 2006 for BOP; Radjou, Prabhu and Ahuja 2012 for jugaad; Govindajan and Trimble 2012 for reverse). As Gérald Gaglio (2017) has demonstrated in his careful dissection of the latter two models and their associated publications, these can be labelled 'innovation fads'. What is noteworthy is that all of these forms of innovation are embedded in businesses and firms, typically Western MNCs, and focus on profit maximisation. While they do encompass some incremental innovation, it rarely leads to substantive transformations, even in the firms themselves. Beyond expanding consumption, Gaglio argues, there is little to no social or user benefit in BOP, jugaad or reverse innovation.

[12] This would include scientists, engineers, economists, researchers from business schools interested in the industrial management and development of technologies and more recently, geographers who focus on spatial scale from cities to regions and nations as hubs of innovation.

Other authors have noted that unlike BOP, jugaad, or reverse innovation, some attribute innovations, such as social, inclusive or frugal innovation, are produced by different institutional and moral-economic drivers.[13] The changing institutional arrangements and ecosystems that support such innovation have been studied by Aoyama and Parthasarathy in *The Rise of the Hybrid Domain* (2016). Their empirically rich case-based research remains mostly focused on how innovation combines technological products and organizational processes across the public-private divide. However, they include an entire chapter on "designing solutions for wicked problems" where they define design as requiring "contextual knowledge, an in-depth knowledge of user incentives, and often multi-disciplinary expertise" (2016: 99). Design itself, however, remains a black box.

B. So what is design and what role does it play in innovation?

At the start of the paper, we defined design as innovative problem-solving at different scales. To this, we now add Nigel Cross' observation in *Designerly Ways of Knowing* (1982) that "designers problem-solve by synthesis." Cross goes on to add that the path to finding the solution by synthesis "emerges from their minds and hands." This synthesis is however, not operationalized; neither is the manner by which it emerges from the mind and hands ever made clear.

Others have taken on the question of the design process, though we don't have the space for a full summary of debates here. We focus instead on Charles and Ray Eames' *the India Report* [1958] (1997) commissioned by the Government of India to help create a training institute for design. It remains one of the clearest voices in demystifying the design process. *The India Report* does not begin with a definition of design, instead it asks simply "for a sober investigation into those values and those qualities that Indians hold important to a good life …" For the Eames', design begins with establishing values.

The India Report is in five parts, of which 'Part 3, The Project or Method' lays out a pedagogical structure that helps pry open the black box of design as a process of problem-solving and meaning making. A four-part typology is proposed where projects, A, B, C and D, (each with an allied method) are "meant as a possible guide to the nature of activities not the extent" (1997: 10, italics ours).

- First, Project A, is a study and narrative statement of relative values, continually revisited and restated to reflect changing "time, place and situation." They use Bucky Fuller's well-known problem to students: "what do you take with you when your house burns down?" to illustrate a method by which to produce the value statement. The Eames' take values as foundational but also something that need to be constantly restated to reflect the particular challenges of place, context and time.

- Second, Project B, which involves looking at problems such that basic issues are clarified and highlighted, and all the information collected to understand the problem is "organized and communicated" so that mistakes become apparent and can be corrected. The information comes from various disciplines. They also recommend disseminating the learning widely through communication and media—which is an interesting precedent to current work that focuses on establishing need and demand. Together these two ideas create "a general procedure of exhaustive analysis and specific [problem] statement" (1997: 12).

- Third, Project C is the standardized solution to a specific problem in a specific locality. The example of designing local post offices for a national postal system is used.

- Fourth, Project D is "a design for an occasion … a problem in true speculation." It involves mood, can be symbolic, cheerful, colourful, evocative but importantly, has "a limited time span" and "treats an occasion" and is explained using the example of the beauty of floats in a traditional festival yatra versus the floats of the Republic Day parade.

In this framework, C and D are design solutions framed by values (A) and research and analysis (B). The Eames' asserted that the complex problems in the fast-changing world around them needed holistic, human-centric solutions, rooted in cultural contexts, with technological underpinnings.

In practice, we know that a part of Project B which could also be called 'design research' spans a variety of methods. It includes ethnographies and observations to understand user needs and locate the problem statement; product and materials research to understand possible solutions and production parameters; market research to understand price points and a range of system requirements; as well as usability studies. Designers arrive at human-centric solutions through an iterative process, where prototypes/models are built. They are then tested/explored/evaluated, and the lessons learned are

[13] Godin (2015, p.13) notes a long entry on communism in the 1888 edition of the *Encyclopaedia Britannica* which went thus, "Communism is the name given to schemes of social innovation which have for their starting point the attempted overthrow of the institution of private property". Frugal innovation on the other hand, is often seen as rooted in civil society or third sector organizations (Gaglio, 2017) and linked conceptually to conversations around notions of thrift, frugality, collaboration, coworking, sharing and so on, all of which are situated within particular moral economies, and specific sets of values and relations (Psarikidou, 2015). Instead of going in the direction of creating sustainable futures, unfortunately, many of these innovations often reverse into established socio-economic enterprise arrangements: think of coworking becoming WeWork, ridesharing becoming Uber, and couchsurfing transforming into AirBnB.

folded back into refining and building the next prototype. The process comes to an end only "when the results are appropriate or when the allotted time has run out." (Norman and Verganti, 2014, p. 78). This is design as incremental innovation at work.

In contrast, Dahlin and Behrens (2005) define radical innovation as being novel, and unique, as well as successful when it is able to harness social, market, and other forces. As Norman and Verganti have noted, this implies that "[t]he correct idea at the wrong time can fail" and that "successful radical innovation is surprisingly rare" possibly a once in 5-10 year event (2014, p.83). In their exploration of design-driven radical innovation, they use the example of Swiss Swatch watches, the Italian firm Alessi's kitchen products line, and the design of the Japan's Nintendo and Sony Playstation, to demonstrate that radical innovation is driven by changing meaning. This resonates with Eames' notion of value as a foundational principle for design. Swatch changed the meaning and use of watches from jewellery for keeping time into a cheap, fashion accessory, and Alessi changed functional kitchen tools into objects of attachment for adults and play for children and families. Both successes rested on a continuous tinkering to create new models to fit various users within an ecosystem that could source and take products to market efficiently. Norman and Verganti (2014, p. 84) write:

> "The bottom line is that both forms of innovation are necessary. Radical innovation brings new domains and new paradigms, and it creates a potential for major changes. Incremental innovation is how the value of that potential is captured. Without radical innovation, incremental innovation reaches a limit. Without incremental innovation, the potential enabled by radical change is not captured."

When this logic of design as problem-solving and a driver of innovation is applied to jugaad, what do we get? The value of jugaad is recognised as primarily survivalist, instrumental and short-term. The meaning of jugaad lies in giving voice to the ability to triumph over a bad situation. This contrasts with design as defined by *The India Report*, where the value of meeting a broadly defined value of service and social need is foundational, and design emerges through a process of testing and exploration in an iterative manner. Jugaad exemplifies creativity, pleasure, and indomitable spirit often in the face of scarcity, which can usefully be folded into the design process. But jugaad, unlike design as incremental innovation, rarely focuses on constructing a broader innovation ecosystem or bringing innovation to scale through technological and organizational innovations within a range of complex contexts and conditions (Douthwaite and Hoffecker, 2017). In the narratives that follow we explore what jugaad offers to designers.

Part 2: Narratives on jugaad, design and innovation

Example 1 Handcrafted home composters

Kambha (column in Hindi) (Fig. 4a & Fig. 4b) is a handcrafted modular terracotta stack composting system for a family producing about 1kg of compostable waste a

Fig. 4a: *Kambha***.** Source: *Poonam Bir Kasturi*

Fig. 4b: *Kambha* with user. Source: *Poonam Bir Kasturi*

day, and whose access to outdoor space may be limited to a small balcony in a high-rise, a tight space along the side of a home, or a more comfortable garden. There is a bigger version available as well. Poonam Bir Kasturi, whose team designed the kambha (and perfected it over 25 prototypes), set up a company, Daily Dump, to take the innovation to scale. She suspects that their products resonate "with that part of us which respects the labour of the hand, feels connected to natural cycles and is fascinated by the primeval magic of composting happening in the bowels of a mud pot."[14]

Kasturi is in that group of Indian design professionals who engage seriously with artisans and craftspeople and value design as a deliberate facilitative process that can take a strong role in pushing for equality and sustainability. She identified several challenges in their design and manufacturing processes, from training designers and craftspeople to collaborate and work together, to the fundamental difficulty of working in an environment "where the ecologies of practice and use are not established."[15] Acquiring materials that meet a defined quality standard in sufficient quantity, as well as in a consistent coordinated manner to maintain enlarged production is often difficult, even as product demand and customer needs have to be generated.

Kasturi's challenges of producing the kambha and running Daily Dump also highlight how certain industries such as trash and waste present an ideal case to think through jugaad innovation. Despite its size and ubiquity, these sectors are highly decentralized and context specific, and in India, underfunded, low-tech and hugely reliant on manual labour. The work exists almost completely in the informal sector, and even as it is reviled and ignored, is critically important to the livelihood of millions and to the health of many more communities and the environment in our cities and villages.[16]

Kasturi had many examples of kabar me jugar (to riff pardonably on Gupta's book title discussed earlier), particularly in the trash sorting and recycling industry that tends to be in clustered in slums, and in industrial or peripheral areas of cities large and small (Gidwani, 2015; Kudva 2013). Three issues came up repeatedly in our conversation on jugaad within the recycling and trash sectors: first, low barriers to entry (where the low-tech and non-specialized nature of recycling and trash work provides easy access to people lacking specialized training and resources); second, a work structure where groups of people focus on particular aspects of dis-assembly (removing and collecting filaments from an electric bulb, or melting copper from particular types of wiring for example; which leads to the creation of simple jugaad machine tools or applying jugaad to machines that were originally imported or created for another use and have been modified and kept working in the Indian context through various hacks). Lastly, industries like trash and recycling do not attract big players (corporates who work in building infrastructure for instance, are loath to enter socially stigmatised waste and recycling sectors). All this leads to a sector characterized by systemic underinvestment and crowded with examples that Kasturi described as "survivalist yet triumphant jugaad" that mostly displace risk and danger onto workers.

Example 2, Retail Spaces keeping energy costs in mind

The industrial designer, Jacob Mathew, described a series of large retail spaces that were designed and built in the 1990s by the design firm, Tessaract, where he was a founding partner. His description of their frugal innovation, which he contrasted to make-shift jugaad, to achieve energy savings went thus:

> We had to build energy savings into the lighting and A/C systems of the big stores we were designing. Building automation was new. Honeywell was one of the few companies that did building automation systems, but it was expensive. So, we did 'smart' wiring with different circuits for emergency store lighting, non-shopping hours lighting, peak hours lighting and did the same with the air conditioning. The A/C compressors only ran during peak and non-peak hours, for the rest of the time it was only on-air circulation. We colour-coded the switches, and instead of an automated system, we had timers and a 'Raju'. One of the staff members ran around switching the colour coded switches on and off. Walmart could not afford to do building automation at that time, but our innovative system worked well. We used it in most retail spaces where there were savings to be made.[17]

Mathew also described how their design practices to achieve energy savings changed as costs for building automation technologies dropped and became affordable to retailers. He carefully distinguished his example of frugal innovation--a transferable design solution responsive to considerable constraints at a particular moment in time--from the "miasma of jugaad" that he saw around him. This miasma is characteristic of Indian homes and cities from the use of cloth rags to bind leaking taps and hold live electrical wiring in place, to the ways in which wiring for electricity and cable are done in homes rich and poor. For Mathew, the importance of jugaad innovation lies not in its celebration of a 'can-do' attitude but in that it identifies, signals and offers "a problem statement." Cataloguing jugaad is a form of design research to get to better understand a user's needs.

Example 3, Maintaining Records and Enterprise Resource Planning (ERP) systems

For Rema Subramanian, the co-founder of an investment fund that focuses on social enterprises, jugaad is not

[14] Daily Dump website https://dailydump.org/about-us/#Mindset

[15] Interview, January 1, 2020. For ecosystems of innovation (Hoffecker, 2018)

[16] As of 2016 GoI statistics, India generates 62 million MT of recyclable and non-recyclable waste, out of which only 15% is processed (Swaminathan, 2018) and about 66% of solid waste is currently recycled by the informal sector (Chintan, 2019). In a city like Delhi, the informal waste collection sector provides livelihoods for 40,000 – 45,000 people (Chintan, 2019).

[17] Interview, January 10, 2020

innovation but "copycat adaptation," a tweaking of products and systems that are underfunded and of poor quality. Subramanian was unequivocal in her judgement of jugaad innovation: "you get sub-optimal returns, sub-optimal output and sub-optimal performance."[18] For her, jugaad needs to become a thing of the past, a practice that was necessary when resources were constrained, when poverty was endemic. She saw its persistence not so much due to necessity but because it had become "a habit of the mind," which shaped business decisions, and was focused on "short-term compromise rather than a longer-term perspective." Subramanian's first example was of the design of food product packaging, where smaller companies routinely economize by using poor quality plastics, cheap packaging machinery, and refuse to invest in packaging design for ease of use and transportation, or to meet shelf-life constraints.

Subramanian's second example was of jugaad practices in organizational settings: she spoke at length about how small companies resisted investment in planning systems and the use of software to track sourcing, manufacture, inventory control and marketing for planning purposes. Many smaller companies would prefer the jugaad of hiring a cheap junior programmer to create something for them using a pirated version of a program like Excel rather than use a specialized ERP or other proprietary system that has been tested across multiple organizations and follows standard, best-practice processes. Subramanian went on to point out that

> this creates software that crashes, [is] not scalable, doesn't give management reports and basically, is not only not worth the money saved but has a lot of hidden costs and [does not account for] time, which is the reason very few Indian companies have scaled [up].

The mindset of compromising on inputs was not the only issue that concerned Subramanian, who spoke of jugaad as a product of

> a very rational fear that you will not be able to get the right price for the quality. It's a vicious circle. So, we are now caught in a trap of lower quality, lower price, lower income and lower affordability. Unfortunately, [this] attitude has become part of our DNA.

The companies that Subramanian refers to are among the 60 million micro, small and medium enterprises (MSMEs) "job creators at the local level" that are seen as critical to providing employment for a workforce of which over 80% is in the informal sector. Kudva (2019) who wrote of the importance of MSMEs in the context of being asked to share her vision for India's development in the second decade of the twenty-first century, went on to note that "[d]eveloping an ecosystem for mass entrepreneurship can be catalytic." The development of ecosystems for entrepreneurship, for skilling (Krishnan and Kudva, 2019) that provide the basic infrastructure for enabling social transformations and a range of other innovations remains a critical issue.[19]

Example 4, The Kanchipuram Silk Sari

Aarti Kawlra's work (2005, 2018) on how the Kanchipuram silk sari - that unique garment both functional and auspicious -, is produced within an ecosystem that operates along many dimensions provides one view into how the Padma Saliyars, a Telugu speaking community who identify with weaving as a hereditary occupation, created and managed an ecosystem of entrepreneurship, innovation, and market leadership in Tamil Nadu. What Norman and Verganti (2014) labelled

Fig. 5a, 5b, 5c: The home as the primary center for production. Source: Aarti Kawlra

Fig. 5b:

[18] Interview, December 26, 2019

[19] Another view of the ecosystem is to consider the basic system of supports or infrastructures that would allow innovation to thrive. The debates around infrastructure as the basis for thriving economies, societies, and cities—networked or singular, hard or soft, even people as infrastructure—are beyond the scope of this paper.

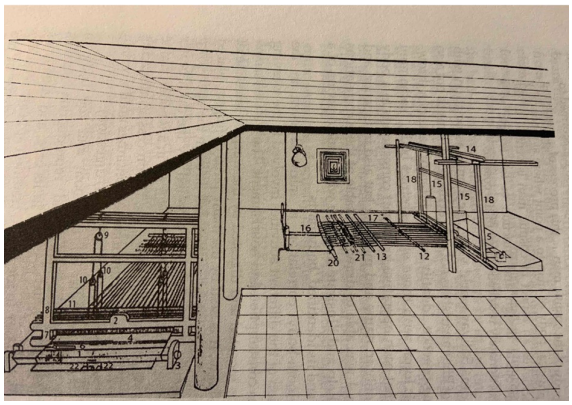

Fig. 5c

incremental innovation is continuously at work, allowing saris, the looms, organizational practices, and institutional arrangements to be recast as techno-economic conditions alter and shift.

Kawlra described to us how homes are the primary centres of production.[20] Men and women both weave saris even as the ancillary tasks for weaving filled the daily chores of the household along with other essential functions of minding children, cooking, cleaning and maintaining sociality. The dimensions and technologies of the loom are human-scale and incorporate the labour of both the young and old regardless of gender. Kawlra spoke of how community based relations of productions underpin the procurement of raw material, dyeing of the yarn, the weaving, distribution and sale of the woven silk saris across the region, in metropolitan areas and even globally. The trans-local community networks provide an important buffer against market fluctuations shaped by global silk prices, government policies, and increasingly, changing fashion trends as Indian women buy fewer and fewer saris. The Padma Saliyars have managed economic uncertainties by innovatively altering and modifying their exposure to risk through community-based and distributed production practices. With the younger generation of Padma Saliyars moving away from the work of weaving, and the entry of other non-hereditary group including landless agricultural labourers, the high value silk sari handloom industry is seeing a shift of incumbents at the retail as well as production levels. While each move involves experimentation, "a mustering of resources," and a problem-solving stance, there was little in Kawlra's complex narrative of an artisanal weaving community producing exquisite unique saris of high quality that one could label jugaad.

Beyond Jugaad, Design as a Driver for Innovation

How do these four examples allow us to summarize our argument against jugaad and go beyond it? The narratives used the analytic frame we proposed earlier, to highlight value, benefit, scale, and voice as the core principles by

Fig. 6: Washing station in Nilambur, Kerala. Source: Sharan, Shantigramam, Malapuram District, Kerala

which to understand the efficacy of design as problem-solving and as a driver for innovation.

For many of our interlocutors jugaad provided examples or a way of thinking that was productive. In the example of jugaad in the trash and recycling industry, jugaad occurred when there was no established ecosystem within which innovation could occur to be successful. On the flip side, Kawlra's study of the Padma Saliyar's highlighted the success of incremental technological, design and organizational innovations within a broader and robust ecosystem of production interdependencies based on trust.

All our interlocutors saw jugaad practices as useful in locating or defining a problem (with Mathew noting it most explicitly). As fundamental were the ways in which jugaad reflected the voice and needs of people. Jugaad can thus be read as a crucial component of the innovation process but not the design solution or innovation itself.[21] It embodies a form of design thinking – a prototype making process that was short-changed before it could go through the process of iterative design to transform into incremental innovation.

Equally, innovation can harness the voice and participatory energy of communities and create low-cost, well-designed infrastructure within tight local government budgets. Himanshu Parikh's Slum Networking projects in the Indian cities of Ahmedabad and Indore offer an example of such design innovation that is low-cost but thoughtfully implemented. To improve urban infrastructure, Parikh started at the neighbourhood-level of informal settlements and worked with teams of neighbourhood committees, settlement residents, and contractors to implement better transportation and drainage systems. Although the projects started at a local level, each system was eventually scaled to connect with other neighbourhoods, and then, other settlements (Diacon, 1996; Parikh, 2012). Instead of providing a costly top-down infrastructural solution, a frugal solution, to borrow from Krishnan (2012), delivered an end-to-end

[20] Interview, January 2, 2020

[21] With thanks to Alekhya who captured this succinctly in the process of editing.

innovation process where designing, installing, and servicing were all given similar priorities. Studies also indicate that in the five year period following project implementation, community members invested substantial amounts in their homes and community businesses and public amenities: about 13 times what the government spent in constructing the infrastructure itself (Parikh, 2012)

Parikh's slum networking is an example of design driven innovation, where values and meaning-making are foundational. In contrast, jugaad remains a provisional act, a hack, emerging from scarcity, and short-term. And while the benefits it provides to the improviser and the user are often instantaneous, the lack of ability to standardize and scale up design and innovation remain a serious problem if we are to meet India's many challenges head-on.

Conclusion

In conclusion, we return to where we started: jugaad during the pandemic. The public washing stations in the image above are our last example of jugaad design. Designed and produced within a short timespan by repurposing available materials, the stations allow for frequent handwashing that helps prevent the spread of the coronavirus. Such stations are found all over Kerala, and many of them been set up by the Democratic Youth Federation of India or DYFI, the youth wing of the CPI(M). They have become a public symbol of Kerala's ability to flatten the curve, even though people recognize that Kerala's success is primarily rooted in a robust three tier governance structure, borne of a century of policy innovations that produced the Kerala model of development. This model--a mix of radical land reform and focus on women's empowerment, universal health care and education, and maintaining vigorous democratic political systems--places value on public participation and caring for the vulnerable. Critical to our argument here, the system produces the conditions and the infrastructures for successful innovation, transformation and change.

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Keywords

Problem-solving, frugal innovation, Charles and Ray Eames, The India Report, design.

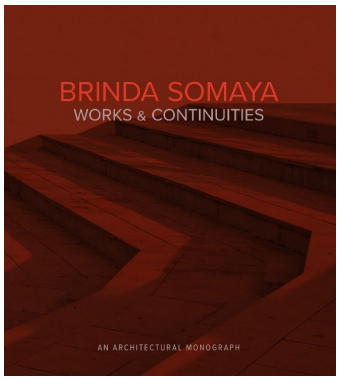
Book Review

By **Madhavi Desai**

Partner, ARCHICRAFTS, Ahmedabad, India.

Brinda Somaya - Works & Continuities: An Architectural Monograph

Curated by Ruturaj Parikh
Edited by Nandini Somaya Sampat
Mapin Publishing in association with The HECAR Foundation



All over the world, but especially in South Asia, women's contributions and achievements have been ignored in the canonical histories of architecture. Women architects' careers nearly parallel the development of modernism in colonial and postcolonial India. An examination of contemporary practices at the national level demonstrates the ways in which modernism was shaped by them in diverse regional settings and in a myriad of stylistic approaches. Therefore, the publication of the first monograph on the works of a woman architect – Brinda Somaya of Mumbai – holds great significance. It has come at a particularly vital moment, challenging the gender neutrality of the architectural profession, which needs to work hard towards creating greater diversity and inclusivity. The sheer quantity and quality of Somaya's journey of 40 years through her firm Somaya and Kalappa (SNK), places her in a leadership position in the field, unmatched by any other woman architect of the country.

The monograph is produced very well with excellent drawings and colour photographs. Its visual narrative includes master planning to exhibition designs, institutional and corporate commissions to campus designs and community to urban projects. Curated by Ruturaj Parikh and edited/introduced by Nandini Somaya Sampat, the main text is by Brinda Somaya herself, who is the winner of highly acclaimed national and international awards and many other accolades. This volume of her multi-project practice represents the shattering of the proverbial glass ceiling of the profession!

Fortunately, the monograph is not packed with all architectural projects undertaken by SNK but has a sensitive selection of non-chronological, key projects that represent the varied work of the firm. The monotony is broken by three background interviews with leaders in politics, architecture, and the arts as well as four essays by well-known scholars. The essays locate Somaya's work in the broader social, cultural and academic context of the country. Belonging to the second generation of women architects in India, Somaya's work offers a variety of expressions embedded in the post-Independence modernism of India.

As a single woman heading a prolific practice, Somaya has also collaborated with prestigious international firms and spear-headed two very important international conferences on women in architecture. Her projects represent diversity within a modernist framework while pluralizing various concepts of design. Rather than directly copying Western solutions, she attempts to arrive at an Indian consciousness of design. Her priority is context, strong concepts, climatic responses, and local landscapes. She is versatile and open in her approach, often using vernacular references and local craftsmanship. Besides doing conservation projects and *pro bono* community work, she is at the forefront of urban issues and challenges in a megapolis like Mumbai.

As a reviewer and a feminist, I do have a couple of suggestions. A rigorous architectural analysis of Somaya's practice would have added a critical angle to the publication. Also, this was a unique opportunity to include a brief gendered point of view of Somaya and her experience as a successful professional woman located in patriarchal Indian society. Nevertheless, it is extremely valuable to have Somaya's path-breaking publication of historical significance made available in the twenty first century

EKISTICS GRID

Created by Doxiadis as a Thinking Tool for Constructive Action, for Focusing Discussion, Classifying, Cataloguing, inspired by Geddes *Notation of Life* and *CIAM Grid*, with the added dimension of Ekistics Population Scale

Kinds of Human Settlements:			Temporary		Villages		Polises		Metropolises		Megalopolises		National Systems	International Systems	
Community Class				**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
Ekistic Unit	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Kinetic Field	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Name of Unit	**anthropos** (human being)	**room**	**house**	**house group** (dwelling group)	**small neighbourhood**	**neighbourhood** or village	**small polis** (town or urban ecovillage**)**	**polis** (town or suburb)	**small metropolis** (large city)	**metropolis**	**small megalopolis** (conurbation)	**megalopolis**	**small eperopolis** (urbanized region)	**eperopolis**	**ecumenopolis**
NATURE - Habitat Foundations															
ANTHROPOS - Physiological/biological and social-psychological needs and constraints															
SOCIETY - Social, economic, governance and political organization															
SHELLS - the envelopes that contain settlement functions															
NETWORKS - Node-to-node systems and flows of resources, waste, data, people and information															
SYNTHESIS - Human Settlements Combined, applied, coherent design and knowledge															
EPS (Ekistics Population Scale) Doxiadis rounded figures	**1**	**2**	**5**	**40**	**250**	**1.5 T**	**10 T**	**75 T**	**500 T**	**4 M**	**25 M**	**150 M**	**1,000M**	**7,500 M**	**50.000 M**
Core Population calculated at log 7	**1**	**2**	**5**	**35**	**245**	**1.7 T**	**12 T**	**84 T**	**558 T**	**4 M**	**29 M**	**202 M**	**1,412M**	**9,886 M**	**69 B**
Population Range			3-15	16-100	101-750	751-5000	5-30 T	30-200 T	200-1,500 T	1.5 -10 M	10 - 75 M	75 - 500 M	500 - 3000 M	3 - 20 B	> 20 B
	T = Thousand; M = Million; B = Billion (thousand million). Each unit has 7 times the population of the previous unit, based on Christaller's hexagon theory.														
	Kinetic Fields a-g are the distances anthropos can walk for a given period: **A-H** are when using draft animals or vehicles.														
	Adapted by Catharine Nagashima for Ekistics and the New Habitat 2020/05/07														


Ekistics