Against Jugaad

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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.

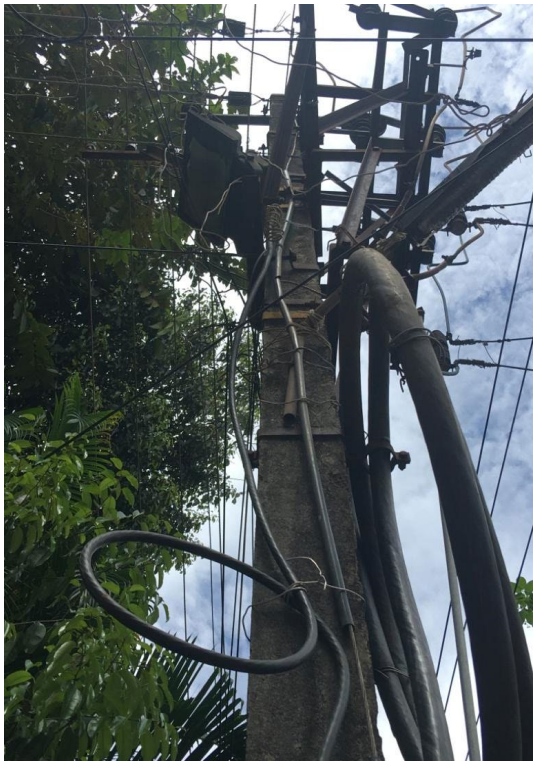

Fig. 2: Electrical pole with wiring
Source: Author's images.

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 into 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.

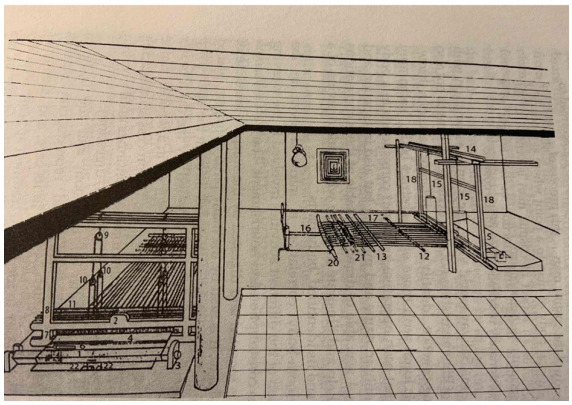

Fig. 5c

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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