



Technology, inequality and subalternity: theorizing technological agency among migrant workers in India

Anant Kamath

To cite this article: Anant Kamath (01 Sep 2026): Technology, inequality and subalternity: theorizing technological agency among migrant workers in India, *Innovation and Development*, DOI: [10.1080/2157930X.2026.2725566](https://doi.org/10.1080/2157930X.2026.2725566)

To link to this article: <https://doi.org/10.1080/2157930X.2026.2725566>



Published online: 01 Sep 2026.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)



Technology, inequality and subalternity: theorizing technological agency among migrant workers in India

Anant Kamath 

School of Social Sciences, National Institute of Advanced Studies (NIAS), Bangalore, India

ABSTRACT

This study is concerned with technology and inequality among the subaltern in contemporary India. It analyses visual material from Jharkhand and empirical work in Bangalore to understand technological engagement among certain subaltern socio-economic groups. The paper theorizes the interaction between subalternity, socio-spatiality and technology, where spatiality (through the 'proximity principle') appears to operate at the core of this interactive space. The study argues that spatiality needs to be integrated into the sociology of technology in the understanding of the technology-inequality-development interface. That is, socio-spatiality drives technological praxis and moulds the technological condition. We discover a spectrum of subaltern technological praxis, where the character of the technological engagement (in terms of praxis, outcomes and condition) is discursively shaped (in terms of collectively constructed imaginary, principles, routines and meanings ascribed to the technologies). Technological agency exercised either by informal frugal invention or by external intervention can battle the lived experience of inequality, and perhaps even the condition of subalternity.

ARTICLE HISTORY

Received 17 December 2025
Accepted 24 August 2026

KEYWORDS

Technology; inequality;
subalternity; spatiality; frugal
invention

1. Introduction

This study is about technology and inequality among certain subaltern socio-economic groups in contemporary India. The motivation here is that one aspect of inequality relatively understudied in India has been the technological dimension, as there has been insufficient attention to the instrumentality of socio-economic inequality on technological experience. Likewise, among studies on technology in India, the theme of inequality has not received sufficient attention, has often been misdirected and has been accorded negligible theorization (see Kamath 2021). Particularly among the subaltern, attention by academia and policy to this technology-inequality engagement will be enriching, given the sheer proportion of marginalized social groups that have been in the trenches of contemporary economic distress. We need to improve our understanding of inequality with respect to technology, and we need to improve our understanding of technology within a context of inequality. Understanding the reality of subaltern technological praxis helps us theorize the interaction between subalternity and technology, and we find in our analysis that *spatiality* appears to operate at the core of the interactive space between technology and lifeworld practice for migrant workers who hail from disadvantaged socio-economic groups facing economic distress. Technological experiences among marginalized social groups (such as Dalits, transgender individuals or indigenous peoples) are complicated, non-linear and unpredictable, but technological creativity is certainly not absent, weak or impotent. This study wishes to enrich the discourse on technology and development in India among the subaltern. The paper proposes that socio-spatiality drives technological praxis and moulds the technological condition. That is, technological imaginaries, responses and accomplishments in any setting are determined by the triad of society, discourse and the nature of *space* in that setting. In the right combination of this triad, the subaltern assert their struggle against distress and inequality via technology.

The subaltern function technologically well outside of the mainstream conceptual matrix of 'technology' as defined by dominant economic and technocratic structures. Their technological politics and praxis, especially in the Indian policy discourse, have been marginalized and glossed over. But technological agency, even creativity, among the subaltern can be kindled in favourable circumstances; and on the contrary, it can

even be stifled in other conditions, thereby reinforcing their socio-economic and technological subalternity. Explaining this is the essence of this paper.

2. Clarifying ‘technology’, clarifying ‘subalternity’

Deriving from foundational definitions and conceptualizations (Bernal 1969; Bijker, Hughes, and Pinch 1987; Feenberg 1999; Heidegger 1954; Ingold 1997; Kirkpatrick 2008; Pfaffenberger, 1988, 1992), we understand ‘technology’ as an entity of intrinsically sociological basis that emerges out of the interplay between materiality, environment and power, importantly (but not obligatorily) created to further efficiency (in work, life and recreation), reflective of a state of mind, and capable of serving as a vehicle of cultural expression, resistance and agency.

Subalternity’, though, is a far more debated (and easily tendentious) term that has generated voluminous scholarly output over several decades now, and in the Indian context too. We adopt Pandey’s (2006) categorization of ‘subaltern’ as a political category institutionalized and qualified from the more privileged position of ‘citizenship’, deriving from the lack of a sense of belonging and agency within a society with the potential for life and creativity (including the recording and maintenance of memory of individual and collective lives) proactively restricted for certain social groups. Nilsen and Roy (2015) and Green (2002) explain how the subaltern nevertheless have their own politics and organize to exercise their agency and to become politically intelligible, even if in varied degrees of political consciousness and action, even if they do not overthrow hegemony, and even if they are ultimately unable to excise the root of their subalternity. Subalternity, according to Nilsen and Roy (2015), is therefore a position of adverse incorporation¹ in socio-historical power (hence, it is ‘relational’), is constituted along several axes of power and is empirically operationalized context-specifically (hence ‘intersectional’) and is constitutive of agency against dominance (hence ‘dynamic’). It is important to acknowledge (drawing from Pankaj and Pandey 2014), that subalternity is not monolithic or uniform, and there are internal variations too. For instance, with horizontal subalternity (that is, ‘heterogeneous subalternity’), different subaltern groups face varying experiences of subalternity depending on social and historical contexts, and hence, there is no generic subaltern subject. There is also ‘differential subalternity’ wherein subalternity is experienced not as placed within a discrete spectrum but on a continuous calibrated scale wherein communities experience internal hierarchies and power asymmetries within an already marginalized category, such as when individuals or groups experience intersecting subalternities simultaneously. For the context of this paper, it is ‘heterogeneous subalternity’ that is of relevance. To this, we add one dimension of the lived experience of subalternity, namely precarity, by adopting Millar (2017) and Butler (2004) emphasizing precarity as an *existential* fact of sociality, encompassing but not limited to political-economic categorizations of class or employment, and being *relational* at its core. The lived experience of precarity, its associated politics and even its creative possibilities, therefore, becomes our axis while employing the term ‘subaltern’.

3. Methodology

The most appropriate methodology for such a study on technology-inequality-subalternity ought to assist us in effectively breaking through the webs of technological meanings, experience, and agency among the subaltern. We needed an enquiry into the nature of the technological ambience (technics, products, nature, theory, intersubjectivity) around the subaltern groups in question. The methods that stem from an ethnomethodological approach seemed appropriate, helping us reveal technological ambience, socio-technological engagement, as well as the technological imaginaries (i.e. collectively shared visions and understandings of technology, and its purpose in life, society, and development) among these social groups. Attached to the ethnomethodological approach is discourse analysis, which unpacks the creation and perpetuation of meaning by subaltern groups around their associated technological ambiances, artefacts, and practices. This approach helped us deconstruct everyday technological routines, the discourse around subaltern technological engagement, ‘naturalized’ technological conditions and practices among them, and ultimately helped us place all this in a context of inequality.

The ethnomethodological approach² facilitated uncovering the roots of moment-to-moment technological accomplishments of situated social actions, their mundane everyday tasks and conversations, and so on. An understanding was developed of their ‘naturalized technological conditions’ or ‘naturalized technological reality’. To uncover these ‘realities’ and how they are interpersonally and situationally produced, ethnomethodology directed us to investigate the discursive practices around technology within which interactional mechanisms play within these subaltern groups, and which finally constitute meaning/action around their artefacts and ambiances. The ethnomethodological approach facilitated us to theorize subaltern technological engagement within, detail people’s ordinary technological activities in their settings, uncover meanings around technologies they are associated with, examine hidden agendas they might have with those technologies, determine power equations, and question ‘common-sense’ technological assumptions. We employed ethnomethodology to take seemingly mundane events in the technological ambience of subaltern social groups, and to interpret and theorize them.

4. Respondents and field sites

Three fields were studied. Two of the three fields for this study constituted workers based in and from Jharkhand state, both in their native towns and villages in that state, as well as at the destination of migration (here, Bangalore city). In the last field, however, we were led to cobblers, potters, tailors, and blacksmiths within Bangalore city (who were not necessarily from Jharkhand).

- (1) Field 1 is situated in Jharkhand state, and Babu (2023) has been drawn from for this. While Babu (2023) concerns rural inequalities, migration, and skills, for this study here, we draw only from the visual material and some conversational reflections that he gathered during his groundwork there. This Field is a rural setting where its members share a cultural, environmental, and social familiarity with the environs and the larger community.
- (2) Field 2, on the outskirts of Bangalore city, is a set of two construction worker colonies with migrant workers from the same areas in Jharkhand that characterize Field 1. While there are several thousand male workers in both construction sites, those from Jharkhand numbered 142 workers, all male, across both sites, and all of whom were included in the study. Both colonies are well-appointed facilities with wide open spaces for recreation, a medical facility with half a dozen beds and a standby ambulance, ample area within the living quarters, clean sanitation facilities, and uninterrupted electricity and water supply. All 142 workers across the construction colonies were interviewed using a semi-structured questionnaire and spoken to in Hindi, with written consent obtained at all levels of the company and verbal consent obtained from the individuals (as most were only partially literate). This questionnaire served as a preliminary to the ethnomethodological investigation into this cohort that followed.
- (3) Field 3 is well within metropolitan city limits in Bangalore and includes a set of worksites of the beneficiaries of the organization Selco Foundation, which engages with technologies for livelihood development. Worksites included those of cobblers, tailors, blacksmiths, and potters engaging with solar technologies for their occupations. The twelve respondents spoken to at length are not migrants and have settled for most of their lives in the city, and they were conversed with in Kannada and Hindi. In a city with millions of informal workers, it is an almost impossible task to scout for frugal or grassroots inventions created by individuals in their own capacity. Hence, we analysed technological experience among marginalized socio-economic groups who received innovations exogenously, i.e. they may not have developed these inventions on their own and have acquired them from external actors and have full ownership of them.

All three Fields are significantly divergent in almost every manner, with the exception that the social groups under study in all three live under the duress of socio-economic inequality. However, these Fields are not siloed spaces and settings. Even if the three Fields are not traversed by the same individuals, they are deeply intertwined. It is significantly due to economic (largely agrarian) distress that individuals and communities from Field 1 migrate to settings such as Field 2 to soften income uncertainty, which is a central characteristic of their life in Field 1. While movement between Fields 1 and 2 invokes notions of circular migration, mobility of individuals and communities from Field 1 to Field 3 is mostly a form of

permanent migration, given that they have possibly been altogether dispossessed of land in their native regions or perhaps shrinking livelihood options have forced them to make a near-permanent migration. Hence, all three Fields share with one another resonances of socio-cultural context, economic precarity, distress and adversity, and are connected with varying threads of subalternity.

The positionality of this researcher here conferred several advantages during the interview and ethnomethodology process. Being introduced as an academic (euphemistically *adhyapak*, that is 'teacher' in the Hindi language) attributed not only a position of respect but also (what they assumed to be) political neutrality (unlike, say, a civil society professional or union member). The workers felt obliged to cooperate, though in a respectful if not coerced manner, during conversations with this researcher. From the part of this researcher, of course, political neutrality and unbiasedness was not pretended but not announced either.

5. Findings

A considerable length of time was spent with respondents – often hours, mostly individually but occasionally in groups – speaking to them about these aspects in colloquial language and tone, closely noting their verbal intonation and gestures, as well as their perspectives when describing the technologies they associate with on an everyday basis for life and livelihood. Some of these elements, such as institutional structures or spatial features, were gleaned from first-hand observation. The respondent was always the focal point rather than the artefact or process, which allowed us to ethnomethodologically deconstruct.

- (a) The technological 'gaze' of the respondents and social groups in each setting.
- (b) The 'doing' of the technology (technological praxis, in other words) by these actors.
- (c) Problematizing the 'raw' experience of technological engagement, rendering 'naturalized technological facts' as accomplishments and not self-evident.
- (d) Knowledge (shared principles, routines, artefacts and processes), settings (exogenous factors such as social structure and spatial makeup) and actions (decision-making around technologies, mitigation of inequality, empowerment, technological expression politically, culturally and economically).

5.1. Field 1

Babu (2023), a large-scale statistical survey of technology usage in the context of skilling among over eight hundred individuals in a village in Jharkhand state, generated a wealth of qualitative information, including some visual material on the technological artefacts produced there. Lengthy conversations with him about his experience there in understanding technological engagement also produced reflective qualitative material for this study. What is evident is that in this rural agrarian site, his respondents shared an almost 'organic' relationship with the cultural, environmental and social composition of the setting – quite naturally.

The thriving technological practices in this field were impressive. These inventions attest to an ingenuity in attempting to work around adversity in that setting; an adversity that stems from conditions of economic distress and transformation that are associated with the socio-economic inequalities in that region. At first glance, these inventions may invoke amusement as awkward quick-fixes. However, these are undeniably solutions that individuals and their compatriots in the region have developed to mitigate adversity and inequality in aspects of life and work. More than simply experimental or quirky, these creative technological solutions have improved their lives in non-insignificant ways by appending their livelihoods and accessibility and, to some extent, have fed into the process of empowerment by strengthening their technological agency, even if in such 'unconventional' forms. Such inventions included cycles and motorbikes refashioned via locally available materials into cargo transportation, with no formal knowledge of engineering or design; cloth-ironing equipment and coal heaters that were repurposed for (small-scale) industrial production purposes; three-wheeled transportation that was reconverted and refabricated for other purposes; and so on.

Upon speaking to Babu about the conversations he had had around these frugal technologies in his field site, a noteworthy narration was reported by him to emerge – that the creators of these technologies did not actually consider them ‘innovations’ or even ‘technologies’. While this appears to embolden the mainstream technocratic view of these creations, what Babu narrated to me was that they considered them ‘merely common-sensical recombinations of ordinary things around us’ and ‘with no novelty’. We cannot overlook that interpretation as ‘modesty’ on the part of the inventors because such admissions are loaded with a wealth of meaning, which we shall revisit in later sections. Clearly, there was no sense of ‘intellectual property’, since Babu had reported that the creators of these frugal inventions did not mind those technologies being copied and recreated elsewhere by other people – even their rivals. And to add, Babu related how these technological creations are *not even named*, as they seem ‘not worthy to be named’, in the words of their creators.

Babu (2023) had noted in his findings that these creations are mostly designed by oneself, and based mainly on the search for utility and efficiency. The fulfilment of utility and efficiency is achieved, Babu observed, via intuitive resourcefulness that is kindled upon observing materials in the vicinity, particularly in scrap yards or the immediate surroundings. Upon asking if the design process required seeking materials outside of one’s proximity, they replied in the negative, as the creators did not go out of their way to source materials and relied almost entirely on locally sourced stuff. There are, of course, constant informal interactions with welders, scrap dealers, other creators, and so on, in the process of design. This allows for an iterative process of creation, replete with trial-and-error, and with a final product that is usually different from what was originally intuitively imagined. Hence, there appears in the visual evidence in Babu (2023) an intense exercising of agency, resulting in technological creativity and empowering life and livelihood in the fight against adversity.

5.2. Field 2

This field was in complete contrast to Field 1 in almost every aspect except that the workers here are migrant labourers from Jharkhand. The rationale for this is to study whether individuals, upon migration, modulate their technological praxis – the findings seem to suggest an overwhelming affirmation of this. The total population of workers from Jharkhand in the construction projects, numbering 142, were spoken to, whose narrations and conversations were at a complete antipode to what was witnessed in field 1. Let us first visit a few basic details about the cohort, as gathered via a structured survey questionnaire.

All respondents in this cohort were working as manual construction labourers, headed by supervisors. Around 70% of the group of 142 workers belonged to the most marginalized of social groups in India – the Scheduled Castes (SC) and Scheduled Tribes (ST) – while over a quarter belonged to Other Backward Classes (OBC); only around 5% were non-OBC/SC/ST. Half the cohort was aged between 21 and 30, while three-quarters were under forty years old, and only a quarter of the entire group were schooled beyond grade ten. Nearly 70% were married and had left their families back in their native villages. Despite being away from their families, almost 90% reported that the job was ‘satisfactory’ (although around 60% saw no aspirational improvement in the last five years of working at this site or in the construction sector in general).

The technologies immediately around them – ceiling fans and televisions in their living spaces – belonged to the company they work for. No vehicles, cooking equipment, irons, or other electronic or mechanical equipment were reported to be owned; in fact, besides their clothes and a few small personal items, the only technology they individually owned was a mobile phone. Interestingly, an equal share of the cohort had bought their phone from their village or town as well as from their destination of migration (both around 40%), with no significant indication that smartphone owners (who constituted almost 90% of the group) bought theirs after they left their native towns. It was also of interest to note that a good 40% admitted that there was no exceptional utility they enjoyed upon owning a phone (besides for recreation or communication).

The ambience was characterized by an observable comfort in immediate material needs and in work conditions, but an understandable sense of spatial alienation persisted in their living and working space, given that this was a construction-worker colony with a floating population of workers from several states across the country. Some cultural alienation that is expected in a faraway construction site was mitigated by

interpersonal bonding with co-workers and via the phone. The only connection with the immediate space was in the context of work and lodging, and hence sentiments of estrangement were reported to coexist with feelings of contentment with their semi-stable livelihood. Upon speaking to them at length, over several days, about their engagement with their mobile phone, there seemed to emerge, expectedly, a flaccid response that there was little that they could do with it except conversing with their families and perhaps some entertainment. However, some reported that it facilitated migration (and eventually helped cope with cultural alienation at the destination) and hence changed their lives for the better.

It felt reassuring, respondents reported, that they could maintain their cultural connection with their native villages and towns, including even local festivals, political activity, and other events and updates in the extended family. But enquiries about any sort of cultural expression via the phone were met with blank stares – especially in the context of the outburst of entertaining and informative activity online that was widely witnessed from rural India upon the proliferation of the now-banned TikTok. Hence, cultural alienation may be battled with some measure of success as passive users of the technology, but there seems to be no cultural expression that follows from this success. Family bonding and maintenance of cultural connection were reported to be the primary motivation for owning and operating the device, and routines around the phone were also rather homogeneous across caste and age. Almost everyone who had a smartphone stated how they ‘automatically’ began using WhatsApp and Facebook the moment their recreation commenced in the evening after working hours.

Later in the fieldwork, the workers in Field 2 were spoken to about the technologies developed in Field 1, about how people back in their own native towns and villages had developed frugal inventions both large and small, and how they accomplished these despite serious adversity – possibly even greater financial adversity – as compared to these workers in Field 2 who receive steady incomes, comfortable facilities, and other benefits from the company. It was enquired whether there was any possibility of putting together interesting artefacts like those in Field 1 within one’s artefactual and resource limitations, and the responses received from several workers were nearly similar to one another: that those activities were ‘easier’ in the rural, and were ‘culturally more natural’ there.

... it’s not that we don’t know *how* to do all this here. We just *don’t* do it, that’s all ...

We even explained to them how workers in other regions (as informed to us by the Aajeevika Bureau) have used mobile phones to create videos about their conditions of work and life, perhaps air some grievances too, and circulate such videos to spread awareness, even if not challenge the systems they were living and working in. While the workers here in Field 2 reported that they (perhaps justifiably) had no reason to be so aggrieved, they also seemed to suggest that frugal invention and technological creativity were a ‘natural feature’ of their native towns and not of a construction site. The narratives from Field 2 seemed to gravitate towards their immediate location as a determinant in the nature of their technological engagement.

While this might seem obvious, our ethnomethodological approach does not permit us to simply accept this as a ‘naturalized’ condition – i.e. technological stuntedness in Field 2 in contrast to technological creativity in Field 1, despite serious economic adversity prevalent in Field 1. In Field 2 here, it appeared upon spending several days with them and drawing from their conversations, opinions, and sentiments about the technologies that the respondents were associated with, that these technologies were employed primarily for the objective of communication efficiency, besides cultural connect back home, if we understood ‘efficiency’ as merely the operational ease of communication and ‘cultural connect’ as merely being able to access entertainment content in one’s native language. ‘Mere’ because it is in complete contrast to the rich technological activity – through the phone or otherwise – that was witnessed in Field 1 and in other general observations of rural India’s engagement with the smartphone outside of this study. The attitude towards technology gathered through the narrations in this field inclined greatly towards a relationship of materiality (more than of agency or empowerment or expression), and the ‘naturalized’ technological condition appeared to be that of technological stuntedness. As to how this is ‘naturalized’ will be explained in detail in subsequent sections.

5.3. Field 3

Field 3 was a set of four sites within Bangalore city limits, which showed more promise than Field 2 in terms of technological engagement with their artefacts, but did not demonstrate the technological creativity seen in Field 1. The rationale for Field 3 was to study the technological engagement of subaltern groups experiencing economic adversity, who may not develop frugal inventions on their own but who are also not stunted in terms of technological agency, as they were beneficiaries of bespoke technologies. The four-site amalgamation in Field 3 includes three cobbler units, two tailoring units, two blacksmith units, and one pottery unit. All these units are beneficiaries of the organization Selco Foundation, which provides solar energy solutions for livelihood development, especially micro- and small-sized enterprises (MSMEs).

The purpose of these technologies, according to Selco, is to combat livelihood uncertainty and adversity. In some sense, the technologies actually do combat unsteadiness and volatility, which stand at the core of our conceptualisation of subalternity. However, the beneficiaries in Field 3 did not subsequently tinker with the innovations, or even develop further frugal technologies out of them. Due to the success of these innovations, it was even reported that they would continue in their respective occupation for the long term and not move into gig work such as delivery or taxi driving. This is a very telling indicator that the new technologies have helped mitigate some amount of medium- to long-term uncertainty and precarity that are considered second nature in these low-tech occupations, and provided incentive enough to engage with these occupations as a livelihood, rather than out-migrate from town or the occupation, or succumb to more precarious urban employment.

In all four types of units studied (potters, blacksmiths, tailors, cobblers), the technologies helped power some central functions of the production process. The innovations that these units were provided included a blacksmith blower machine, a mechanized pottery wheel, a tailoring facility, and a sewing machine for shoe services – all solar-powered. With the exception of the cobbler units (with respondents who belonged to the SC social group), all other respondents in the other units belonged to the OBCs. All individuals were male and married, with families living with them; in the case of the blacksmith units and pottery units, the workspace was attached to the living space, and hence (unpaid) family labour was employed for various tasks within the production process. All respondents from all the units had arrived in Bangalore as migrants from villages nearby within Karnataka, with the only exception being one blacksmith who had arrived from Tamil Nadu, three decades ago. While all other respondents lived with their families in rented accommodation in concrete houses with electricity supply from the city's power company, the respondents in one blacksmith unit lived in a crude shanty, though powered by solar lighting from Selco.

They were spoken to at length about their experience with the technologies that they received from Selco. Importantly, the family's opinion on the technology was enquired into as well. The experience in general was reported to be positive. In the case of the tailoring and cobbler units, the innovations powered different types of sewing machines and other equipment, and supported lighting within the premises; the sustainable and uninterrupted lighting alone helped increase working hours and improve capacity. In the blacksmith units, the blower machine helped in the critical function of continuous airflow, which was traditionally pumped by hand or by conventional electricity; both technologies became unsustainable and expensive over the long term, affecting the livelihoods of the blacksmiths interviewed. In the case of the pottery unit also, the pottery wheel was now powered by solar energy, as were slurry machines, significantly improving daily productivity of the units. While the purchasing cost of the technologies from Selco was cited as a concern, the overall engagement was positive.

The frugal inventions accomplished in Field 1 were discussed, and they were asked whether they had attempted something like this in the context of their setting, occupation, and associated technologies, but the response was that those technological activities are 'very rural' and that 'people become quite serious [sic] in character when they come to the cities, compared to being casual and informal in the villages'. These experiences were taken back to Selco on a follow-up visit to speak to their staff, who had stated, quite interestingly:

... the poor in cities will not do this sort of *jugaad* compared to village folk. I don't know: maybe its in the air there, or maybe they're just more risk-taking back in the villages. I disagree that our equipment is inflexible, since we've given them the basics about troubleshooting and taking it apart. But I can think of one reason I feel this is not happening here. I feel its not happening here because there's no space to do that. I'm not talking only

space in terms of exercising intellectual capability, but in terms of actual physical *space*. The poor in cities live in congested slums and shanties and mostly rented homes; I mean, where's the space to try out all this?

However, though creativity around the technology was not witnessed in Field 3, conversations with the respondents across the units strongly conveyed empowerment due to the technological intervention into their livelihoods. Their technological engagement did help overcome their economic adversity and improve to an appreciable extent away from their condition of subalternity, but there was little in terms of expression of inventiveness. Hence, technological engagement in Field 3 can be said to be characterized by technological accommodation and ownership, and empowerment beyond just technological materiality, but still without the imaginativeness seen in Field 1. It is not as stunted as Field 2, but not as technologically fertile as Field 1 either.

6. Spectrum, split and synthesis

The findings assist in ethnomethodologically analysing the technological gaze of the respondents and social groups in each setting, technological praxis by these actors, and the 'naturalized' technological condition.

6.1. Spectrum of subaltern technological praxis

Let us begin with Field 2. The relationship of the individual to the technology is only that of material ownership. There is little creativity or agency generated via the technology, and individuals have ended up as passive users of the artefact. Due to this, there is little response to their socio-economic condition, and the technology's purpose has been relegated to merely recreational and communicational uses. Since the cohort in general appears to orbit around the notion that 'there is little that can be done here', the discursive construction of the technological imaginary relegates the technological praxis to one that positions the artefact as one whose primary (often sole) purpose is to provide ease of communication and entertainment. This 'technization of the social world' – a comprehension that emerges from Jürgen Habermas and Martin Heidegger – within the migrant-worker colony is what actually obstructs any form of creativity, even for frugal invention around the technology (Feenberg 1999). The technical world consumes the 'lifeworld', which is the sphere of everyday functions of family, education, interpersonal interaction, and so on; according to Habermas and Heidegger, lifeworlds of modern societies are pathologically colonized by technological systems that place systemic efficiency above all else (ibid.). This, in turn, enfeebls any technological response to their existential condition of subalternity. The only significantly positive feature of the technology-inequality interface in Field 1 is that this technology facilitated the out-migration to the urban among those in rural economic distress and helped counter cultural alienation at the urban destination.

Field 1, on the other hand, is technologically much richer and has witnessed individuals mitigating their existential conditions of adversity and technological/socio-economic subalternity via technological creativity. This technological creativity is powered by the very imagination of technology in that setting. The discursive construction of that technological imaginary, as well as the praxis emerging out of it, appears to bud from the notion (in that setting) that technology is not merely an artefact, but what Andrew Feenberg (1999, based on Habermas) calls 'lifeworld practice'. Technology here is no mere artefact but one that enjoys the integration of natural, technical, and social environments in that setting; that is, technology is not relegated only to materiality, and merges with lifeworld-practice. This discursive construction of individuals and their associated groups, of what technology is and does, is what drives the thriving technological praxis in this Field.

Finally, Field 3 straddles the socio-technological space between the other two Fields, where we see that there is indeed ownership of and empowerment via the technology, but little creativity. The technologies significantly improved livelihoods and expanded the options available in life and work. In that sense, individuals here indeed progressed beyond mere materiality in their relationship with the technology, and have achieved technological accommodation, but the full task of integration of the technology into lifeworld-practice remained incomplete. Any signs of incremental invention by the respondents would have accomplished this. There was hence active technological engagement that has triumphed over

Table 1. Comparison of findings.

	Field 1 <i>Rural</i>	Field 2 <i>Migrant-Worker Colony</i>	Field 3 <i>UrbanWorkspace</i>
Technological Praxis	Thriving creative socio-technological praxis via frugal invention	Mere technization of the social world, and technological stuntedness	Technology successful for livelihood advancement, but no additional incremental invention
Outcome of Technological Engagement	Empowerment, creativity, ownership, agency	Only ownership	Empowerment/ownership but no creativity
Subalternity and Inequality	Strong subaltern technological response to inequality	No response	Technological engagement helps combat inequality only within domain of livelihood
Technology and Lifeworld Practice	Tech materiality and lifeworld practice unite	Tech essentialized and rationalized, deterministic rigidity	Tech materiality integrated only with livelihood, not lifeworld practice
'Naturalized' Technological Outcome	Creative-technological engagement	Reinforced technological and socio-economic subalternity	Active technological engagement, combating adversity but without creativity

socio-economic adversity (hence an improvement over Field 2) but is devoid of technological creativity (hence not as successful as Field 1).

To summarize, the 'naturalized' technological outcomes are:

- (1) **Field 1:** creative-technological response against subalternity and inequality; this is because technological materiality and lifeworld practice have been discursively united in this setting.
- (2) **Field 2:** reinforced technological and socio-economic subalternity; this is because technology has been discursively essentialized and rationalized with deterministic rigidity.
- (3) **Field 3:** active technological engagement combating socio-economic adversity, but without creativity; this is because technological materiality is successfully integrated with livelihood practice, but has not discursively progressed into integrating with lifeworld practice.

We can hence propose a spectrum of subaltern technological praxis. The technological engagement (in terms of praxis, outcomes, condition) is discursively shaped (in terms of collectively-constructed imaginary, principles, routines, and meanings ascribed to the technologies). Let us proceed to label these discursive outcomes; for this, we pick Fields 1 and 2, which lie at the extremities of our empirical ground. Table 1 summarizes the findings within a range of categories.

6.2. Splits and syntheses

To recall, in Field 2, the migrant-worker colony, technological stuntedness was observed. The social world in this Field appears to have become subservient to technology. There is impotence towards any response to the conditions of inequality, subalternity, dispossession or alienation. However, when we study their technological praxis and the discourse that shapes it, we need to turn to Heidegger. Drawing from Kirkpatrick (2008), we understand that Heidegger feared that advances in industrial civilization and its uneasy notions of modernity would sap technology of its essence and that society may end up engaging with its artefacts only in the context of their materiality, so much so that technology then ends up enframing us. 'Social gathering' around technology weakens. Technological subservience results, and individuals' relationship with technology becomes 'coldly' rationalized and essentialized, with a rigidity that echoes technological determinism. We know from the literature around Heidegger that in such a state, technology emerges purely as an instrument of practical efficacy, subordinate to the systematized pursuit of ends (Kirkpatrick 2008). The literature that has emerged from Heidegger (especially in the work of Albert Borgmann) has also illustrated the emergence of a 'device paradigm', that is, a techno-culture that places efficiency as supreme and distances individuals from their human reality, which results in a deadening effect, draining technological praxis of any human meaning (Borgmann 1984; Feenberg 1999).

Social patterns hence are mapped straight on to technological imaginary and praxis, and the temperament of technological praxis becomes a mirror of social reality – which in Field 2 is that of inequality, dispossession, depoliticization, estrangement, and alienation (albeit, seated within material comfort, stable monetary income, and livelihood security reportedly associated with this occupation by the cohort spoken

to). Nothing in Field 2 seemed to suggest the technological artefact (the mobile phone) is an *asset* that fuels aspiration, empowerment, or capability-building. In some sense, a Heideggerian ‘essentialization’ seems to have come about, with only the ‘technological’ (i.e. materiality and efficiency) in the technology. The individuals who originated from the very same society and culture of Field 1 transformed from potentially technologically creative to technologically stunted beings. Conditions of inequality seemed to have trumped technological creativity among this cohort. A device/meaning duality seemed to have concretized over time in Field 2, wherein individual integration with nature and with other human beings for technological praxis (as seen to thrive in Field 1) was reduced to a bare minimum; the very existence of creative and organic dimensions of human experience was suppressed by this uncritical engagement with technology (Lawson 2010). Drawing from the context of this study on the technology-inequality interface among the subaltern – the split between lifeworld-practice (L) and essentialized technology (T) – can be termed as an *LT-Split*.

In Field 1, despite serious economic adversity, the technological praxis was far richer and empowering. With their frugal technologies, the communities in this Field vividly exercised technological agency and creativity, and in the process responded to the conditions of distress and inequality in their setting. These frugal technologies were created not simply out of any spontaneous quirkiness or luck, but as a result of a deliberate integration of the natural, technical and social environments by the individuals and communities there. This integration seemed so natural (almost inconsequential) to the individuals there that Babu (2023) observed how the creators of these technologies considered their creations as merely a utility-driven, socially designed, iteratively built recombination of what was – technical, socially and naturally – immediately around them, and that they weren’t really considered ‘innovations’. While in Field 2, there was conservation of social hierarchy and preservation of subalternity due to technological stuntedness, in Field 1, by contrast, there was the ‘democratic rationalization’ of technology that undermines the socio-economic and provokes structural responses to inequality in communication and mobility technologies, among other inventions (Veak 2000). Not just the instrumental dimensions, but the social dimensions of technological praxis were brought to life in Field 1, with new frugal technologies taking birth at the intersection of the knowledge of that culture and the practical requirements of its economic organization and livelihood. What Andrew Feenberg calls a ‘dual aspect’ was witnessed here, with technological objects being identified by individuals in *both* technical and social constituents (Kirkpatrick 2008), being socially and culturally shaped into the remarkable objects and utilities we see in first-hand observations in Babu (2023).

If we study Feenberg (1999) in some detail, we see how naturally that seems to apply in Field 1 and its flourishing frugal-technological culture. Feenberg argues that technologies are perceived by individuals beyond their mere efficiency (even if utility and efficiency still remain at the core); here, both dimensions – the technical and the lifeworld – are simultaneously at the centre of the technology, and the essentialism which Heidegger warned us about does not materialize. On many occasions, even among the subaltern, lifeworld meanings of these communities – gathered from practice and culture as much as from technical rationality – are embodied in the technological designs and solutions that individuals in Field 1 put forth to combat adversity. Technologies are embodied forms of power but also weapons against power structures and processes. But this is possible when lifeworld-practice and technical materiality are discursively integrated, and a blossoming culture of frugal invention that challenges inequality and subalternity is nurtured. Drawing from the context of this study, this lifeworld/techné (LT) integration is termed an *LT-Synthesis*.

To summarize

- (1) *LT-Split* is where the individual’s relationship to technology becomes rationalized, with lifeworld-practice of technology and technological-materiality diverging. In the technology-inequality interface, an LT-Split results in technological stuntedness, with little technological creativity, even in frugal invention, to combat inequality and economic distress. Technologies remain only instruments or artefacts, and not assets. On the other hand,
- (2) *LT-Synthesis* is where technological-materiality and lifeworld-practice unite, through the discursive integration of one’s natural, technical, and social environments. As a result, there is active technological engagement, empowerment and agency, which results in creativity, here in the form of frugal invention. The LT-Synthesis poses a strong subaltern response to inequality and subalternity itself. Technologies transform into assets, expanding the capability set of individuals and their associated social groups.

However, we need to further unpack, because there is a critical feature in each of the fields, which impinges on depoliticization, alienation, empowerment and agency. This critical feature is space.

6.3. Centrality of space

It can be proposed that the ‘naturalized technological condition’ in each setting is produced through a discursive formulation *bound* with the individuals’ relationship towards their respective spaces. From this proposition, we now proceed in this section to build a theorization that the nature of a spatial setting shapes the socio-technological discourse in that setting, and subsequently the subaltern technological engagement in that setting.

At the centre of our theorization is the ‘Proximity Principle’ elaborated by Pani (2022, who developed this concept via Cassirer (1944) and Harvey (2006)). The Proximity Principle emerges from the understanding that space is a determining factor in human intuition. The nature of the immediate surroundings of an individual has, logically, an important and significant influence on shaping that individual’s intuition. That is, what is presented to an individual as ‘true’ is in a significant part driven by one’s immediate locale. This could apply to one’s cultural, familial, economic, and therefore, by extension, technological surroundings too. The Proximity Principle, based on this reasoning, alludes to a person’s intended actions to her intuitively perceived immediate surroundings, to the exclusion of what falls beyond these boundaries in all the spaces one acts in. As Pani (2022) continues to explain, what constitutes an ‘immediate surrounding’ for an individual is more intuitively than objectively determined, and the boundaries of these surroundings are always in flux. Very importantly, the Proximity Principle also puts forth that as long as individuals are mobile, the boundaries they draw between their immediate and the remote surroundings will also be concurrently mobile, as will be the actions of those individuals that demand intuitive responses.

The thesis that what is presented to an individual as ‘true’ is driven by one’s immediate locale invokes to mind two conceptual threads. One, a post-structuralist explanation that the nature of discourse (which is naturally a consequence of power) steers an individual’s notions of truth. Two, the ethnomethodological approach, which perceives ‘natural’ or ‘ascribed facts’ as actually socially-interactionally produced accomplishments. Identity and discourse around an individual’s immediate proximate space influence that individual’s intuition in that space – hence, even technological.

The Proximity Principle fits neatly and robustly for our study here on technology and inequality among the subaltern. The nature of the immediate locale biases an individual’s intuition towards one’s immediate technologies, and this builds the socio-technological discourse in that respective spatial context, which produces the ‘naturalized’ technological reality and technological praxis in that spatial context. In other words, the Proximity Principle operates at the core of space, and in turn, the nature of the immediate space biases the individual’s ontological and phenomenological intuition towards technology and technological praxis. Social identity and discourse within the immediate proximate space of an individual influence one’s technological intuition and praxis in that space. To recall from earlier sections, context as well as identity and socio-technological discourse create and perpetuate technological meaning by subaltern groups around the technological ambiances, artefacts, and practices they are associated with. The set of shared techno-cultural principles in each Field derives from the nature of the *space* in each Field, which influence and shift relational configurations, from which technological meaning and praxis are discursively constructed. In addition, with migration, there is a stark transition in the immediate boundaries of individuals’ space, hence a consequent transition in technological engagement as well. Space is hence a determinant of whether the technological engagement of subalternity reproduces or mitigates inequality. Space therefore is pivotal in determining the subaltern response to inequality.³

Individuals and groups socio-spatially produce their technological practices and outcomes. These are therefore anything but ‘naturalized’ technological conditions and are actually accomplished by the nature of social group, of discourse, and of *space* (as depicted in Figures 1 and 2). The roots of technological accomplishments of situated social actions are therefore a product of the coupling between society, discourse and space. This coalition of social-technological discourse and the nature of immediate spatiality in each setting determines individuals’ potential to exercise their technological agency against inequality and the associated condition of subalternity. This coalition can be said to channel the condition of precarity either towards further adversity or to transform it into opportunity. It can be said to elevate subaltern

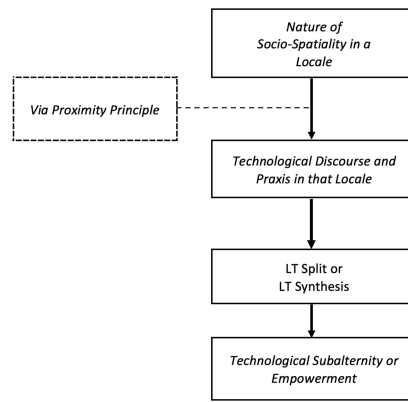


Figure 1. Causality from nature of socio-spatiality to technological subalternity or empowerment.

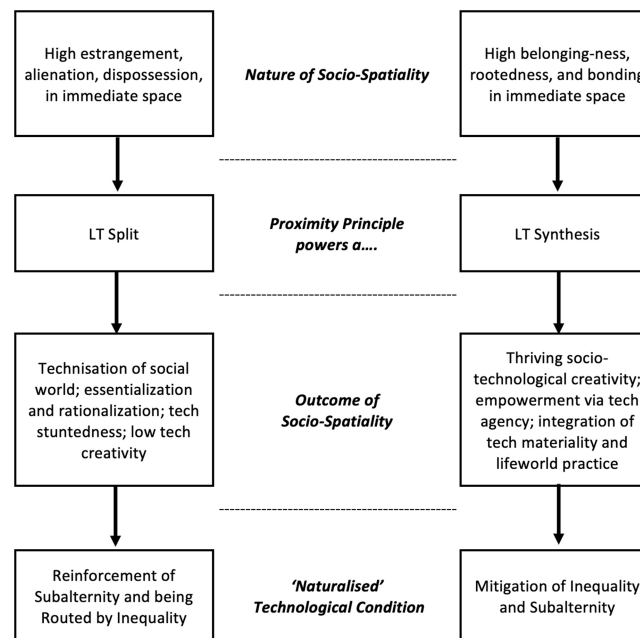


Figure 2. Detailed causality, with two scenarios.

technological engagement into socio-economic empowerment and cultural expression, beyond mere material efficiency. That the sociological is central to the technological has been robustly established in the literature. However, that space is as cardinal for technology as society is a novel contribution of this enquiry here on technology and inequality among the subaltern.

One of the most consistent findings in social science is that ‘who you know’ (social networks) determines ‘what you know’ (knowledge and information) (Cross, Parker, and Sasson 2003); to this we can easily add ‘who you are’ (identity) as a determinant of ‘who–’ and ‘what you know’. However, with this paper, we extend that ‘where you are’ is as important as ‘who you are’ and ‘who you know’ in determining ‘what you know’ and ‘what you do’ technologically.

7. Implications for development

With the exception of grassroots technologies, frugal technologies (such as what we see in Field 1) are generally given only passing mention in technocratic policy formulations about the role of technology in economic development in India. What is often mockingly and condescendingly termed as *jugaad* is, as seen in this study, actually a powerful weapon of mitigation and response to subalternity and inequality.

There is a growing and fervent body of literature that wholeheartedly endorses frugal technological activity as deserving serious scholarly attention, analysis, and foregrounding (see Radjou, Prabhu, and Ahuja 2012; Irani 2019; Kaur 2016). This body of work demonstrates that frugal technological activity is not simply a random venture by some unschooled individuals, but testimony to opportunity in adversity, resourcefulness, characterized by flexibility, nimbleness and simplicity that are not bound by formal constraints or requiring high technical complexity. Therefore, frugal technological activity among subaltern socio-economic groups can actually be rich and empowering, exercising technological agency and creativity, and responding to local conditions of economic distress over the short- and mid-term.⁴

Frugal technologies, developments and products have to be matured into industry-led design and operability to reach a level of scale, replication and modification in order to open the scope for wide diffusion. Creative ideas from the ground need to be brought up to this standard, which can be propelled by diffusion- and incentive-led interventions (see Kamath 2024 and 2025, which has been drawn from for this section). The mainstream innovation system and the frugal innovation system in India need far stronger communication with one another, so that they may join forces in order to improve and disseminate such technologies that battle inequality, deprivation and adversity in the lives of the socio-economically disadvantaged.

8. Technology, subalternity, socio-spatiality and inequality

Our study on subaltern technological engagement has not only presented three varying empirical experiences across regions and sectors, but via these has theorized the interface of subalternity, socio-spatiality and technology. The technological matrices of each region and society, the routines, rituals and shared principles around artefacts and practices that individuals and social groups attach, the instrumentality of technologies in terms of aspiration, empowerment and capability – are all driven by technological imaginaries, social intersubjectivities, the technological gaze of the social groups, the ‘doing’ of the technology (i.e. technological praxis) and the nature of spatiality.

Technological imaginaries, responses and accomplishments are determined by the triad of society, discourse and space. This study hopes to have improved the understanding of inequality with respect to technology, and the understanding of technology in the context of inequality – and both within the condition of subalternity. It also proposes that technological ‘modernity’ among the subaltern must be understood not merely in terms of artefact sophistication but as where LT-Syntheses occur, and where technological agency is instigated, even if in the form of frugal invention. Importantly, this study argues that space adds to the discursive formulation of a technological condition and to no small extent. Space is cardinal in spawning LT-Splits, LT-Syntheses and everything in between. Spatial intuition emerges as equally central to technological condition and outcome as social dynamics. Spatiality has to be therefore integrated into the sociology of technology in the understanding of the technology-inequality-development interface. This study hopes to have provoked fresh perspectives on technology and inequality, within the context of subalternity in India.

Notes

1. A condition where inclusion, sociologically or otherwise, ends up causing greater disadvantage.
2. This discussion draws from Thomas (1993), Brewer (2000) and Cortazzi (2001).
3. It is important to state here that this study recognizes, drawing from the thought of Neil Smith (2008) and Henri Lefebvre (1991), that space is no objective or static entity, and its production is integrated with human historical and social practice. Space is a human product to a large extent, and its meanings and consciousness cease to exist devoid of its social engagement. The social production of space cannot really be divorced from natural space in contexts such as in our study. The sense of alienation, dispossession and other similar sentiments associated with space are produced by the everyday spatial practices of the workers, within the power dynamics of the setting (especially in the construction sites), reflecting broader structural inequalities.
4. Of course, by no means does the argument here propose a one-to-one mapping of subaltern socio-economic groups to frugal technological activity, to suggest that such individuals or communities are restricted to this variety of technological activity. Studies such as Sekhsaria (2016) have shown that frugal technological practices operate even within structured innovation cultures, formal establishments, and among socio-economically

well-endowed individuals and communities too. Also, it is certainly not out of the horizon for disadvantaged communities to conduct formal innovative activity.

Acknowledgements

Thanks are due to Narendar Pani, Ajit Kumar Babu and the other members of the Inequality and Human Development Programme at the National Institute of Advanced Studies (NIAS) Bangalore. Thanks are also due to the anonymous referees and to Prof J Devika.

Author contribution

Anant Kamath: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This study was funded by TCS (Tata Consultancy Services) Foundation, India.

ORCID

Anant Kamath  <http://orcid.org/0000-0001-5355-2296>

References

- Babu, A. K. (2023). "Inequalities in the Process of Agriculturists learning Non-Agricultural Skills." PhD thesis submitted to The University of Trans-Disciplinary Health Sciences and Technology.
- Bernal, J.-D. 1969. *Science in History*. Science in History. Harmondsworth: Penguin.
- Bijker, W., T. Hughes, and T. Pinch. 1987. *The Social Construction of Technological Systems*. Cambridge, MA: The MIT Press.
- Borgmann, A. 1984. *Technology and the Character of Contemporary Life*. Chicago, IL: University of Chicago Press.
- Brewer, J. 2000. *Ethnography*. Buckingham and Philadelphia: Open University Press.
- Butler, J. 2004. *Precarious Life: The Powers of Mourning and Violence*. New York: Verso.
- Cassirer, E. 1944. *An Essay on Man: An Introduction to a Philosophy of Human Culture*. New York: Doubleday.
- Cortazzi, M. 2001. "Narrative Analysis in Ethnography." In *Handbook of Ethnography*, edited by P. Atkinson, A. Coffey, S. Delamont, J. Lofland, and L. Lofland, 384–395. London: Sage.
- Cross, R., A. Parker, and L. Sasson. 2003. "Introduction." In *Networks in the Knowledge Economy*, edited by R. Cross, A. Parker, and L. Sasson, 3–10. Oxford and New York: Oxford University Press.
- Feenberg, A. 1999. *Questioning Technology*. London: Routledge.
- Green, M. 2002. "Gramsci Cannot Speak: Presentations and Interpretations of Gramsci's Concept of the Subaltern." *Rethinking Marxism* 14 (3): 1–24.
- Harvey, D. 2006. *Spaces of Global Capitalism: Towards a Theory of Uneven Geographic Development*. London and New York: Verso.
- Heidegger, M. 1954. *The Question Concerning Technology*. Germany: Garland.
- Ingold, T. 1997. "Eight Themes in the Anthropology of Technology." *Social Analysis* 41 (1): 106–138.
- Irani, L. 2019. *Chasing Innovation: Making Entrepreneurial Citizens in Modern India*. Princeton and Oxford: Princeton University Press.
- Kamath, A. 2021. "A Technological Enquiry into Inequality: A Conceptual Review NIAS Working Paper NIAS/SSC/IHD/U/WP/11/2021." National Institute of Advanced Studies (NIAS), India.
- Kamath, A. 2024. "Technological Weapons of the Weak: Frugal Technological Praxis as Empowerment." *Economic and Political Weekly* 59 (43): 25–29.

- Kamath, A. 2025. Interventions around Frugal Technology in India. NIAS policy brief NIAS/SSc/IHD/R/PB/04/2025.
- Kaur, R. 2016. "The Innovative Indian: Common Man and the Politics of Jugaad Culture." *Contemporary South Asia* 24 (3): 313–327.
- Kirkpatrick, G. 2008. *Technology and Social Power*. Hampshire and New York: Palgrave.
- Lawson, C. 2010. "Technology and the Extension of Human Capabilities." *Journal for the Theory of Social Behaviour* 40 (2): 207–223.
- Lefebvre, H. 1991. *The Production of Space*. Oxford: Basil Blackwell.
- Millar, K. 2017. "Toward a Critical Politics of Precarity." *Sociology Compass* 11 (6): e12483.
- Nilsen, A. G., and S. Roy. 2015. "Introduction: Reconceptualising Subaltern Politics in Contemporary India." In *New Subaltern Politics: Reconceptualising Hegemony and Resistance in Contemporary India*, edited by A. G. Nilsen and S. Roy, 1–35. Oxford and New Delhi: Oxford University Press.
- Pandey, G. 2006. "The Subaltern as Subaltern Citizen." *Economic and Political Weekly* 41 (46): 4735–4741.
- Pani, N. 2022. *The City As Action: Retheorizing Urban Studies*. Oxon and New York: Routledge.
- Pankaj, A., and A. K. Pandey. 2014. *Subalternity, Exclusion, and Social Change in India*. New Delhi: Foundation Books.
- Pfaffenberg, B. 1988. "Fetishised Objects and Humanised Nature: Towards an Anthropology of Technology." *Man* 23 (2): 236–252.
- Pfaffenberg, B. 1992. "Social Anthropology of Technology." *Annual Review of Anthropology* 21:491–516.
- Radjou, N., J. Prabhu, and S. Ahuja. 2012. *Jugaad Innovation: A Frugal and Flexible Approach to Innovation for the 21st Century*. New Delhi: Random House India.
- Sekhsaria, P. 2016. *Enculturing Innovation: Indian Engagements with Nanotechnology*, PhD Thesis submitted to Maastricht University, The Netherlands.
- Smith, N. 2008. *Uneven Development: Nature, Capital, and the Production of Space*. Athens and London: The University of Georgia Press.
- Thomas, J. 1993. *Doing Critical Ethnography*. Newbury Park and London: Sage.
- Veak, T. 2000. "Whose Technology? Whose Modernity? Questioning Feenberg's Questioning Technology." *Science, Technology, and Human Values* 25 (2): 226–237.