

Anant Kamath

NIAS

A TECHNOLOGICAL ENQUIRY INTO INEQUALITY: A CONCEPTUAL REVIEW

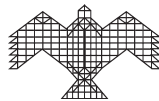


NATIONAL INSTITUTE OF ADVANCED STUDIES
Bengaluru, India

NIAS Working Paper: NIAS/SSc/IHD/U/WP/11/2021

A TECHNOLOGICAL ENQUIRY INTO INEQUALITY: A Conceptual Review

Anant Kamath



Inequality and Human Development
NATIONAL INSTITUTE OF ADVANCED STUDIES
Indian Institute of Science Campus, Bengaluru 560012, India

© National Institute of Advanced Studies, 2021

Published by

National Institute of Advanced Studies

Indian Institute of Science Campus

Bengaluru - 560 012

Tel: 2218 5000, Fax: 2218 5028

E-mail: publications@nias.res.in

NIAS Working Paper: NIAS/SSc/IHD/U/WP/11/2021

Cover photo: Photograph by Meena Kadri, accessed from Flickr

Typeset & Printed by

Aditi Enterprises

aditiprints@yahoo.com

A Technological Enquiry into Inequality

A Conceptual Review

Abstract

This paper is a conceptual review around the relationship between technology and inequality. It underscores the necessity to bring together two concerns: how we need to improve our understanding of inequality with respect to technology, and how we need to improve our understanding of technology in terms of inequality. The paper provides a review of the core themes that are associated with the relationship between technology and inequality, such as the conceptual foundations of technology and its role in heralding modernity, its social context, its relationship with human agency, the notion of the digital divide, technological inequality in India, and the instrumentality of digital communication technologies. We see how technologies can emerge as a new site for modern incarnations of inequality, given how they are a realm of experience and activity not separate from the social. We see how technology interbreeds with existing inequalities by virtue of the fact that it is not simply a set of artefacts or assets but an integral social participant. We see, in this paper, why we need to critique the mainstream Indian discourse and meta-narrative around these realities to bring out the true nature of the relationship between technology and inequality. This paper finally provokes a series of questions that are pertinent to get a grasp of the interface between technology, inequality, and development.

Keywords

Technology, Inequality, Modernity, Socio-Technology, Agency, Capabilities and Functionings, Digital Divide, Socio-Technological Inequality

Acknowledgement

Due thanks to Narendar Pani and the members of Inequality and Human Development Programme at NIAS.

Introduction

Social and economic inequality are born of a range of historical factors and policy decisions, and in turn have procreated a brood of maladies that are entwined with the development trajectory of India. Disempowerment in political-economic life, aggravated labour and livelihood vulnerability, and the marginalisation of certain socio-economic groups are some of the most glaring manifestations and progenies of inequality, all nourished by traditional and novel sources of social and economic power imbalances. Similarly, new employment patterns (arising out of agrarian distress and migration to the urban), bleak economic aspirational openings, reconfiguration of family structures (due to increasing distress migration, informality, inequality, urbanity), issues of ecological sustainability, and finally the future intergenerational impact that all these disquieting trends have, in multiple dimensions, garnered interest from policy, academia, journalism, the arts, and popular discourse. The economic analysis of inequality has also been interwoven with sociological studies on the contemporary character and operationalisation of caste, class, and gender, and their intersections. There have recently also been novel theorisations of inequality, and sufficient international attention has been accorded

to the condition and context in India. However, one aspect of inequality that has been relatively understudied has been the technological dimension, as there has been woefully insufficient (possibly even misdirected) attention to the impact of socio-economic inequality on technological outcomes. Hence, a first question that arises is: *what has been the instrumentality of inequality in the technological condition in India?*

Technology – particularly digital technology – has emerged in academic research and policy formulations as one of the principal stimulants that drives individuals and groups on the path towards modernity, empowerment, and prosperity. However, the greater part of the research on technology and development in India has lacked either depth or scope by restricting to the quantifiable, the economic, and the tangible; only very few studies (and almost no policy documents) have departed from this trinity. Debates and statistics around formal R&D statistics, industrial innovation, digital- and information-technology-led interventions, and other such themes, take up the larger share of academic and policy studies. Preoccupations with prescriptive-technology research, interventions in rural economic sectors, digital governance, and international comparisons on technology devoid of



context have created an aura around the very idea of technology that has inclined towards oversimplification, technological determinism, and solutionism. Evidently, there has been little in the way of historicisation, sociological enquiry, and political critique around technology and development in India. A serious enquiry stares at us as a second question – *what has been the instrumentality of technological outcomes and technological trajectories in socio-economic inequality in India?*

We therefore have two questions that need to be wedded. We need to improve our understanding of inequality with respect to technology, and we need to improve our understanding of technology in terms of inequality. Hence, this review paper hopes to deepen the theorisation, and improve granularity, of the empirical investigation around the relationship between technology and inequality in contemporary India. We need to ask – what is our understanding of technology? Does socio-political context matter? Does it empower human agency? What genuinely are ‘technological inequalities’? In what follows, I provide a review of these and other core themes that are associated with the relationship between technology and

inequality, which include the conceptual foundations of technology and its role in heralding modernity, its social context, its relationship with human agency, the notion of the digital divide, and the instrumentality of digital communication technologies.

As indicated in the figure above, this paper progresses from the very idea of technology to the triad of technology-inequality-development. That is, I first visit definitions and conceptualisations of technology (in terms of actor-network theory, social construction of technology, and the politics of technology), identify what purpose the literature has accorded to technology (in terms of modernity, agency, and development), how studies so far have grasped the nature of its instrumentality (in terms of capability and functionings, and in capital creation), and finally to how the problematisation of inequality has been critiqued (in terms of the digital divide and socio-technological inequality). This conceptual review then provokes a series of questions that are pertinent to get a grasp of the interface between technology, inequality, and development.

Conceptualising and Socialising Technology

Technology has become an established part of contemporary thinking as an apparatus to assess the human condition.¹ Whether one is a utopian, sceptic, contextualist, or determinist in one's stand towards the instrumentality of technology, certain commonalities nonetheless hold: such as its extension (desirable or not) of ourselves and our capabilities and intentions, and its role in transformation of people and the diverse worlds we inhabit.² Following this, technologies are conceptualised as individual goods, social goods, and global goods, earning a significant place in the daily lives of people everywhere.³ There arises, then, the question (alluded to Jean-Paul Sartre) of 'what we make' of technology in development, both in terms of what we *can* decide and what we *must* decide, and whether we sincerely wish technology to improve individuals' microclimates in a macro-landscape of aggravating inequality.⁴ There also arises the need to conceive of technology as an arena of power, conflict, struggle, and negotiation, a realisation which will also urge us to depart from a largely Western (or industrial-economic) tradition of

comprehending technology, to exploring and conceptualising its alternative cultural meanings in the context of the people using and experiencing them.⁵ Let us take a look at how the very concept of technology itself (aside from its role in development) has been conceived, with a universalistic starting point of understanding 'technology' as any alteration⁶ to nature, based on, and furthering, that understanding of nature.

John Desmond Bernal⁷ viewed a 'technique' as a set of individually acquired and socially secured methods of doing something (whereas 'science' was a way of understanding how to do it, consequently therefore to improve technique in turn); 'techniques' could have public-goods characteristics, are certainly embedded in social relations, and are much wider than merely high-complexity industrial or mechanical inventions (or having 'high social impact') thereby including even new processes.⁸ This seems to echo an earlier conceptualisation by Lewis Mumford. In *Technics and Civilization*,

1 Ingold 1997

2 Zheng, 2009; Toyama 2015

3 Arnold 2013

4 Toyama 2015; Krishna 2017

5 Feenberg 1999, 2010; Fortunati 2008; Faulkner et al. 2010; Lupton 2015

6 Alterations that are not necessarily of human origin alone, and not necessarily always driven by necessity.

7 Bernal 1969

8 Pani 2016

Mumford⁹ adhered to the Greek ‘tekhne’ and broadened the relationship between technological innovation and social environment beyond industrial processes, thereby including even art, skill, and dexterity. Much later, and quite similarly, Tim Ingold demonstrated how ‘tekhne’ (art and skill associated with craftsmanship) and ‘logos’ (framework of principles derived from the application of reason) were combined to denote the art of reason, which has now evolved to instead denote the reason of art; in any case, technology remains the application of the mechanics of nature, derived through scientific enquiry, to the ends of expressive art.¹⁰

A narrower Schumpeterian conceptualisation explains technological innovation as comprised of invention (conceptualisation of novelty), innovation (commercialisation of the invention) and diffusion (adoption and spread of the invention or innovation).¹¹ Similar (but not as narrow) artefactual conceptualisations distinguish three layers of the meaning of ‘technology’ – physical objects or artefacts or systems, the knowledge or activities or processes around them, and the

practices of handling them.¹² Adopting this approach allows us to understand the direct extension of physical faculties (through tools and artefacts), the extension of cognitive capabilities, and the extension of intentions (whereby people develop artefacts as a means to realise their intentions).¹³

However, in Martin Heidegger’s conceptualisation, technology was not simply an artefactual innovation or instrument, and whose essence has much more than simply ‘technical’ or attributable entirely to innovation, and which cannot be reduced to either the instrumental or anthropological components of its character. Technology, Heidegger¹⁴ explains, is a mode of understanding, a mode of being and revealing, and a state of mind. He warns that we cannot blindly rely on technology to solve by itself every existential crisis that humanity faces, but at the same time we must not slip into complacency to the point where we assume that we will always have the technological capacity to solve problems in the present and future. Comprised of skills, techniques, methods, and

9 Mumford 1934

10 Ingold 1997: 130-132

11 Mejia 2017

12 Bijker et al. 1987; MacKenzie and Wacjman 1999; Bijker 2010

13 Zheng 2009

14 Heidegger 1954

processes, technology¹⁵ thereby actually has four ‘causes’ – *materialis* (materials and data), *formalis* (methods or forms), *efficiens* (the owner or creator) and *finalis* (the users or reasons) – which bring something into appearance, letting it come forth into presencing, to unconcealment, and finally to revelation (what he terms ‘*poieses*’). Enframing, finally, emerges as the essence of modern technology which end up being mostly technique-led.

At this point, let us turn towards an anthropological approach to understanding technology. Bryan Pfaffenberger¹⁶ proposed that a society’s material culture is an indicator of its physical record of adaptation, as well as the means by which it effects its reproduction. Techniques and material culture, he continues, includes material resources, tools, operational sequences, skills, verbal and non-verbal knowledge; this does not operate alone, but is intermeshed with the social coordination of labour that operates within what he terms a ‘socio-technical system’ – a concept employed throughout in this paper.

There are other notions that ascribe an instrumental role for technology in laying the path towards ‘the good life,’ but these reveal themselves to be facile because there are as many conceptions of technology as there are of ‘the good life.’¹⁷ Bereft of virtue or vice by itself, as stated by Kranzberg¹⁸ who famously stated how technology is “neither good nor bad; nor is it neutral,” it can neither be universalised as a development instrument, nor pushed into simplistic correlations between acquisition and development, nor cast as some ‘ultimately desirable functioning,’ nor (as will be reflected upon in a later section in this paper) an assured harbinger or modernity.¹⁹ Just as erroneously, representing technology as adhering to a defined path (linear or otherwise) of peaks and troughs in its life-cycle is problematic, because such a simplistic conceptualisation is ignorant of variation, unpredictability, reconfiguration, and social context.²⁰ Therefore, context dependency becomes central in the definition and analysis of technology. This is where we must turn to Langdon Winner. In his acclaimed work ‘Do Artifacts Have

15 Threats to our own existence, Heidegger argues, arise when humankind increasingly brackets progress and advance, and our relationship with nature, only through technology.

16 Pfaffenberger 1988 and 1992

17 Basalla 1989; van den Hoven 2012

18 Kranzberg 1986

19 Zheng 2007 and 2009

20 Borup et al. 2006

Politics²¹, Winner compellingly argued for including social context, or more specifically the social determination of technology. He proposed that it was as important to study the social circumstances of technology as an “obvious wisdom”,²² certainly not by universal reductionism to social forces, but to identify the social and (more importantly) the political within the technological. Any given technology unavoidably brings in human relationships that have entrenched political qualities, such that adopting a technological system generally requires the openness to, and compatibility with, a set of socio-political conditions because technologies are invariably linked to particular institutionalised systems and patterns of power. Embedding the understanding of the nature and instrumentality of technology in structures of social power and prevailing normative systems eschews technocratic and naturalistic tendencies, fetishism in conceptualising technology, as well as the ‘technology as solution’ approach, all of which propound the assumption that its outcomes in terms of improvements of life are universalistic and equitably benefited by all, ignoring the social conditions

that determine access and impact.²³ In reality, technologies enter and operate within complex sociological and political ecologies (right from the home to large communities), and negotiate with grids of social meaning.²⁴ Technology is, largely, a social practice that often mirrors social differentiation and cleavages by being structured through social categories (such as gender, class, location, ethnicity, etc.) and, surely, also feeds back in to those political and power relations by configuring social life in turn.²⁵ Individuals make technological choices within their social contexts, often upturning the intentions of the developers of those technological artefacts.²⁶

Hence, technologies have no life by themselves – the way societies embrace them is what matters; some technologies are political in their entirety.²⁷ Return to Pfaffenberger²⁸, we must adopt the view that technology is, therefore, ‘humanised nature’ and hence a ‘total social phenomenon’²⁹. Every technology is “a human world... to construct a technology is not merely

21 Winner 1980

22 Winner 1980: 29

23 Beck 1992; Ingold 1997; Heeks 1999; Warschauer 2003

24 Bell 2006a, 2006b

25 Castells et al. 2007; Lupton 2015

26 Schwartz-Cowan 1987

27 MacKenzie and Wajcman 1999

28 Pfaffenberger 1988 and 1992

29 Attributed to Marcel Mauss

to deploy materials and techniques; it is also to construct social and economic alliances, to invent new legal principles for social relations, and to provide powerful new vehicles for culturally-provided myths".³⁰

To pursue a more effective analysis of technology, given these sociological contexts and political characteristics, we must draw from the feminist tradition in technological analysis which not only opens up the essentially gendered nature of technological artefacts, but also at large the sociological factors that shape technological devices and experiences, as well as how technology reflects those sociological divisions and cleavages.³¹ As the work of Ruth Schwartz-Cowan and Judy Wajcman have convincingly revealed, technology and sociological variables (gender being but one) are not separate realms but products of moving relational processes emerging from individual and collective relationships with technology that are influenced by meaning ascribed to technology across sites. In the utopian discourses that often circulate in mainstream accounts of technological successes and possibilities, such socio-political aspects of these technologies are glaringly missing.³² However much the mainstream

discourses around technology attempt to divorce technology and society and argue that the former independently influences the latter, a more realistic and grounded approach must be adopted that recognises the primacy and co-constitutiveness of social structures as part and parcel of technological trajectories and outcomes.³³ Technology thus rides on, and amplifies social processes and practices, even if it does not advance for structural reform or undermine existing social order.³⁴ What is needed, therefore, is a *socio-technological* analysis that sees society and technology as a seamless web that is mutually connected and continuously interlinked, with enough flexibility to accommodate for the derivativeness of either.³⁵ In order to comprehend the 'seamless web' of society and technology, we call upon two influential frameworks – Actor-Network Theory (ANT) and Social Construction of Technology (SCOT).

Let us introduce the basic tenets of Actor-Network Theory developed by Michel Callon and Bruno Latour. While we do not adopt this paradigm wholesale to our analysis on technology and inequality, we find value in drawing from its founding principles when understanding the sociological context

30 Praffenberger 1988: 249

31 Wajcman 2010

32 Lupton 2015

33 Warschauer 2003

34 Veak 2000; Warschauer 2003; Toyama 2015

35 Bijker et al. 1987; Arnold 2013

of technology, or interpreting the nature of technology itself; this, in turn, enriches our enquiry on technology and inequality. In what follows, we draw from Latour, Callon, and Strum, who are in turn inspired by Gabriel Tarde, Harold Garfinkel, Wiebe Bijker, and John Law.³⁶ In order to succeed in tracing a technology throughout its experience, it is most appropriate to study not only society (not even simply social relationships), but *actor-networks* that procreate both society and technology; this implies that we cannot, truthfully, begin with society or social aggregates (and certainly not with technology either), but with we must seek to understand associations in society that are between social and non-social actors. Of course, such an approach does not claim that non-social actors (artefacts) ‘replace’ people, but that we must treat them as ‘participants’ in social assemblages – the domain of the *social* is much more extensive than just humans. That is, social ties are comprised as much about human-artefact (or even artefact-artefact) connections as much as human-human connections, because artefacts are *actants* that make a difference (which can

be measured or assessed) in the course of a human agent’s actions. Artefacts ought to be given a ‘social thought’ in the general analysis, because they are knitted with social ties to humans, they are often what glue together that which we call ‘the social,’ they help provide the durability, solidity, and inertia that society erroneously attributes to itself, and hence deserve a dedicated exploration into what humans are doing with them. What must be explored with as intensely as human relations in a society are how human-technological relations are interlaced to build and produce a society. As Garfinkel and Tarde had urged, long prior to the development of ANTI, we need to understand what is actually holding society together, instead of slipping into the convenient assumption that society (as only human assemblages) can help explain conditions or can address political issues. Drawing from observations of primate societies, who also use tools (i.e., technologies), we understand that when observing the complexity of society, that which we call ‘primitive’ or ‘modern’ is nothing but a degree of scale in which material (i.e., technological) resources are employed; in other words, technology is a way of building society on a larger more complex scale – in this sense, the idea is reinforced that technology is social and is what allows resources to

36 Latour 2005; Callon 2012; Strum and Latour 1987; Gabriel Tarde 1899/2000; Garfinkel 1967; Bijker 1995, among others; John Law 1992, among others.

be woven together into durable social links.³⁷ Hence, technological artefacts cannot be studied in their isolation, social links are not only about human associations, and we must acknowledge that artefacts are social ties; i.e., technical artefacts are the ties that constitute and reproduce human societies, they are extensions of ourselves (in the context of interdependencies), and must be studied for their relational properties.³⁸ Technology, according to Michel Callon, therefore, is an effective sociological tool of analysis.

An approach that supplements Callon's assertion more than ANT does, which draws from Langdon Winner more directly, and which is more immediately applicable to our enquiry here on technology and inequality is the SCOT (Social Construction of Technology) framework as developed by Wiebe Bijker, Thomas Hughes, and Trevor Pinch. Expounding the 'seamless web' concept more definitively, the emphasis in SCOT, born out of social determinism, is on how technology cannot be understood outside of its social context, and that while

technologies do indeed interlock with people, it is *people* who ultimately act and make decisions about the purposes of technology.³⁹ The SCOT framework exemplifies the sociological analysis of technology by virtue of its robust acknowledgement of the stabilisation of artefacts in a society as subject to that group's politics; therefore, we need to acknowledge the interpretative flexibility of socio-technological ensembles.⁴⁰ When a technological system grows by investments (capital, technological, and human), it build up a 'technological momentum,' acquiring a certain directional development and speed, and finally stability.⁴¹ Devoid of such an understanding, we as analysts of technology will only reproduce already stabilised meanings of technological artefacts but will also miss opportunities for intervention. In such an approach, as explained by Bijker,⁴² we appreciate the diversity in meaning for a technological device by social groups (that is what is termed 'interpretative flexibility' above), which arises as a product of interactions by its members, through which emerges a certain stability in meaning and interpretation. All these processes operate within (and in turn

37 Though it must be warned that low complexity in technology need not necessarily imply low complexity of society; one only has to think of aboriginal societies to confirm this (Ingold 1997).

38 Zheng 2009

39 Faulkner et al. 2010; Toyama, 2015

40 Bijker, 1997; Bijker et al. 2012

41 Bijker 2010

42 Bijker 2010

build) a technological frame which is a broader technological paradigm⁴³ (similar, but not identical, to a Kuhnian paradigm) comprising tacit knowledge, procedures, goals, and techniques of technological problem-solving. In this manner, interactions between members of a social group play a significant role in the evolution of a particular form of technology. The SCOT approach can be engaged with when we understand the domestication of technologies too. According to Oudshoorn and Pinch⁴⁴ there are four phases of domestication of a technology – appropriation, objectification, incorporation, and conversion. Appropriation occurs when a technological artefact is sold to a consumer and owned by a person,

and objectification processes reveal the norms and principles of the individual's or group's sense of itself and its place in the world. The focus for us, however, is on incorporation (how the device is used in the routines of daily life) and conversion (how the device shapes relationships between its users and other people). Appropriation and objectification occur in (continually) constructed spatial environments, while incorporation is heavily determined by social variables such as gender and age. In fact, incorporation can even reinforce the culture of the technology, such as its embedded masculinity. Similarly, conversion defines the relationship between the user and one's external world (outside the household, caste group, or neighbourhood), in the process claiming a status in the wider society. Hence, the complexity of technological experience intensifies, as it is not simply about a device that is restricted within the individual domain (or even within a household's domain, such as a refrigerator), but rather about a medium of interaction between individuals and social groups, therefore doubly articulating both private and public domains.⁴⁵ Clearly, there are much broader cultural and sociological concerns than just who

43 A technological paradigm, elaborated in the celebrated work of Dosi (1982), is analogous to the Kuhnian 'scientific paradigm.' It is a model or pattern of solution of selected technological problems, based on selected principles derived from natural sciences and on selected material technologies. Technological trajectories are possible technological directions bounded by the paradigm they operate within. Technological trajectories are patterns of normal problem solving activities, i.e., as multi-dimensional trade-offs among the technological variables which the paradigm defines as relevant. Economic and institutional factors have a major role in the selection and establishment of technological paradigms. There may be complementary or competing technological trajectories, due to variations in potency and power, and even lock-ins.

44 Oudshoorn and Pinch 2003

45 Silverstone et al. 1992

owns a technological artefact, arising out of the fact that the non-neutrality of technology is what brings differential experiences across cultures.⁴⁶ In the context of our study, the social construction of an artefact's usage is conditioned greatly not only by ownership or the relationships between individuals and their peers in a society, but importantly by incorporation and conversion, which rest on contemporary social conditions and aspirations or even prestige.

This is why societies have contrasting experiences with technologies, why technology is essentially socially constructed (as much as it weaves society in turn), and why technologies comfortably operate with inequalities therein. Apart from Bijker and his co-scholars, others⁴⁷ have also empirically demonstrated this non-universality of technology, society, and inequality – that people's use of technologies in their social contexts (and conditions of inequality) are what shape societies and technologies together, what builds the seamless web of technology and society, and what probably determines its role in development. This now calls

for reviewing the critique of whether technology can, genuinely, serve as a harbinger of modernity.

The Promise of Modernity

Technology has moved out of being solely an urban phenomenon, with several artefacts becoming 'emerging technologies' even in the rural, with their own novel experiences, having escaped from being usurped by any single (or dominant) social group and having emerged as potential harbingers of change.⁴⁸ In this way, many technologies have ceased to remain, in Partha Chatterjee's terms, as 'someone else's modernity' to be imported and consumed.⁴⁹ So many technological artefacts have facilitated supportive relationships between people in various economic activities. Technological imaginaries around such artefacts have come about due to collectively held visions of 'modernity,' stabilised and publicly performed based on shared understandings of social life and aspirations, with artefacts proxying as materialised indicators of these aspirations.⁵⁰ But, even if not succumbing to solutionist temptations of casting them as silver bullets, there has been for too long a disappointing

46 Bell 2006a 2006b; Sarukkai 2008

47 Such as Schwartz-Cowan 1987; Wajcman, various; Best and Maier 2007; Morozov 2011 and 2013; Ahmed et al. 2014; Lupton 2015; Kamath 2020

48 Arnold 2013

49 Ibid.

50 Borup et al. 2006; Jasanoff 2015a, 2015b

notion that ‘modernity’ is confined entirely within a technological frame, with little reference to social, cultural, and political engagements, inclining towards a belief that ‘technical progress equals social progress.’⁵¹ Such narratives around modernity have become the drivers of political and economic projects; governments have subscribed to these ideas too, courting major figures from the technology industry, with an unquestioning stand on the character of progress drawn by technology.⁵² The visual pageantry of individually-owned digital gadgetry, and little else, usually ends up emerging as an exhibition of modernity. All this is propelled by technological determinism, based on conceptualisations of modernity that glorify technology as the ‘prime-mover’ of history, releasing forces of modernism.⁵³ Hence, unfortunately, what has been enthusiastically imported as ‘modernity’ is actually the spectacle of merely technical materiality, without the political shifts that need to be undertaken foundationally and the cultural shifts that need to be undertaken behaviourally, which explains the wide-prevalent glamour of sleek gadgets in everyday private and social life.⁵⁴ And

to top it, the state and its policymaking processes subscribe mostly to an elite construction of technology that easily reproduces and perpetuates existing inequality.⁵⁵

In the context of India, Dipankar Gupta⁵⁶ has revealed that modernity has been mistakenly equated, all too routinely, with the possession and symbolic visibility of technological artefacts, and with little in the way of dismantling regressive socioeconomic conditions and improving social ethics and universalistic norms of merit and equity and justice (which are features of genuine modernity, by which people can live and operate with dignity and realise their aspirations). This is similar to a convenient (and slack) imagination of modernity as a departure from ‘savage’ or ‘primitive’ society to a more ‘advanced’ one defined by the prevalence of complex and sleek technologies. But the issue is far more complex. One of the prime reasons for these mistaken notions of modernity is that the technical and the social – and the modernities thereof – are separately studied, due to which the true nature of the reverberations of technology at economic, political, religious, and cultural levels is little understood.⁵⁷

51 Beck 1992

52 O’Hara 2020

53 Marx and Smith, 1994; Jongergen 2008

54 Baudrillard 1987

55 Cartier et al. 2005

56 Gupta 2000

57 Feenberg 1999, 2010

Andrew Feenberg explains how the fate of society is bound to our *understanding* of technology, and therefore on its repercussions upon inequality and development as well. This is why a shallow understanding of technology – and the convenience with presenting technological modernity as a singular and revolutionary state than modernity in its more genuine form – can result in the preservation and reproduction of debilitating social structures and hierarchies, and resultant economic processes.⁵⁸ The handiness of such a stunted unidirectional perception extends, as O’Hara⁵⁹ comments, that progress in the technological dimension correlates with progress in other spheres, in a simplistic two-dimensional direction from ‘backward to forward’ or from ‘periphery’ (i.e., the rural and remote) to ‘centre’ (i.e., ‘smart spaces’ such as the urban).

This is why a tactile and materialistic imaginary of ‘technology-led development’ so easily comes about, seen too often in celebrations of encouraging statistical data on widespread permeation of digital devices such as the mobile phone into Indian society, and through visual gratification from or isolated ethnographic anecdotes

on impoverished and subaltern communities partaking a share in the digital experience. Such imaginaries of modernity flourish within spaces of politics⁶⁰, which are themselves highly regressive in their deliberations, if not just myopic. Clearly, even visibly, technological duality has become a striking characteristic of the Indian socio-technical landscape⁶¹, with technological inclusion comfortably coexisting with socio-economic deprivation⁶², despite the well-established fact that technology resides and operates in a socio-economic crucible and that the two should ideally provide concomitant (hopefully positive) feedback effects to one another. This is what has materialised due to the success of a myopic symbolism that is content with technological materiality, with devices proxying as emblems of modernity⁶³, or in other words, a fulfilment with a purely visual and tactile socio-technical imaginary, instead of a true socio-technical modernity that facilitates escape from squalor. Hence, questions arise on whether modernity in a genuine sense can be realised with technological permeation, i.e., are inequalities, vulnerabilities, and precarities at all

58 Veak 2000; O’Hara 2020

59 O’Hara 2020

60 Jasanoff 2015a, 2015b

61 Arnold 2013

62 Zheng 2009

63 Baudrillard 1987; Arnold 2013

diminished by the omnipresence of technology in turbulent settings? Do new forms of subalternity emerge with, and through technological modernity?⁶⁴

With society and technology being a seamless web⁶⁵, not just technological exclusion in terms of device ownership but socio-technological exclusion and the resultant impact on human agency ought to be factored into the analysis of inequality, if we need to address the above questions. Assessments of technological participation ought to be about understanding whether technology has been leveraged for greater emancipation and more genuine imaginaries of modernity. We need to examine technological dualities that pervert the quest for modernity in socio-economic life, and whether we can move beyond simply device modernisation and into more meaningful modernity. Both, for the everyday life of an individual as well as for the greater vision of development. This, then, leads us to understand the effects of technology on agency, capability, and human development.

An Amplifier of Agency

An ensuing question from the above discussion is whether, and how, technology can convert-

transform-translate into capabilities and functionings for human dignity (minimum levels of capabilities), excellence (maximising levels of capability), and enhancement (changing the capabilities by technological or other means).⁶⁶ Technological artefacts are supposed to help people overcome restrictions to agency, and expand and achieve greater capabilities and translate into enhanced functionings in order to lead the lives they value and aspire to.⁶⁷ And this is not merely an aspiration – technological artefacts can indeed be harnessed as ‘capability inputs’ for their transformative potential to extend capabilities, and improve functionings and aspirational possibilities, because there is an enormous amount of evidence that they are *agentive amplifiers*.⁶⁸ This is not only about what technological devices can directly enable people to do, but also about what their ubiquitous presence can advance in a wider sense; that is, not only replicating, amplifying, and supplementing bodily and mental faculties, but also extending cognitive possibilities and the human will in a much more expansive sense.⁶⁹ Existing capabilities (such as literacy

64 Arnold 2013

65 Bijker et al. 1987

66 Coeckelbergh 2011

67 Zheng 2009

68 Lawson 2010; van den Hoven 2012; Haenssgen and Ariana 2018

69 Lawson 2010; Oosterlaken 2011, 2012; Oosterlaken and van den Hoven 2012

and entrepreneurial or other skills) can be supplemented by multiplier effects from technological artefacts, giving people greater control and agency.⁷⁰

This process of agency amplification to transform the potential within artefacts into actual human functionings will require processes of *conversion* (of commodity to capability, attributed to Amartya Sen) and *translation* (of human and non-human materials into situated forms of agency and association, attributed to Bruno Latour), which would require complementarities with other technologies and with socio-economic conditions, and of course with equalising of interpersonal variation in technological usage.⁷¹ More

than just ‘inputs’ or ‘commodities’, technologies in their interactions with the social contexts they are embedded in, hold transformative properties that build informational capital, assist social and environmental conversion factors, improve safety and append livelihoods, and help maintain important relationships in families that are separated due to distant employment.⁷² Technologies can enhance access to a broad range of other assets including political resources and social capital.⁷³ These are what can enable technologies to translate and convert possibilities into actual functionings. However, we must be mindful of the fact that because capabilities are multiple, complex, and incommensurable, is it possible for technology to contract the capabilities of some groups as much as to expand the aspirations of others, and to have differential effects even across the short- and long-term; i.e., capability effects of technology may be intended or unintended, expected or unexpected, and are generally complicated.⁷⁴ Similarly, technologies with the potential to improve social reality and promote emancipation may end up with opposite effects because social and economic

70 Gigler 2008; Dasuki et al. 2014

71 See Kullman and Lee (2012); Haenssger and Ariana (2018). Kullman and Lee (2012) explain how Sen is concerned with the means by which self-determination can be fostered in populations who have experienced political and economic oppression, while Latour is interested in the self-comprehension of the developed world in its relation to technology and nature. They argue that both interests are not at odds, since Sen’s emphasis on individual agency at the expense of collective action is supplemented by Latour’s relational notion of agency. Hence, Sen’s ‘conversion’ and Latour’s ‘translation’ are reconciled with their structural resemblance and common exploration of technological involvement in individuals’ liberation in their everyday social and material environments; despite Sen’s concerns about self-determination among those experiencing political and economic oppression and Latour’s concerns about self-comprehension of the relationship between technology and nature.

72 Gigler 2008; Zheng 2009; Dasuki et al. 2014; Haenssger and Ariana 2018

73 Duncombe 2006

74 van den Hoven 2012; Johnstone 2012

structures influence the values and politics on which technologies are built.⁷⁵ Some of the negative effects may be foreseeable and preventable, either by adapting the technology or by intervening in other complementarities and supportive structures.⁷⁶

Hence, the role of technology in capabilities and functionings is anything but predictable (or straightforward in its instrumentality) given the material and social circumstances of operation, and the fact that even conversion factors modulate and interact with changing social conditions.⁷⁷ This implies, vitally, that serious evaluations of translation and conversion possibilities during technological interventions must assess what capabilities the technologies contribute to, for whom, under what circumstances, and what the enablers and barriers are.⁷⁸ Such evaluations eschew any automatic linkages between technology and capability, and embrace considerations of not only the proposed positive outcomes of these interventions but also the inequalities and restrictions that impede technologies from fuelling capabilities and ushering in genuine

modernity.⁷⁹ Such an approach would also allow space for the working with the bi-directional nature of conversion factors and technology inputs, and for the relationship between technology and other complementary conversion factors in the socio-political setting (in terms of how one influences, or transforms, the impacts of the other – i.e., their ‘transformative dimensions’).⁸⁰

For all this to materialise, individuals, social structures, and technical artefacts are to work in harmony to achieve causal efficacy, because each one enables changes in the others and together they reshape core capabilities;⁸¹ this implies that in a broader assessment of capability deprivation, which must embrace a normative framework to include technology and information, socio-technological exclusion must be evaluated critically at a variety

75 Zheng and Stahl 2009

76 Johnstone 2012

77 Zheng and Walsham 2008; Zheng and Stahl 2009

78 Zheng and Stahl 2012

79 Ibid.

80 See Haensslen and Ariana (2018) for more on conceptions of technology in the literature on the capability approach. See also Tshivhase et al. (2016) for a rich review of literature on the application of the capability approach into the ICT4D (Information and Communication Technologies for Development) approach. Also see Bajmocy and Gebert (2014) for the relationship between technological change and well-being in the capability approach.

81 In fact, van den Hoven (2012) even explicates on more unexplored relations between technology and the capability approach in what he terms as the capability-technology-affinity (CTA) thesis.

of levels.⁸² These levels range from policy evaluations right at the top, to the planning and implementation of development interventions, and right down to local-level analyses of socio-technological conditions.⁸³ This reiterates the fact that merely the distribution of devices is insufficient, and that social exclusion and inequalities can be overcome with technological ownership and intervention only when the flow of information and when opening up venues of socio-economic and political participation by means of these technologies (thereby expanding people's capabilities and aspirations) are genuinely successful.⁸⁴

Hence, it ought to be clear by now that though technologies must generally be evaluated for their role in human capabilities to help lead flourishing lives, there is no direct and causal relationship between technology and human development, because the relationship between individuals and technologies are steeped within a specific local, cultural, and sociopolitical contexts.⁸⁵ In other words, technology is not simply 'yet another input' to development since

its linkage to the social context renders technology inseparable from other inputs.⁸⁶ This reinforces the fact that for a technological device to facilitate the dilution or elimination of inequalities, adhering to its scripted role in facilitating positive developmental outcomes, it has to work through the giant web of socio-economic and technological interdependencies between technologies and social structures.⁸⁷ Capabilities (both core and specific new ones) modulate with technological and social context, which means that the end/means scheme as applied to the relation between capabilities and technology must be replaced by a hermeneutics of 'techno-human change,' involving the use of the capability approach in a way that highlights its interpretative dimension.⁸⁸

Based on this package of arguments is a well-formed critical theoretisation of technology and the capability approach by Zheng and Stahl⁸⁹ termed a 'critical capability approach to technology' (CCAT). Similar to SCOT, they argue for a reflection on technology not only in an individual capacity but also factoring in evaluation of society that is conducive to such reflection. The foundation for

82 Zheng 2009; Coeckelbergh 2011; Oosterlaken 2011; Johnstone 2012; van den Hoven, 2012; Dasuki et al. 2014

83 Johnstone 2012

84 Zheng and Walsham 2008

85 Gigler 2008; van den Hoven 2012

86 Johnstone 2012; Haenssger and Ariana 2018

87 Lawson 2010; Oosterlaken 2011

88 Coeckelbergh 2011

89 Zheng and Stahl 2011, 2012

CCAT lies in four principles: human-centred technological development, human diversity, protection of human agency, and democratic discourse. The approach situates agency as a key element for the critical evaluation of socio-cultural arrangements while assessing technology's role in well-being; in this process, the very conception of technology, the conception of agency, and the methodological implications of the two, gain centrality. While for our analysis here on technology and inequality we do not borrow CCAT verbatim, we are inspired by what Zheng and Stahl⁹⁰, eschewing universalism in technological analysis or absolutism between technology and human development, pose as central questions: “what capabilities does the technology contribute? For whom? Under what circumstances? What are the enabling factors and what are the barriers?”⁹¹

Connecting back to our earlier discussion, *Modernity*, therefore, does not become either an abstract notion or a mundane numerical figure of technological device ownership, but freedom and agency in a rightful sense. *Capability* and associated functionings, in the same vein, also do not mean only operational technological skills (or

merely ownership, in the commodity view of technology), but those which append life opportunities.⁹² *Deprivation*, therefore, implies whether the individual suffers restrictions, both internal and external, and is not in a position to convert and translate from technology into capabilities and functionings.⁹³ In other words, what is far more important than technological advancement among people is human empowerment and enhancement of well-being and agency through technology – that is, not simply what technology can directly enable people to do, but also what the introduction of technology brings about in a wider sense, valuing people's agency and taking their felt needs and aspirations into account.⁹⁴ This substantive ‘freedom’ is in the sense of liberation from (or, more importantly, within)⁹⁵ one's social and material surroundings, which can be realised through gradual modifications in the everyday socio-technological conditions, through

90 Zheng and Stahl 2012

91 Ibid: page 11

92 Zheng 2009

93 Zheng and Stahl 2011, 2012

94 Zheng 2009; Oosterlaken 2011, 2012; Oosterlaken and van den Hoven 2012

95 Liberation within improves relations between people and their environments, which is more important than minimising dependencies between people and their surroundings (in the form of some transcendent security) because building such relationships are central for individual and collective agency (Kullman and Lee 2012).

improving relationships between people, environments, and technologies, or even through psychological empowerment in the sense of achievement and self-esteem.⁹⁶ At a more elevated pitch, technological modernity must also append capabilities and functionings which help buttress the struggle against political oppression and give a voice to the historically marginalised.⁹⁷

The Idea of a Divide

One technological artefact that was deployed as a political combat vehicle against oppression by the marginalised, primarily because of its inexpensiveness and portability, was the bicycle in the 1980s in India; but an even cheaper and more portable artefact arrived on the scene two decades later – the mobile phone.⁹⁸ Robin Jeffrey has commented extensively on the incredibly democratic and ubiquitous nature of this device in the Indian setting, proposing that it was the ‘most disruptive device to hit humanity since shoes,’ often the first device poor people bought which give them a chance to work around structures and practices of historical discrimination, an observation supported also by CK Prahalad who commented in 2006

that the mobile phone opened up possibilities of information capital to poor people, allowing them to work around exploitative middlemen. This device also opened up vast opportunities to build on one’s existing social capital – one of the most important assets of livelihood for the deprived, which could potentially compensate for one’s low physical and financial capital – and help ameliorate poverty particularly in the rural and among deprived women.⁹⁹ At low operating costs, the mobile phone could extend communication networks laden with social and information capital to remote regions and communities, to whom conventional communication technologies would take much longer to reach, if they at all did.¹⁰⁰ Much like how the sewing machine became an ‘everyday technology’¹⁰¹, the mobile phone did not find itself cornered and gobbled by any single (or a stratum of) caste or class alone – it was far more accessible to practically anyone who could afford a device and its operating costs (which appeared to even reduce in nominal and real terms every year).

On the face of it, the mobile phone seemed the ideal device that

96 Gigler 2008; Kullman and Lee 2012; Zheng and Stahl 2011, 2012; Dasuki et al. 2014

97 Sen 2010

98 Jeffrey and Doron 2013

99 Schilderman 2002; Cecchini and Scott 2003; Garai and Shardrach 2006; Mehta and Kalra 2006; Mehta and Mehta 2014

100 World Bank 1999

101 Arnold 2013

would steer every positive turn in the trajectory of technology, modernity, information and social capital, agency, functioning, and ultimately human development. The mobile phone quickly became an important component of the development toolkit, but it was soon realised that this, like other technologies, also aggravated inequities due to the fact that high-income groups were disproportionately ahead in terms of possessing the skills and resources required to utilise it more effectively.¹⁰² The mobile phone had the potential to exacerbate exclusion in already historically marginalised communities and regions.¹⁰³ The mobile phone certainly changed some conditions – some very significantly – but “it did not reorder society”.¹⁰⁴ It could be well suspected that the mobile phone was also overemphasised like many other technologies in development research, policy, and practice, and in the livelihoods approach.¹⁰⁵ The question still remains whether it extends social capital, a much broader concern compared to whether it only appends existing social capital.¹⁰⁶

102 Saith 2008; Saith and Vijayabaskar 2008

103 As evidenced by Schilderman (2002) and Kamath (2018, 2020) who studied such communities in underserved regions

104 Jeffrey and Doron 2013: 121

105 Duncombe 2006

106 Warschauer 2003

But an even more pivotal concern is our very understanding of what *access* to these technologies in the first place is about, conventionally termed the ‘digital divide.’ Is it simply about ownership of an object or access to an interface, as much as it actually is about whether one is able to convert the object or access into real capabilities and functionings?¹⁰⁷ At the level of the household too, simply because there is a device at home, does that mean everyone uses it equally effectively, if they use it at all?¹⁰⁸ Is there a divide across caste, gender, language, age, region even among those who have access to these technologies? There are more questions than answers that the literature on the digital divide, and on the role of mobile phone technologies in the development process. We engage with this debate, as follows.

It has been questioned as to whether the mainstream policy and academic literature on the digital divide has narrowly adopted only an economic viewpoint, focusing on physical access to devices and artefacts, or whether it has focused disproportionately on computers, mobile phones, and the internet; worse, has it neatly divided people into dichotomous categories of ‘haves’ and ‘have-nots’ in the context of

107 Zheng and Stahl 2012

108 Bell 2006a, 2006b

these technologies?¹⁰⁹ Take for instance Deepak Kumar¹¹⁰, who, as late as 2006, was still concerned about “differential access to ICTs [being] at the root of the existing digital divide”, in the process defining digital divide as the “ever growing gap between those people and communities who have access to ICTs and those who do not have it...the digital divide is first and foremost an issue of accessibility”.¹¹¹ The writing by Deepak Kumar is perhaps not a defining work on the Indian digital divide, but is a very telling reflection of the oversimplified policy and popular understanding around technological inequalities. By observing such simplistic and singular boundaries, the mainstream literature – for that matter the very conceptual and policy understanding of the digital divide or technological inequality as such – glossed over more complex processes of stratification.¹¹²

Mark Warschauer¹¹³ signalled the issue early enough though, and assessed that the binary digital divide approach could fail to value the social resources and agency of social groups. However, he explained, the digital divide in that understanding was a product of the times,

exhibiting a superficial examination of technology’s relationship to socio-economic processes as though ICTs created a parallel reality that could be accessed by leaping across a divide of sorts. Pre-empting the critical literature on digital divide, Warschauer explained two issues: first, that the (conventional) digital divide framework provides a poor roadmap for using ‘technology for development’ in a manner that over-emphasises the physical presence of devices at the cost of other factors that allow people to use these devices for meaningful ends (recall ‘conversion’ and ‘translation’ from the section prior on agency), and second, that it connotes ‘digital solutions’ without engaging sufficiently with complementary resources (physical, technological, human, social) and complex interventions and conditions (technological and social contexts) to support social inclusion. Much later, the World Bank’s *World Development Report 2016: Digital Dividends* clearly spelt out that ICTs may be critical but are not sufficient, and that digital interventions to bridge technological inequalities require ‘strong analogue foundations’ or ‘analogue complements’ which will enhance skills, capabilities, functionings, and individual agency, and will stress for accountable institutions and empowering socio-political structures.

109 Fortunati 2008

110 Kumar 2006

111 Ibid: page 35

112 Halford and Savage 2010; Lupton 2015

113 Warschauer 2003

Taking these ideas even further, Kentaro Toyama commented¹¹⁴ that the digital divide (in its conventional understanding) is actually a symptom than a cause because of what he terms the ‘law of amplification’ which argues that technology, even when equally distributed, “isn’t a bridge, but a jack” amplifying existing conditions. Low-cost technology, Toyama continues, may not be an effective armament against inequality, because the outcomes of technology differ proportionately to other underlying advantages. If the digital divide were truly binary and mostly about ownership of ICTs, the achievability of ‘universal connectedness’ in any region would be a task that could be successful very swiftly. The conventional conceptualisation of digital divide, and hence technological inequality, therefore, seriously needed a major reworking.

Concurring with and drawing further from sociological framings of technology such as SCOT, ANT, CCAT discussed in earlier sections, feminist theorisations questioned the conventional idea of the digital divide and alternately propounded, what is best termed by Halford and Savage¹¹⁵ as the idea of *digital social inequality*.

This is an approach that, at once, captures not only the ‘seamless web’ conceptualisation of technology and society, but also the fact that technology and society in their joint dynamics can spawn (or break) inequalities, can append (or diminish) capabilities, can enhance (or deplete) skills, and can empower (or disempower) individual agency, and undermine (or reinforce) social structures – greatly due to the fact that technology and society work hand-in-hand, and are possibly even actants in the same network on one plane. We borrow the term ‘digital social inequality’ in its broader incarnation of *socio-technological inequality*. The feminist theorisation of technology has also provided concepts to more effectively understand users of a technology, differentiating them into ‘end users’, ‘lay end users’, and ‘implicated actors.’¹¹⁶ While the first two terms refer to those who are affected downstream by innovation and those who have been excluded from expert discourse, ‘implicated actors’ include those who have been either not physically present but discursively constructed and targeted by technology developers, or those who are physically present but who have been generally silenced,

114 Toyama 2015: 49

115 Halford and Savage 2010

116 Oudshoorn and Pinch, 2003; see also Wajcman, 2004 and 2010

ignored, or made invisible by those in power.

Very similar to ‘implicated actors,’ another useful conceptualisation around technological inequality that has emerged in the literature is the ‘*information have-less*,’ which also embraces the seamless-web paradigm of thinking rather seriously by conceptualising not just the nature of technology and society, but the nature of socio-technological deprivation among individuals and social groups. Studying China across the first decade of the 21st century, Jack-Linchuan Qiu first employed this expression as an alternative to the conventional binary digital divide, to appreciate technological and informational stratification with a much more fine-grained, and realistic, approach of observation and analysis.

Qiu¹¹⁷ observed that there are hundreds of millions of people who have gained new access to low-end ICTs (these devices therefore becoming ‘everyday technologies,’ employing David Arnold’s term), who also happen to be drawn (or pushed) to urban agglomerations in the neoliberal economy. Fusing the technological to the social, Qiu put forward that there is an entire socio-technological class that can be called the ‘*information have-less*,’ which is a vast group of

people including migrant informal workers, those who seek to escape agrarian distress, those who have highly precarious and vulnerable working lives, and those who generally constitute the underclass in the city and peri-urban. There is a strong likelihood that every one of these individuals possess a mobile phone, or even possess the skills to search something on Google, to watch videos on YouTube, perhaps operate an account on Facebook, and are able to send text messages and images through platforms such as WhatsApp. Have these individuals truly crossed towards the favourable side of the digital divide canyon? Even on a preliminary thought, and certainly on empirical observation of this category of individuals, the answer may not be a simple affirmative. In the case of India, this calls to mind the social groups and regions that are either dispossessed, or forcibly evicted from urban slums, or forced out of their villages. They may possess a device such as a smartphone, will in all likelihood be able to conduct basic operations on the internet, possibly download a film that the family can watch, share content, and so on, but these individuals tangibly lack the effective participation in the ‘digital technological revolution’ either as creators or customers of technological products and services; rather, they are simply passive consumers of

117 Qiu 2009, among his other works

digital technologies on the margins, participating in the digital experience purely for casual interpersonal communication or entertainment. While the more empowered classes employ technology in the fight for democracy and justice, the majority of the information have-less, Qiu observes, are occupied negotiating basic problems of life and living, using devices mainly for entertainment and consumption. The information have-less are hence rarely ‘informed users’¹¹⁸ of digital technology. They may own technological devices, use them as markers of prestige and aspiration, and may use them recurrently, but are still alienated and disempowered in a larger sense of citizenship and digital participation, which is clearly because these technologies operate within existing social conditions without changing those conditions.¹¹⁹

Once we open up our understanding of socio-technological inequalities as not simply a matter of ownership of device, the mammoth scale of the task and agenda ahead for reorienting technology policy becomes evident.¹²⁰ Naïveté in the state policy discourse around technology and development results in the interpretation of the digital divide as simply e-inclusion in

the sense of ownership of devices and access to information, rather than effective participation, demonstrating the erroneous inclination of policy orientation towards technological determinism and solutionism.¹²¹

Technological Experience in India

In India too, such a populous category of the information have-less is glaringly visible, immediately observable around us, which the Indian policy and popular discourse on technology and development has entirely overlooked. Apart from the recognition that those among the poor who possess technological devices must be taught to ‘use them better,’ this is routinely stated as a convenient pedagogic prescription and is in effect impotent in terms of effective technological participation since they remain passive consumers. Programs such as Digital India or the National Digital Literacy Mission speak of ‘digital literacy,’ access to e-governance services, or improving digital infrastructure in terms of device ownership and broadband highways. These programs are no doubt noble endeavours with little doubt about their intentions to expand the technological experience for the demographically

118 Webster, 2006; van Deursen and van Dijk 2014

119 Qiu, 2009

120 Halford and Savage, 2010

121 Fortunati, 2008; Morozov, 2011 and 2013

gigantic underclasses in India, but they are certainly myopic of socio-technological inequalities all over the country. A serious ‘worm’s eye view of digital life’¹²² in Indian policy and academic discourses on technology is in want, but is conspicuously missing because they are heavily slanted towards technological determinism and solutionism. While these two terms have been mentioned in prior sections of this paper, their relevance arises at this point when we finally arrive at the central question on technology and inequality.¹²³

Despite abundant evidence that technology is not a sovereign entity and shares a reciprocal relationship with society (as seen throughout this paper), such a naturalisation seems to remain sturdy.¹²⁴ Such an ascription of autonomic power to technology is what is termed ‘technological determinism,’ a classic example of this being Karl Marx’s conviction that the introduction of the railways in India would dissolve its caste system.¹²⁵ Other examples of technological determinism include placing the waterwheel as the founding artefact of manorialism, the steam

engine as that of industrial society, or the stirrup that of feudalism.¹²⁶ The idea of technologies as driving forces of history was developed within the paradigm that regarded new technological artefacts as a sure-shot means of addressing social and politically defined goals catering to the objective of social change.¹²⁷ An offspring of technological determinism is ‘technological solutionism,’ which brings with it the mindset that technology holds the self-determined potential to ameliorate the human condition.¹²⁸ Technological solutionism employs a reductionist account of the analysis of development concerns to simplifiable ‘obstacles’ that can be overcome, disregarding any sociological or historical complexity of either the concerns or the technological fix.¹²⁹ Such a solutionist inclination is not exclusive to our contemporary era or to digital technologies. Road transport and electrical technology were believed to be harbingers of social transformation and social harmony in the West, back in the nineteenth century.¹³⁰ During the same period, the Governors General of India Lord Dalhousie and Lord William Bentinck believed that the railways and

122 A term adapted from Krishna’s (2017) ‘worm’s eye view of development.’

123 In this section, we borrow from Kamath (2020)

124 Bimber, 1990

125 Heilbroner, 1994

126 Hughes, 1994

127 Marx, 1994, 1997, 2010

128 Morozov, 2013

129 Ibid:14

130 Ibid:44

the telegraph could break down the caste system and usher in modernity into this wretched subcontinent by which the Indian lot could be civilised, saved, and pulled-up towards the industrialised standards of the West.¹³¹ Harriet Martineau's vision, much like Bentinck's, presented on how the railways would expand the otherwise immutable nature of the Indian mind towards new horizons of thought and practice.¹³² David Arnold also cites instances from Indian fiction, with an intriguing episode from Mulk Raj Anand's character – a manual scavenger traditionally and ritually obliged to handle human waste in India – viewing a flush toilet as an artefact that came with the promise of expunging caste from Indian society.¹³³ The idea is that the impact of technology (conceived to be essentially a neutral entity) naturally flows from its inherent qualities, regardless of context.¹³⁴ Both technological determinism and technological solutionism overlook the social foundations of technological processes and outcomes, and severely compromise on multiplicity in conceptualisation, enquiry, and analysis.

Technological determinism, argued Robert Heilbroner, was characterised

especially in high industrial capitalism.¹³⁵ In an interesting similarity, the mindset of technological determinism and solutionism in India gained traction especially over the last thirty years with the reorientation of the state towards neoliberal capitalism.¹³⁶ At the nucleus of neoliberal capitalism has been the reorientation of the state in affairs of political economy. The state, far from having withdrawn across-the-board for the benefit of entrepreneurial potential and material prosperity, has in reality retracted for some while facilitating others, as a result of which general socio-economic inequality has gained tremendous momentum. In tandem with this divergent political-economic experience has been unequal technological experience too, with the affluent (and those closer to that strata) enjoying a strikingly different engagement with digital technologies – appending their prosperity in every dimension of life and work – compared to those at the bottom (and closer to that strata) having either a non-empowering

131 Sarukkai, 2008

132 Arnold 2013

133 Ibid.

134 Morozov 2013

135 Heilbroner. (1967) explains how this is a peculiarity of an era in Anglo-American economic history, from the mid-1800s to pre-Depression 1900s.

136 There is ample evidence, though, that these tendencies towards technological determinism hark back decades prior to the 1991 industrial reforms. For a historical treatment of this, see Kamath (2020).

engagement with digital technology, or possibly even a disparaging technological experience. The acceleration of divergence in technological engagement has only been aggravating, becoming less democratic and universally beneficial, and certainly much more complicated than simply an issue of access and ownership of devices. This is especially evident, even visually, in the context of digital technologies such as mobile phones. Compared to the public phone-booths of the yesteryears that were unequally distributed geographically but were more equally accessible devices immediately around their fixed locations, mobile phones may appear more ubiquitous but the magnitude of inequality in their experience and impact across people, social groups, and regions, is much vaster. For some, the phone has proven to be emancipatory, while for others it has only aggravated disempowerment. For some, it is indispensable for livelihood or political participation, while for others it is purely an entertainment gadget. For some, it has meant freedom of expression, while for others it has only meant being under the scrutiny of further surveillance.

This especially plays out in urban semi-formal work, known popularly as ‘platform economy’ or ‘gig economy’ work (mobile-app based taxi services, food and goods delivery, etc.), where

digital technology is not simply demanded for convenience but stands as the very foundation of that economic sector. A deeply diseased agricultural sector, compounded by problematic neglect of industrial manufacturing over the years, has pushed tens of thousands of rural and small-town unemployed and frustrated young male workers into the metropolitan and peri-urban, where what awaits them is semi-formal low-quality high-stress work that depends on digital technology. There is little justification for calling this ‘employment’ at all (appearing more like a string of personalised tasks through the working day), copious evidence for calling these workers as the ‘information have-less,’ practically no genuine and long-lasting skill building, barely tapping or building any entrepreneurial skills or capabilities or meaningful functionings among them, a systematic resistance against their collective bargaining and empowerment, and certainly founded on the problematic technological-determinist understanding of engagement with especially digital technology as some kind of modernity in life and livelihood.

While platform economy jobs appear to epitomise the complex technology-inequality conundrum, on a more aggregate scale has been the personalisation of economic well-being

along with the increasing personalisation of technology – these two not sharing a cause-effect relationship but certainly not disconnected with one another by virtue of the reorientation of the state and its consequent tendency towards technological determinism and solutionism. Of course, the direction of the relationship is not simply ‘neoliberal capitalism influencing personalisation of economic experience and hence technological inequality,’ but far more complicated with feedbacks operating between technological inequality, personalisation of technology, and neoliberal capitalism – each reproducing one another (platform economy jobs being only one shining example). No doubt, the globalisation of information and communication technologies, in general, is implicated as a critical ingredient in this.

While one can continue debating around the fruitfulness of outcomes and whether these outcomes are self-created or are impacts of macro processes, one feature appears that appears to be consistent is that, in the context of a transforming India, technological inequalities in socio-economic transition processes are generally believed to be ethically undesirable differences¹³⁷ in almost all streams of discourse.

¹³⁷ To use Pani’s (2017) conceptualisation

Mitigating Inequality

Social and economic inequality can be tackled by ushering in processes that actually convert technological ubiquity into progressive emancipatory everyday-life choices. ‘Genuine’ modernity can be realised when technologies are inclusive, and are converted and translated into individual capabilities and realised functionings. Dualities in economy and society can be gradually melted down with technological inclusion working in tandem with socio-economic inclusion, and by moving beyond oversimplified materialities into more meaningful socio-technical imaginaries. We must enquire on how technologies – digital technologies more specifically – are being adopted by the marginalised and the subaltern and whether they have had empowerment effects, or whether transition forces have alienated and disempowered these groups.¹³⁸ We need to explore whether technological optimism is well-founded and warranted, and whether it has and will actually undermine inequalities on the ground or create new divides.¹³⁹ Technology can be a source of progressive dynamism and more improved democratic participation in economy and society. It can be an instrument of a new social

¹³⁸ Qiu 2009

¹³⁹ Chandrasekhar 2001; Saith 2008

order as much as it can be an instrument of social emancipation¹⁴⁰, if we arrive at more dynamic notions of inclusion and inequality, and imagine technology to be a terrain of power, conflict, struggle, and negotiation.¹⁴¹ The evolutionary path of technology can be appropriated for greater empowerment if it can be steered by frameworks of equity and social justice.¹⁴²

For this, we need to start away from the centre and towards the bottom. We need to de-centre the analysis of technology from the urban-metropolitan (and industrial-economic or white-collar corporate) and restate it outside that ambit.¹⁴³ Similarly¹⁴⁴, we need to trim the domination of the narrative of technology away from the more privileged, and adopt a subaltern gaze in order to explicate on the exclusion mechanisms of technological deployment that has aggravated inequality. We need to embrace the fact that technological divides are a graded spectrum of inequality. We need to provoke and compel the discourses on technology and development in India to acknowledge the technologically less-empowered (or even disempowered) as

seriously as it engages with high-tech interventions in artificial intelligence and ‘smart’ solutions, and as easily as it correlates well-being with technological diffusion.¹⁴⁵ We need to find out whether the digitally disenfranchised overlap with the historically socio-economically disadvantaged, and whether such technological disadvantaged-ness will dissolve itself in time and with greater technological access.¹⁴⁶ We need to ask whether participation in the ‘technological revolution’ for the under-recognised technological-underclasses has really facilitated grassroots social and informational networks to cope with economic transition, or has it only meant setting up small shops and cabins and selling mobile phone accessories to other members of that underclass¹⁴⁷, as observed particularly divisively in India. We need to understand that technological inequalities more often manifest as intangible differences (socio-technological inequalities which cannot be rectified simply by material or asset redistribution) than tangible differences (conventional digital divides or lack of access to, say, the internet

140 Foucault 1976

141 Fortunati 2008; Faulkner et al. 2010

142 ITfC 2015

143 Arnold 2013

144 Adapting from Corneliussen et al. (2018)

145 Fortunati 2008; Krishna 2017; Kamath 2020

146 As prodded by Nikhil Govind in a 2017 discussion on ‘An information society for the future’ (https://www.youtube.com/watch?v=fTmqY_ndeI, accessed 18 February 2021).

147 Cartier et al. 2005

which can be reduced or even removed by asset redistribution).¹⁴⁸ We need to accept that while uneven ownership of devices can be an indicator of tangible technological inequality, this cannot entirely reflect the intangible differentials and subsequent vulnerabilities that technological inequalities are associated with.

Whatever the intention or script that is ascribed to technology in its development and planning, it is described and malleable to the logic of society and is situated in (and mirrors) the unequal power relationships that exist in that society.¹⁴⁹ The inertia of social inequality forcefully restrains differentials in social capacity, and terms such as ‘modernisation’ or ‘leapfrogging’ become hollow as they ignore actual inequities on the ground and may even produce unintended consequences.¹⁵⁰ Technology needs to work with entitlements in health, education, in livelihood creation, valuable social capital network formation, and political participation, to strengthen both short- and long-term decision-making capacities of individuals and as well as the character of surrounding

institutional structures that reproduce inequalities.¹⁵¹

Overall, inspired from Ruth Schwartz-Cowan¹⁵², if we are to design and craft a sociological study of technology and inequality, we need to align our enquiry with those aspects of social change and inequality where technology is implicated. We need to grasp the magnitude of the conceptualisation of the technology-inequality relationship and its role, ultimately, in human development. There are about 87.3 mobile phone subscriptions for every hundred individuals in India¹⁵³; it appears that the digital divide (in its conventional understanding) has been practically bridged and that everyone can partake of a progressive and modern technological experience. But if we broaden our understanding of technological empowerment, if we situate this in the context of wider structural and operational inequalities, if we factor-in conceptualisations of technological modernity, and embed this in socio-economic transition processes, we arrive at a much more realistic understanding of socio-technological inequality.

148 Pani and Joshi, forthcoming

149 Feenberg 1999, 2010; Akrich 1997; Warschauer 2003; Morozov 2011

150 Qiu 2009; Toyama 2015

151 Duncombe 2006

152 Schwartz-Cowan 1987

153 World Bank 2019

The Way Ahead

Socio-economic inequality, on a stage of economic neoliberalism and with the spectre of caste still thriving, is an ambience that technology comfortably operates within. Social and economic transition processes are cauldrons that brew inequality, where technology functions as an important ingredient. At once, technology is a contributor to the forces that cause these transitions as well as a participant in the adaptations to and negotiations around these processes. This implies that the enquiry has to circle around both, the facilitative and negotiative relationship between technology and inequality within socio-political processes.

As we have seen in this review paper, technology interbreeds with existing inequalities by virtue of the fact that it is not simply a set of artefacts or assets but an integral social participant. The reconfigurations of social relations and economic processes during transition processes generates new technological inequalities that are ethically unacceptable. Multiple socio-technological trajectories are continually generated and mutated in conditions of inequality through the everyday technological practices and experiences of people and communities. Uncovering these trajectories emerges a

pertinent task, motivating a sociological analysis of technological inequality, and a technological analysis of socio-economic inequality. More specifically, we attend to the critical need for a study of socio-technological inequality in the context of the deep and wide permeation of digital technologies in transitions of everyday life and work in India.

The pervasiveness of digital technologies has played a central role in livelihood transformations, in migration decisions and processes, as well as in the adaptation and negotiation strategies of subaltern groups around political-economic transformations. It is important to explore patterns in socio-technological inequality and the instrumentalities therein, and to conceptualise them. A host of pressing questions therefore emerge:

1. What are the expectations from digital technologies by people under the duress of inequality, and by the state?
2. How does technology interact and interbreed, and mitigate, with dimensions of inequality and their outcomes?
3. Do these technologies provide durability and stability against new socio-political inequalities?

4. Do these technologies build informational assets or append livelihood opportunities?
5. What is the nature of gender and caste differentials?
6. Is there a shared vision of technology and development at all?
7. What are the appropriate interventions to all these?

Addressing these enquiries provides lessons for the understanding of the role of technology in human development, which, after all, is the final mission. We need to critique the mainstream Indian discourse and meta-narrative around this role, and then bring out the true nature of the relationship between technology and inequality. We need to unbox and refine our understanding of the instrumentality of technology on the lived experience of inequality, and, in turn, of the instrumentality of inequality on the technological condition. Digital technologies are a new site for modern incarnations of inequality, given how they are a realm of experience and activity not separate from the social. Uncovering socio-technological inequalities is integral to charting out the realities of socio-economic transformation in terms of novel vulnerabilities, precarities, and uncertainties that these inequalities spawn. To comprehend this more

acutely is why we need to pursue a study of technology as a direction of enquiry into inequality.

References

- Ahmed, H., Qureshi, O.M., and Khan, A.A. (2014) 'Reviving a Ghost in the History of Technology: The Social Construction of the Recumbent Bicycle', *Social Studies of Science*
- Akrich, M. (1997) 'The De-Description of Technical Objects', in Bijker and Law (eds.) *Shaping Technology/ Building Society: Studies in Socio-Technical Change*, The MIT Press, London and Cambridge, MA
- Arnold, D. (2013) *Everyday Technology: Machines and the Making of India's Modernity*, University of Chicago Press, Chicago and London
- Basalla, G. (1989) 'The evolution of technology' in Basalla and Hannaway (eds.) *Cambridge Studies in the History of Science*, Cambridge University Press, UK
- Baudrillard, J. (1987) 'Modernity', *Canadian Journal of Political and Social Theory*, 11(3):63-72
- Beck, U. (1992) *Risk Society: Towards a New Modernity*, Sage, London
- Bell, G. (2006a) 'Satu Kelugara, Satu Komputer (One Home, One Computer): Cultural Accounts of ICTs in South and South East

- Asia', *Design Issues*, 22(2): 35-55
- Bell, G. (2006b) 'The Age of the Thumb: A Cultural Reading of Mobile Technologies from Asia', *Knowledge, Technology, and Policy*, 19(2): 41-57
- Bernal, J.D. (1969) *Science in History*, Volume 1, Penguin
- Best, M.L., and Maier, S.G. (2007) 'Gender, Culture, and ICT Use in Rural South India,' *Gender, Technology, and Development*, 11(2):137-155
- Bijker, W.E. (1987) 'The Social Construction of Bakelite: Toward a Theory of Invention', in Bijker et al. (eds.) *The Social Construction of Technological Systems*, The MIT Press, Cambridge, MA
- Bijker, W.E. (1997) *Of Bicycles, Bakelites, and Bulbs*, The MIT Press, Cambridge, MA
- Bijker, W.E. (2010) 'How is Technology Made? That is the Question!', *Cambridge Journal of Economics*, 34(1):63-76
- Bijker, W.E., and Pinch, T. (1987) 'The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other', in Bijker et al. (eds.) *The Social Construction of Technological Systems*, The MIT Press, Cambridge, MA
- Bijker, W.E., Hughes, T.P., and Pinch, T. (1987) *The Social Construction of Technological Systems*, The MIT Press, Cambridge, MA
- Bimber, B. (1990) 'Karl Marx and the Three Faces of Technological Determinism', *Social Studies of Science*, 20(2):331-351
- Borup, M., Brown, N., Konrad, K., and Van Lente, H. (2006) 'The sociology of expectations in science and technology', *Technology Analysis & Strategic Management*, 18(3-4): 285-298
- Callon, M. (1987) 'Society in the Making: The Study of Technology as a Tool for Sociological Analysis', in Bijker et al. (eds.) *The Social Construction of Technological Systems*, The MIT Press, Cambridge, MA
- Cartier, C., Castells, M., and Qiu, J.L. (2005) 'The Information Have-Less: Inequality, Mobility, and Translocal Networks in Chinese Cities,' *Studies in Comparative International Development*, 40(2):9-34
- Castells, M., Fernandez-Ardevol, M., Qiu, J.L., and Sey, A. (2007) *Mobile Communication and Society: A Global Perspective*, The MIT Press, Cambridge MA and London
- Cecchini, S., and Scott, C. (2003) 'Can information and communications technology applications contribute

- to poverty reduction? Lessons from rural India', *Information Technology for Development*, 10(2):73-84
- Chandrasekhar, C.P. (2001) 'ICT in a Developing Country Context: An Indian Case Study' United Nations Development Programme (UNDP), New York
- Coeckelbergh, M. (2011) 'Human Development or Human Enhancement? A Methodological Reflection on Capabilities and the Evaluation of Information Technologies,' *Ethics and Information Technology*, 13:81-92
- Corneliussen, H.G., Herman, C., and Gajjala, R. (2018) 'ICT Changes Everything! But Who Changes ICT?', in Kreps et al. (eds.) *This Changes Everything – ICT and Climate Change: What Can We Do?* Springer, Switzerland
- Dasuki, S.I., Abbott, P., and Azerikatoa, D. (2014) 'ICT and Empowerment to Participate: A Capability Approach', *Information Development*, 30(4):321-331
- Dosi, G. (1982) 'Technological paradigms and technological trajectories: a suggested interpretation of the determinants and directions of technical change' *Research Policy*, 11(3): 147-162
- Duncombe, R. (2006) 'Analysing ICT Applications for Poverty Reduction via Micro-Enterprise Using the Livelihoods Framework', Working Paper 27, IDPM, University of Manchester.
- Faulkner, P., Lawson, C., and Runde, J. (2010) 'Theorising Technology', *Cambridge Journal of Economics*, 34(1):1-16
- Feenberg, A. (1999) *Questioning Technology*, Routledge, London and New York
- Feenberg, A. (2010) *Between Reason and Experience: Essays in Technology and Modernity*, The MIT Press, Cambridge, MA, and London
- Fortunati, L. (2008) 'Re-thinking e-inclusion,' Prati CIRN 2008 Community Informatics Conference: ICTs for Social Inclusion
- Foucault, M. (1976) *The History of Sexuality*, Volume 1, Gallimard, Paris
- Garai, A., and Shadrach, B. (2006) *Taking ICT to Every Indian Village: Opportunities and Challenges*, OneWorld South Asia, New Delhi
- Garfinkel, H. (1967) *Studies in Ethnomethodology*, Prentice Hall, New Jersey
- Gigler, B-S. (2008) 'Enacting and Interpreting Technology: From Usage to Well-Being', in Rahman (ed.) *Empowering Marginal Communities with Information*

- Networking*, Idea Publishing, Hershey and London
- Gupta, D. (2000) *Mistaken Modernity: India Between Worlds*, Harper Collins, New Delhi
- Haenssger, M.J., and Ariana, P. (2018) 'The Place of Technology in the Capability Approach', *Oxford Development Studies*, 46(1):98-112
- Halford, S., and Savage, M. (2010) 'Reconceptualising Digital Social Inequality', *Information, Communication, and Society*, 13(7): 937-955
- Heeks, R.B. (1999) *Information and Communications Technology, Poverty and Development*, Development Informatics paper no.5, IDPM, University of Manchester, UK
- Heidegger, M. (1954) *The Question Concerning Technology*, Garland, Germany
- Heilbroner, R.L. (1967) 'Do Machines Make History?' *Technology and Culture*, 8(3): 335-345
- Heilbroner, R.L. (1994) 'Technological Determinism Revisited', in Marx and Smith (eds.) *Does Technology Drive History: The Dilemma of Technological Determinism*, The MIT Press, Cambridge, MA and London, UK
- Hughes, T.P. (1994) 'Technological Momentum', in Marx and Smith (eds.) *Does Technology Drive History: The Dilemma of Technological Determinism*, The MIT Press, Cambridge, MA and London, UK
- Ingold, T. (1997) 'Eight Themes in the Anthropology of Technology', *Social Analysis*, 41(1): 106-138
- ITfC (2015) *Annual Report 2014-2015*, IT for Change, Bangalore
- Jananoff, S. (2015a) 'Future Imperfect: Science, Technology, and the Imaginations of Modernity', in Jananoff and Kim (eds.) *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, University of Chicago Press, Chicago and London
- Jananoff, S. (2015b) 'Imagined and Invented Worlds', in Jananoff and Kim (eds.) *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, University of Chicago Press, Chicago and London
- Jeffrey, R., and Doron, A. (2013) *Cell Phone Nation*, Hachette India, New Delhi
- Johnstone, J. (2012) 'Capabilities and Technology', in Brey, Briggie, and Spence (eds.) *The Good Life in a Technological Age*, Routledge, Oxon and New York
- Kamath, A. (2018) 'Untouchable Cellphones? Old Caste Exclusions

- and New Digital Divides in Peri-Urban Bangalore' *Critical Asian Studies*, 50(3): 375-394
- Kamath, A. (2020) *The Social Context of Technological Experience: Three Studies from India*, Routledge, New York and London
- Kranzberg, M. (1986) 'Technology and History: Kranzberg's Laws,' *Technology and Culture*, 27(3): 544-560.
- Krishna, A. (2017) *The Broken Ladder: The Paradox and the Potential of India's One Billion*, Penguin Random House, India
- Kullman, K., and Lee, N. (2012) 'Liberation from / Liberation within: Examining One Laptop per Child with Amartya Sen and Bruno Latour', in Oosterlaken and van den Hoven (eds.) *The Capability Approach, Technology and Design*, Springer, The Netherlands
- Kumar, D. (2006) *Information Technology and Social Change*, Rawat Publications, Jaipur
- Latour, B. (2005) *Reassembling the Social: An Introduction to Actor-Network-Theory*, Oxford University Press, UK
- Law, J. (1992) *A Sociology of Monsters: Essays on Power, Technology and Domination*, Routledge Sociological Review Monograph, London
- Lawson, C. (2010) 'Technology and the Extension of Human Capabilities', *Journal for the Theory of Social Behaviour*, 40(2):207-223
- Lupton, D. (2015) *Digital Sociology*, Routledge, Oxon and New York
- MacKenzie, D., and Wajcman, J. (1999) *The Social Shaping of Technology*, Open University Press, Maidenhead and Philadelphia
- Marx, L. (1994) 'The Idea of Technology and Postmodern Pessimism' in Marx and Smith (eds.) *Does Technology Drive History: The Dilemma of Technological Determinism*, The MIT Press, Cambridge, MA and London, UK
- Marx, L. (1997) 'Technology: The Emergence of a Hazardous Concept' *Social Research*, 64(3): 965-988
- Marx, L. (2010) 'Technology: The Emergence of a Hazardous Concept' *Technology and Culture*, 51(3): 561-577
- Marx, L., and Smith, M.R. (1994) 'Introduction', in Marx and Smith (eds.) *Does Technology Drive History: The Dilemma of Technological Determinism*, The MIT Press, Cambridge, MA and London, UK
- Mehta, B.W., and Mehta, N. (2014) 'ICT and Socio-Economic Empowerment of Rural Women:

- Case of Mobile Phone in India', *Knowledge Horizons*, 6(4):103-112
- Mehta, S., and Kalra, M. (2006) 'Information and Communication Technologies: A bridge for social equity and sustainable development in India', *The International Information and Library Review*, 38:147-160
- Mejia, Alberto Gomez (2017) 'The concept of Technology in the History of Economic Thought. From the Classics to Schumpeter, Evolutionism and today' *Libre Empresa*, 14.2: 199-214.
- Morozov, E. (2013) *To Save Everything, Click Here: Technology, Solutionism, and the Urge to Fix Problems that Don't Exist*, Penguin, London
- Mumford, L. (1934) *Technics and Civilization*, Routledge, UK
- O'Hara, K. (2020) 'The Contradictions of Digital Modernity', *AI & Society*, 35:197-208
- Oosterlaken, I. (2011) 'Inserting Technology in the Relational Ontology of Sen's Capability Approach', *Journal of Human Development and Capabilities*, 12(3):425-432
- Oosterlaken, I. (2012) 'The Capability Approach, Technology, and Design: Taking Stock and Looking Ahead', in Oosterlaken and van den Hoven (eds.) *The Capability Approach, Technology and Design*, Springer, The Netherlands
- Oosterlaken, I., and van den Hoven, J. (2012) *The Capability Approach, Technology and Design*, Springer, The Netherlands
- Oudshoorn, N., and Pinch, T. (2003) 'Introduction: How Users and Non-Users Matter', in Pinch and Oudshoorn (eds.) *How Users Matter*, The MIT Press, Cambridge, MA
- Pani, N. (2016) 'Towards a Socially Consistent Science and Technology Policy', *Current Science*, 110(9): 1624-1629
- Pani, N. (2017) 'Normative and Descriptive Inequalities', NIAS Working Paper WP8-2017, National Institute of Advanced Studies, Bangalore, India
- Pani, N., and Joshi, K. (forthcoming) 'Tangible Vulnerability', in Pani (ed.) *Dynamics of Difference: Inequality and Transformation in Rural India*, Routledge
- Pfaffenberger, B. (1988) 'Fetishised Objects and Humanised Nature: Towards an Anthropology of Technology', *Man*, 23(2): 236-252
- Pfaffenberger, B. (1992) 'Social Anthropology of Technology', *Annual Review of Anthropology*, 21: 491-516
- Qiu, J.L. (2009) *Working-Class Network*

- Society: Communication Technology and the Information Have-Less in Urban China*, MIT Press, Cambridge MA, London
- Saith, A. (2008) 'ICTs and Poverty Alleviation: Hope or Hype?', in Saith, Vijayabaskar, and Gayathri (eds.) *ICTs and Indian Social Change: Diffusion, Poverty, and Governance*, Sage, New Delhi
- Saith, A., and Vijayabaskar, M. (2008) 'Introduction', in Saith, Vijayabaskar, and Gayathri (eds.) *ICTs and Indian Social Change: Diffusion, Poverty, and Governance*, Sage, New Delhi
- Sarukkai, S. (2008) 'Culture of Technology and ICTs', in Saith, Vijayabaskar, and Gayathri (eds.) *ICTs and Indian Social Change: Diffusion, Poverty, and Governance*, Sage, New Delhi
- Schwartz-Cowan, R. (1987) 'The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology', in Bijker et al. (eds.) *The Social Construction of Technological Systems*, The MIT Press, Cambridge, MA
- Sen, A. (2010) 'The mobile and the world,' *Information Technologies and International Development* 6SE:1-3.
- Silverstone, R., Hirsch, E., and Morley, D. (1992) 'Information and Communication Technologies and the Moral Economy of the Household', in Silverstone and Hirsch (eds.) *Consuming Technologies: Media and Information in Domestic Spaces*, Routledge, London and New York
- Strum, S., and Latour, B. (1987) 'The Meanings of the Social: From Baboons to Humans', *Information sur les Sciences Sociales*, 26:783-802
- Tarde, G. (1899/2000) *Social Laws: An Outline of Sociology* (translated by Howard C. Warren), Batoche Books, Ontario
- Toyama, K. (2015) *Geek Heresy: Rescuing Social Change from the Cult of Technology*, Public Affairs, New York
- Tshivhase, M., Turpin, M., and Mathee, M. (2016) 'The use of Sen's capability approach in ICT4D: an exploratory review' CONF-IRM 2016 Proceedings
- Van den Hoven, J. (2012) 'Human Capabilities and Technology', in Oosterlaken and van den Hoven (eds.) *The Capability Approach, Technology and Design*, Springer, The Netherlands
- Van Deursen, A.J.A.M., and van Dijk, J.A.G.M (2014) 'The Digital Divide Shifts to Difference in Usage', *New Media and Society*, 16(3): 507-526
- Veak, T. (2000) 'Whose Technology? Whose Modernity? Questioning

- Feenberg's Questioning Technology', *Science, Technology, and Human Values*, 25(2):226-237
- Wajcman, J. (2004) *Techno Feminism*, Polity Press, Cambridge
- Wajcman, J. (2010) 'Feminist Theories of Technology', *Cambridge Journal of Economics*, 34(1):143-152
- Warschauer, M. (2003) *Technology and Social Inclusion: Rethinking the Digital Divide*, The MIT Press, Cambridge MA, and London, UK
- Winner, L. (1980) 'Do Artifacts have Politics?' *Daedalus*, 121-136
- World Bank (2016) *World Development Report 2016: Digital Dividends*, The World Bank, Washington DC
- Zheng, Y. (2007) 'Exploring the Value of the Capability Approach for E-Development', Proceedings of the 9th International Conference on Social Implications of Computers in Developing Countries, Sao Paulo, Brazil
- Zheng, Y. (2009) 'Different Spaces for e-Development: What can we learn from the Capability Approach?', *Information Technology for Development*, 15(2):66-82
- Zheng, Y., and Stahl, B. C. (2011) 'Technology, capabilities and critical perspectives: what can critical theory contribute to Sen's capability approach?' *Ethics and Information Technology*, 13(2):69-80
- Zheng, Y., and Stahl, B.C. (2012) 'Evaluating Emerging ICTs: A Critical Capability Approach of Technology', in Oosterlaken and van den Hoven (eds.) *The Capability Approach, Technology and Design*, Springer, The Netherlands
- Zheng, Y., and Walsham, G. (2008) 'Inequality of What? Social Exclusion in the E-Society as Capability Deprivation', *Information Technology and People*, 21(3):222-243

DOCUMENT CONTROL SHEET

1. **Document No. and Year** : NIAS/SSc/IHD/U/WP/11/2021
2. **Title** : A Technological Enquiry into Inequality:
A Conceptual Review
3. **Type of Document** : Working Paper
4. **No. of Pages and Figures** : 40 pages, 1 figure
5. **No. of References** : 103
6. **Authors(s)** : Anant Kamath
7. **Originating School** : School of Social Sciences
8. **Programme** : Inequality and Human Development
9. **Collaboration** : None
10. **Sponsoring Agency** : Tata Consultancy Services (TCS)

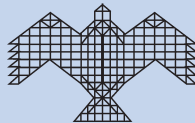
11. Abstract:

This paper is a conceptual review around the relationship between technology and inequality. It provides a review of the core themes that are associated with their relationship, underscoring the necessity to bring together two concerns: how we need to improve our understanding of inequality with respect to technology, and how we need to improve our understanding of technology in terms of inequality. It finally provokes a series of questions that are pertinent to get a grasp of the interface between technology, inequality, and development.

12. **Keywords** : Technology, Inequality, Socio-Technology, Agency, Digital Divide, Socio-Technological Inequality
13. **Security Classification** : Unrestricted
14. **ISBN** : None

NATIONAL INSTITUTE OF ADVANCED STUDIES

The National Institute of Advanced Studies (NIAS) was conceived and established in 1988 by the vision and initiative of the late Mr. J.R.D. Tata primarily to nurture a broad base of scholars, managers and leaders to address complex and important challenges faced by society through interdisciplinary approaches. The Institute also engages in advanced multidisciplinary research in the areas of humanities, social sciences, natural sciences and engineering, as well as conflict and security studies.



School of Social Sciences
NATIONAL INSTITUTE OF ADVANCED STUDIES
Bengaluru, India