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Digital Development

Working Paper Series

The Digital Development working paper series discusses the broad issues surrounding digital data, information, knowledge, information systems, and information and communication technologies in the process of socio-economic development

Paper No. 107

Theorising Digital Inclusion and Inequalities in ICT4D: Insights and Implications for Future Research

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Table of Contents

<i>Abstract</i>	1
A. Introduction	2
B. Methodology	3
<i>B1. Systematic literature review (SLR)</i>	3
<i>B2. Categorisation and coding</i>	6
<i>B3. Matrix development</i>	9
C. Analysis of literature (Part 1) - Conceptualisations of digital inclusion..	10
<i>C1. Digital inclusion as contingent on increased adoption, use and sustainability of ICTs across diverse contexts (40 papers)</i>	10
<i>C2. Digital inclusion as contingent on improved economic and human development outcomes across diverse contexts (18 papers)</i>	11
<i>C3. Digital inclusion as contingent on reflexive design and implementation practices (7 papers)</i>	12
<i>C4. Digital inclusion as contingent on addressing structural inequalities in attendant development processes (6 papers)</i>	13
D. Analysis of literature (Part 2) - Observations and knowledge gaps	15
<i>D1. A predominantly tech-centric, provision-focused worldview of digital inclusion, lacking an engagement with development outcomes</i>	15
<i>D2. A divide-led, exclusion-centric view of inequality dominates, with insufficient attention to processes of adverse incorporation (harms)</i>	16
<i>D3. A simplistic handling of context, with less focus on the role of power asymmetries in creating and maintaining differential advantages / disadvantages within and among groups</i>	17
<i>D4. Pathways to reduce structural inequalities remain under-developed</i>	18
E. Implications for future research	19
F. Conclusions	20
<i>Acknowledgements</i>	20
<i>References</i>	21
<i>Appendix 1 - Listing of articles and their classifications</i>	28

Theorising Digital Inclusion and Inequalities in ICT4D: Insights and Implications for Future Research

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2024

Abstract

Even though the field of ICT4D has had a long-standing interest in understanding the relationship between ICTs, inclusion, and inequality, the topic has not yet been reviewed systematically. Key knowledge gaps exist with respect to understanding what constitutes inclusion and inequality, the extent to which binary notions of the digital divide persist, the emerging contestations in this space, and the implications they have for future research and practice in the area of equitable digital futures. In response to this gap, this paper aims to provide a systematic and comprehensive review of the ICT4D literature on digital inclusion and inequalities, via a review of 71 articles on this topic.

Its main contribution is the development of a matrix through which the dominant conceptualisations of digital inclusion as they exist in ICT4D can be understood, their implications for knowledge and practice can be discussed, and priorities for future research can be identified. The matrix and the conceptualisations are expected to enable scholars, academics, and practitioners to reflect on where their work fits in relation to the contestations and debates that surround inclusion and inequalities, and to offer pathways to consider and develop alternate theorisations. Overall, the paper encourages a critique as well as a constructive re-imagining of what constitutes inclusion, and the practice of deploying ICTs for positive socio-economic impacts.

A. Introduction

The field of ICT4D (information and communication technologies for development) has had a long-standing objective of using ICTs to build a fairer, inclusive and more equitable world (Qureshi, 2016; Walsham, 2012). The “what” and the “how” of this, i.e., what constitutes inclusion and equity, and how this can be achieved, have been widely debated (Imran, 2023; Rothe et al., 2023; Sahay, 2016; Unwin, 2017). One of the long-standing debates relates to the inadequacy of academic theorisations in this space, with conceptions of inclusion relying on common sense or popular assumptions of what is desirable and how it can be achieved (e.g., short term gains such as productivity / efficiency), or becoming politically enmeshed with the success and failure of ICT4D projects (Avgerou, 2010; Hayes et al., 2013; Heeks, 2010; Thapa & Sæbø, 2014; Unwin, 2017).

More recently, the topic of inequities, i.e., the tendency of ICTs to amplify rather than mitigate inequalities, has received widespread attention (Chaudhuri, 2021; Mann, 2017; Masiero & Bailur, 2021), and in the particular context of the pandemic, called into sharp focus the intersectional nature of digital inequalities and the need to centre and examine them from and within pre-existing social structures of privilege and oppression (Zheng & Walsham, 2021). In a similar vein, relational theories of capabilities and social inclusion / exclusion (Zheng & Walsham, 2008), and critical theories of adverse incorporation (Heeks, 2022), and subalternism (Masiero, 2018) have challenged traditional instrumental notions of inclusion and inequalities, advancing more pluralistic, power-focused and decolonial conceptions that centre structural asymmetries and social injustices.

However, despite this evinced interest in understanding the relationship between ICTs, inclusion, and inequality, the topic is still argued to have not received adequate attention across academia, practice and policy alike (Imran, 2023; Rothe et al., 2023; Unwin, 2017). There is a sense that digital inclusion literature continues to remain narrow and siloed in its analysis of inequalities (Heeks, 2022), and that policy makers and practitioners lack the much-needed policy coherence to ensure that advancements in the digital realm do not increase inequalities for the most marginalised groups (Imran, 2023; Unwin, 2017). Overall, we seem to be missing a shared understanding of what constitutes inclusion and inequality, the extent to which the critical frames highlighted above are being adopted, the emerging contestations, and the implications they have for future research and practice in the area of equitable digital futures. This is a key knowledge gap, with potentially a lot at stake if it persists. With ICTs becoming implicated in inequality increases due to a growing understanding of their “dark side” (Masiero, 2023; Unwin, 2017), the shape of future ICT4D research in this space hinges on developing more nuanced and productive theorisations of the tensions they produce – i.e., simultaneous improvements and harms (Masiero, 2024).

Additionally, with increasing digitalisation of various development services such as health care, social protection payments, education, etc., equity in the digital realm is a central building block towards tackling inequalities as a whole, with calls to mainstream the issue of digital inequalities more explicitly in development policy and practice, in order to emphasise the vulnerable position of marginalised groups in a digital context (Imran, 2023; Rothe et al., 2023). Therefore, as we continue to debate use of theory in ICT4D (Sein et al., 2019; Thapa & Zheng, 2019), its conceptualisation of development (Chipidza & Leidner, 2019; Zheng et al., 2018) its reflexivity and criticality (De et al., 2018; Schelenz & Pawelec, 2022), and indeed

even its relevance as a field (Masiero, 2022), it would be remiss not to focus on inclusion and inequalities as concepts that have underpinned and shaped many of these debates, either implicitly or explicitly. A systematic and comprehensive understanding of the debates in this space can enable ICT4D academics to build on and contribute to further research on equity and inclusion, and guide development policy makers and practitioners working to advance equitable digital futures.

This paper attempts to address this knowledge gap through a review of the ICT4D literature on digital inclusion and inequalities. The two primary questions it aims to answer are - What are the dominant conceptions of digital inclusion in ICT4D / digital development? What implications do these conceptions have for theorising inequalities and inequality reduction pathways? An important contribution of this paper is the development of a matrix through which the dominant conceptualisations of digital inclusion as they exist in ICT4D today can be understood, and their implications for knowledge and practice in relation to enhancing equity, including priorities for future research, can be discussed. The matrix and the conceptualisations are expected to enable scholars, academics, and practitioners to reflect on where their work fits in relation to the contestations and debates that surround inclusion and inequalities in ICT4D, hopefully offering pathways to build on their thinking and to consider and develop alternate theorisations.

The rest of the paper is organised as follows. Beginning with a description of the methods used in conducting the literature review and data analysis, including the development of the matrix, it presents a description of four dominant conceptualisations of inclusion that emerge from the matrix. This is followed by a summary of the key observations and the knowledge gaps deriving from analysis of the literature, and a discussion on their implications for future research priorities, after which concluding remarks are provided.

B. Methodology

B1. Systematic literature review (SLR)

Since one of the objectives of this review is to find out what is already known about digital inclusion and inequalities and build a foundation for advancing knowledge, the SLR was considered to be an apt methodological choice (Levy & Ellis, 2006; Webster & Watson, 2002). A systematic literature review, as defined by Okoli (2015) is “a systematic, explicit, [comprehensive,] and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners”. The SLR for this paper adapted the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) protocol (Moher et al., 2009). Because ICT4D lies at the intersection of several disciplines (Walsham, 2017), a multidisciplinary literature review may generate insights of the phenomenon that are less likely to be uncovered by focusing only on ICT4D-specific journals. Additionally, due to the theoretical focus of the paper, the search was carried out on academic databases – this would decrease the chances of grey literature, such as project reports or policy briefs, appearing in the search. Two academic databases - Web of Science and Scopus - were chosen for the search because they are the most widespread databases on different fields, covering a range of scientific disciplines (Joshi, 2016). The search method thus sought to obtain a good yet manageable sample of

academic ICT4D articles across disciplines such as development studies, information systems, media and communication studies, human-computer-interaction, sociology and anthropology.

An automated keyword search was used to retrieve articles from both databases. On Scopus, the search was performed using the operator “article title, keyword, and abstract”, which ensures that either the title, author keyword(s), or abstract of the retrieved articles would include the keyword(s) specified. On Web of Science, the operator “topic” was used, which searches the title, abstract, keywords plusⁱ, and author keywords. Two search strings were developed for the purpose of the search. In order to ensure relevance of the search to the field of ICT4D, the first search string used the words ICT4D, ICTD, and “digital development”, with digital development representing the recent terminology describing the relation between ICTs and development (Heeks, 2020). The second search string used the words inclusion, and two synonyms of inclusion - equality and equity, in order to ensure that the primary focus of the paper was related to the topic of inclusion. Additionally, Boolean operators AND and OR were used to reduce the time required in screening irrelevant sources.

The search strings along with the Boolean operators used are outlined in Table 1.

Search strings	
Scopus	Str1: in "article title, abstract, keywords": "ICT4D" OR "ICTD" OR "Digital Development" AND Str2: in "article title, abstract, keywords": "Inclusion" OR "Equity" OR "Equality"
Web of Science	Str1: in "topic": "ICT4D" AND "Inclusion" OR "Equity" OR "Equality" OR Str2: in "topic": "ICTD" AND "Inclusion" OR "Equity" OR "Equality" OR Str3: in "topic": "Digital Development" AND "Inclusion" OR "Equity" OR "Equality"
Screening criteria	
1	Must focus only on Global South countries.
2	Must have primary data – defined as data that has been generated by the researcher themselves through qualitative or quantitative data collection tools.
3	Must have at least one keyword match in each string as per the below: Str1: in "article title, abstract, author keywords": "ICT4D" or "ICTD" OR "Digital" AND Str2: in "article title, abstract, author keywords": "Inclusion" OR "Equity" OR "Equality"

Table 1: Search strings and screening criteria

A total of 280 articles were identified through this search. In the first step, the corpus was screened for duplicates, non-English articles, abstracts-only of conference proceedings, and articles whose full-text copies were not accessible. This resulted in the removal of 98 articles. In the next step, three screening criteria were used for further shortlisting, as summarised in Table 1. The first criterion included a focus on the Global South countries, given that this has historically been, and continues to be a critical focus area of ICT4D (Masiero, 2022). Therefore, papers that focused on the Global North, or both the Global South and Global North, were not included. In order to identify the list of eligible countries, the full Development Assistance Committee (DAC) listⁱⁱ was used, but the corpus did not

ⁱKeywords Plus is unique to Web of Science and consists of words and phrases harvested from the titles of the cited articles.

ⁱⁱThe DAC List shows all countries and territories eligible to receive official development assistance. These consist of all low- and middle-income countries based on gross national income per capita as published by the World Bank, with the

include any European countries and thus stays true to its intended focus of Global South countries. The second criterion related to methods of data collection – only articles that used primary data collection methods, defined as data that has been generated by the researcher themselves through qualitative or quantitative data collection tools, were included. While articles containing secondary data may have provided some additional information, given that the focus of such papers tends to be on synthesis and analysis of existing data and evidence rather than developing theorisations based on original data, they were seen as less relevant to this paper in comparison with articles that generated primary data, and hence they were not included.

The third criterion related to keyword match in each search string. Only articles that had keyword matches of at least one keyword in each search string were included. For example, if an article had a keyword match in title, abstract, or author keyword for ICT4D in search string 1, but did not have a corresponding keyword match for “inclusion”, or “equity” or “equality” in search string 2, it was excluded. This ensured that only articles that were relevant to the field of ICT4D and were inclusion- / equity-focused were included. In the final step, the screening criteria were applied to all the retrieved articles, resulting in the removal of 108 articles, and a final shortlist of 74 articles. During the subsequent full screening of articles, three more were excluded because – despite meeting the criteria above – their actual content and focus was not related to ICTs and inclusion. The total corpus that was analysed thus consisted of 71 papers. Figure 1 details the stages from identification to inclusion.

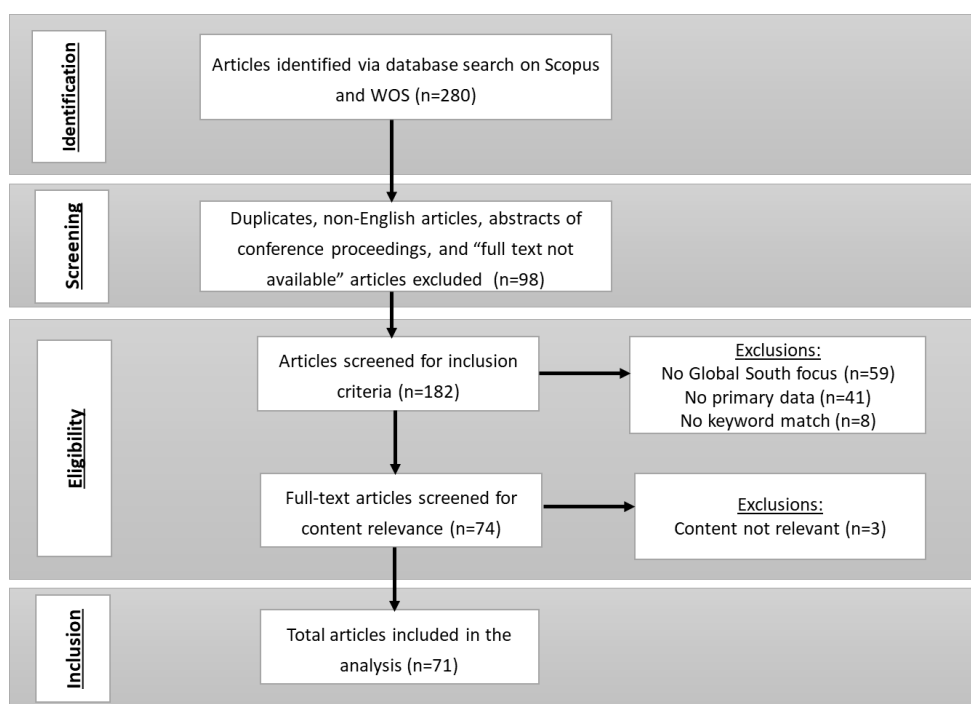


Figure 1: Flow chart of steps from identification to inclusion of articles (adapted from the PRISMA protocol)

exception of G8 members, EU members, and countries with a firm date for entry into the EU. It is available on - <https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/DAC-List-of-ODA-Recipients-for-reporting-2024-25-flows.pdf>

The search strings and the screening criteria used reflect a specific set of decisions that were made in order to produce a corpus that is comprehensive, relevant and reproducible. As is the case with all literature reviews, there is a risk that potentially relevant articles are excluded, and this process does not claim to be an exhaustive review of the literature. However, despite these limitations, the selected articles provide a good summary of the literature and a valuable starting point for advancing knowledge on this topic.

B2. Categorisation and coding

Based on a full reading of the 71 papers, in step one, a coding schema was drawn out inductively and two axes were developed for categorisation of articles - “ICT4D value-chain” and “Conception of inequality”.

Categorising articles by “ICT4D value-chain” – This axis aimed to assess the primary focus area of the papers based on the ICT4D value chain developed by Heeks (2018). In order to develop the dimensions of this axis, a two-step process was followed. In the first step, all 71 papers were classified into three categories as belowⁱⁱⁱ :

(i) Design and implementation (16 papers) – Papers that were primarily focused on the design and implementation of ICTs were classified under this category. *The primary objective of these papers is to understand the relationship between design and implementation paradigms and practices and digital inclusion – i.e., how and to what extent they influence inclusion.* Examples of these would be Montero and Kapinga (2019) who explore the process of co-designing a mobile phone application for women entrepreneurs from rural Tanzania, and Shroff and Kam (2011) who examine a technology-enabled design model for non-government organisations to include and engage with women in low-income communities. On the ICT4D value-chain, this category corresponds to the “availability” stage.

(ii) Adoption, use and sustainability (38 papers) – Papers that were primarily focused on the factors that shape the adoption, use and sustainability of ICTs across individuals, groups and / or communities were classified under this category. *The primary objective of these papers is to understand the relationship between available technologies and extent to which they can be used and sustained across diverse users and contexts, the assumption being that digital inclusion is realised through an increase in adoption, use and sustainability of ICTs.* Examples of these would be Pal (2006) who examines the social factors affecting the uptake of computer-aided education in schools and provides insights towards improving equity in technology adoption and use in rural India, and Lesame and Seti (2014) who examine the use and sustainability of telecentres in East Africa in order to provide pathways for enhancing digital inclusion of rural communities. On the ICT4D value-chain, this category corresponds to the “uptake” stage.

(iii) Outputs and development impacts (24 papers) – Papers that were primarily focused on explicating effects – be it at the level of outputs in terms of shifts in behaviours, systems, and processes, or at the level of broader development impacts such as entrepreneurship, gender equality, etc. were categorised under this category. *The primary objective of these papers is to understand the effects of ICT provision in different contexts, and whether or to what extent these could be understood as constituting inclusion.* Examples of these would be

ⁱⁱⁱ 7 papers were classified in both category 1 and category 2 because they had an equal focus on both.

Poveda (2016) who examines how a digital inclusion programme shapes critical thinking skills, and Malik and Wahaj (2019) who examine the impacts of a digital platform on women’s empowerment and entrepreneurship. On the ICT4D value-chain, this category corresponds to the “impacts” stage.

In the second step, these three categories were further collapsed to present two dimensions of the axis – “provision-focus” and “impact-focus”. This was done in order to assess the extent to which the articles in the corpus were focused on studying “impacts”, which is expected to form a key element of ICT4D studies of inclusion. The two dimensions are highlighted below.

Provision-focus (47 papers) - Papers in Category (i) and Category (ii) were clubbed together to form this category, because of their primary focus on provisioning, i.e., ensuring adequate supply (availability) and demand (uptake) of ICTs, as opposed to understanding what their impacts were.

Impact-focus (24 papers) - Papers in Category (iii) were classified as “impact-focus” papers because of the more explicit connections they make between ICT implementation and its impacts on various economic / social domains.

Figure 2 depicts the process followed in categorising articles as per the ICT4D value-chain.

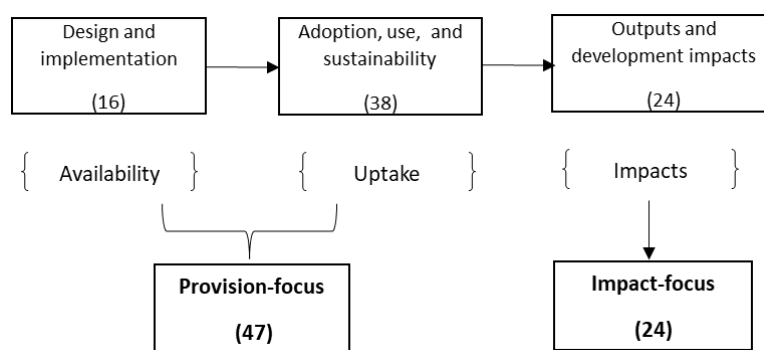


Figure 2: Categorisation of articles based on “ICT4D value-chain” (Heeks, 2018)

Categorising articles by “Conception of inequality”- This axis aimed to assess the extent to which binary, divide-led views of inequalities had evolved to take on more relational and intersectional framings that centred power relations and asymmetric social hierarchies. In order to make this assessment, two dimensions were developed – “divide-centric” and “power-centric”. All 71 articles were then coded into one of the two dimensions.

Divide-centric (58 papers) – Papers that primarily viewed inequalities as stemming from the inability or constraints that a specific group faces in accessing and using ICTs, i.e., groups as being “excluded” in some way (have-nots), in relation to another group that presumably does not face similar constraints (haves), were classified as “divide-centric”. For example, Dasuki & Effah (2022) explain that internally displaced people (IDPs) tend to experience heightened vulnerabilities due to lack of access to basic amenities and marginalisation by their governments. They examine the extent to which mobile phones can mitigate this, i.e., enable them to participate in social, economic, cultural, and political activities, thereby shaping their experience of social inclusion. This would constitute a divide-led view, IDPs as an “excluded” population (as compared to non-IDPs), and the extent to which they can /

cannot use mobile phones in order to be “included” into social / economic / political systems.

Power-centric (13 papers) – Papers that primarily viewed inequalities as arising from asymmetric social hierarchies and other power structures in ICTs and ICT4D interventions were classified as “power-centric”. Unlike the papers holding a divide-centric view, these papers do not frame and compare populations as have vs have-nots based on their ability to access or use technology. Instead, they examine the relationships between various groups engaging with ICTs and ICT4D interventions (e.g., designers, developers, intermediaries, beneficiaries), asking critical questions in relation to “who” benefits from inclusion into these tools and interventions. In this view, inequality is not necessarily created by “excluding” groups (and therefore depriving them of something), but by asymmetric power relations between groups that engage with ICTs and ICT4D interventions, as a result of which the more powerful groups are able to derive a higher share of benefits as compared to less powerful groups (Heeks, 2022).

For example, McCampbell et al. (2022) study the design and implementation of an app-based agricultural extension service that provides disease management information to farmers. They report that while participatory methods “include” farmers in the design of the app, they do not alter their position as the least powerful group in comparison with professionals such as designers, or individuals belonging to donor organisations that are funding the app. They argue that farmers have no access to their farm data once it is shared and are able to exercise little control over its eventual use. On the other hand, the more powerful groups (designers, funders) have full control over key design decisions, including access to data that could potentially be used for both surveillance as well as performance reporting, without the farmers’ knowledge, consent, or capacity to make claims to such data. This would be a power-centric view, i.e., inequality as stemming from unequal access to and control over design decisions and data between technology designers and users.

Figure 3 depicts the outcome of categorising articles as per their “conception of inequality”.

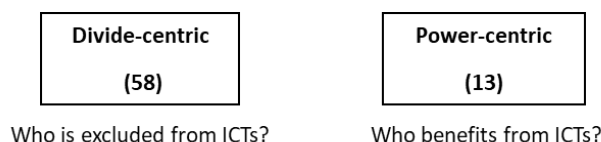


Figure 3: Categorisation of articles based on “conception of inequality”

The classification of all 71 articles on both the dimensions is provided in Appendix 1.

B3. Matrix development

In the final step, based on their dimension on each axis, all papers were plotted into a matrix that produced four categories (Table 2).

	ICT4D value-chain	Conception of inequality	No. of articles
Category 1	Provision-focus	Divide-centric	40
Category 2	Impact-focus	Divide-centric	18
Category 3	Provision-focus	Power-centric	7
Category 4	Impact-focus	Power-centric	6

Table 2: Matrix of four categories

Category 1 is made up papers that fall into the provision-focus, divide-centric category, i.e., they predominantly focus on the factors that shape the availability and uptake of ICTs in relation to populations that are considered “excluded”. Category 2 is made up of papers that fall into the impact-focus, divide-centric category, i.e., they predominantly examine impacts of ICTs in relation to populations that are considered “excluded”. Category 3 is made up of papers that fall into the provision-focus, power-centric category, i.e., they predominantly focus on factors that shape the availability and uptake of ICTs in relation to “who benefits”, i.e., uneven power relations and social hierarchies. Category 4 is made up of papers that fall into the impact-focus, power-centric category, i.e., they predominantly examine the impacts of ICTs in relation to “who benefits”.

Based on the categorisations on this matrix, four conceptualisations of digital inclusion were developed (Figure 4), which are elaborated on in the next section. Even though these conceptions emerge from different categories on the matrix, the aim is not to present them as rigid typologies, but to use them as frames of reference to highlight some of the key differences in the arguments made across each category that result from taking, often more implicitly, particular views about the mechanisms and processes that shape the relationship between ICTs and inclusion.

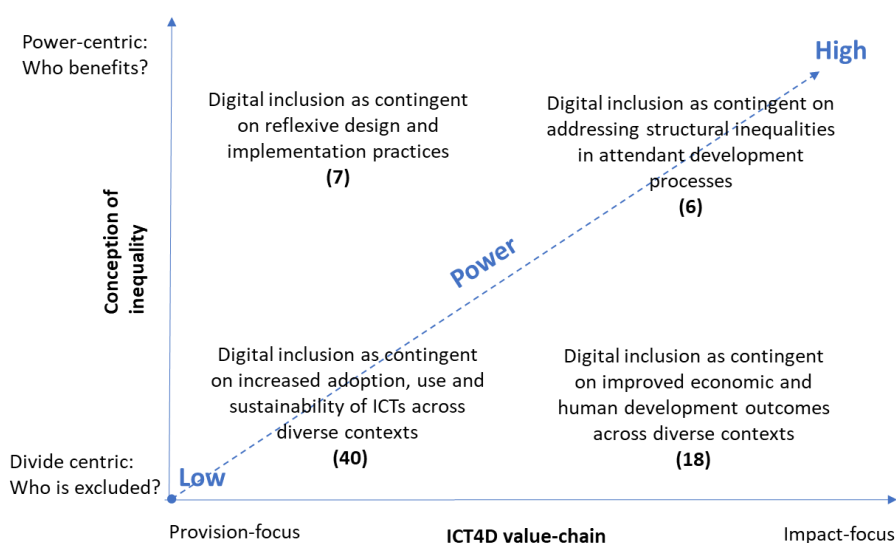


Figure 4: Conceptualisations of digital inclusion

C. Analysis of literature (Part 1) - Conceptualisations of digital inclusion

C1. Digital inclusion as contingent on increased adoption, use and sustainability of ICTs across diverse contexts (40 papers)

This is the dominant conceptualisation of digital inclusion, with roughly 56% of papers espousing this view. It represents the classic “connecting the unconnected” view, which focuses on enhancing the provision of ICTs to groups that are considered as “excluded”. The underlying logic in support of this position rests on the belief that by rectifying the inequities in the diffusion of ICTs between the “developed” and the “developing”, broader social and economic inequalities may also be addressed (Brown & Grant, 2010). Indeed, many papers aimed to fill a knowledge gap that was explicitly informed by a “bridge the gap” view – i.e., the idea that we need a better understanding of ICT use and adoption in hitherto unexamined settings or neglected user groups (Walsham & Sahay, 2010). Papers in this category frame inequalities through the language of absences (Irani et al., 2010) – i.e., “unavailability” / “underutilization” / “unsustainability” based on constructs of constraints and barriers in relation to factors such as gender norms (Ibtasam et al., 2018), perceived usefulness and ease of use of specific technologies (Wibella et al., 2018), lack of digital literacy, skills and capacities (Islam & Inan, 2021; Mawela & Ochara, 2013), difficulties in learnability (Ibtasam et al., 2017), and unsustainable business models (Bon et al., 2020; Rangaswamy, 2008).

This view tends to regard ICTs as a modernising force that will permit “excluded groups” to leapfrog into the digital economy, and ICT4D itself as a project of steering developing countries towards better futures (Heeks, 2002). Implicit here is the idea that global practices can be transposed into and adapted for local needs, with inclusion seen as contingent on the extent to which these adaptations are successful (Avgerou, 2010). Papers in this category often develop explanations for why such adaptations have succeeded or failed, in the form of lessons learnt from participatory design sessions (Montero & Kapinga, 2019), evaluations of failed and successful ICT programme implementations (Brown & Mickelson, 2019; Pal, 2006; Unnikrishnan et al., 2016), prototype testing and feedback (Ghosh, 2012; Isa et al., 2014), etc., sharing a common belief that when seeded appropriately in local contexts, ICT4D can reduce inequalities.

Frequently, papers in this category attribute some form of causal logic to ICTs and their ability to produce change – this may be an explicit expression or a tacit assumption, producing varying degrees of determinism. For example, Erlich et al. (2018) argue that engineering decisions on channel and platform choices are fundamental to the reach, access and sustainability of digital interventions, and describe how their choice of a designing and deploying a multi-channel platform for opinion polling facilitated inclusion of under-represented user groups. Similarly, Wang & Singhal (2018) explicate the potential of IVR (Interactive Voice Response) as a democratising communication and social change tool. Both these papers can be considered closer to “hard-line” techno-determinism, i.e., the idea that certain effects (inclusion / equity in this case) inevitably follow from the introduction of certain technologies (Avgerou, 2017). On the other hand, Perrier et al (2018), Okeke et al (2019) and Peterson et al (2020) – all of whom examine the potential of ICTs to produce

equitable health outcomes - can be considered closer to “soft-line” determinism because of their sensitivity to and caution in acknowledging a range of socio-cultural considerations in health care that could potentially both impede and aid these objectives, i.e., they recognise that ICTs are important, but may not be the only determinant of inclusion or equity.

On the whole though, these differences notwithstanding, papers in this category share a normative belief in the fundamental goodness of both ICTs and inclusion, i.e., ICTs are seen as having transformative potential and inclusion is seen as a state that developing countries or marginalised contexts should aspire for. There is an often implicit or sometimes explicit assumption that technology adoption and diffusion is social progress in its own right, and as such investments in ICT infrastructure would be seen as foundational to reduce inequalities, justifying any potential opportunity costs associated with challenging scarce development funding and resources in this direction (Brown & Grant, 2010).

C2. Digital inclusion as contingent on improved economic and human development outcomes across diverse contexts (18 papers)

This is the second major conceptualisation of digital inclusion, with nearly 25% of the papers adopting this view. Papers in this category also study groups through the lens of “exclusions” but extend their analysis beyond provisioning of ICTs, seeking to understand its effects on these groups, and whether / to what extent these could be understood as constituting inclusion. Like papers in Category 1, they adopt a language of absences to frame inequalities, but this is usually linked to lack of some capacity, with inclusion then seen as contingent on the extent to which ICTs enable these capacities to be realised (impacts). These capacities typically link to short- and medium-term development goals (Zheng et al., 2018). For example, six papers in this category examine “freedom to exercise choice”, as a key human capacity required for inclusion to materialise (Bisht & Mishra, 2016; Dasuki & Effah, 2022; Eskelund et al., 2019; Joia & Giarelli, 2023; Msendema & Nyirenda, 2019; Poveda, 2016). Using Amartya Sen's Capability Approach, they study the extent to which ICTs enabled such freedom across multiple realms – be it in financial choices and wellbeing, social connection outcomes, or critical thinking skills.

This is also a view that aligns technological diffusion with social and / economic progress. To some extent, this would correspond to the belief in the modernising potential of ICTs held by papers in Category 1, the key difference being that papers in this category are more cautious in assuming that such potential can always be realised, in terms of both the ways in which inequalities are impacted and the extent to which they can be reduced. Therefore, they are likely to regard papers in Category 1 as being narrow, top-down, and technocentric in their framing of inclusion. In order to emphasise how inclusion actually materialises on the ground, many papers in this category adopt epistemological positions that privilege interpretive and meaning-making processes. For example, Vannini et al. (2015) use the theory of social constructions of meanings to emphasise the role of Community Media Centres as a symbol of social recognition for the communities in Mozambique within which they operate, and their importance in fostering inclusion. Similarly, Straubhaar and Davis (2018) draw upon music training programmes developed by Afro-Brazilian activists Salvador, as a strategy for connecting training in musical production with computer skills. They argue that for Afro-Brazilian young people, learning how to create music provides a sense of cultural identity and consciousness that helps them then move into learning about

technology. By doing so, the authors emphasise the importance of strengthening racial identity and pride as a key component of digital inclusion.

While papers in this category do not necessarily challenge the modernisation potential of ICTs, unlike papers in Category 1, they are less likely to assume that modernisation will simply follow from local adaptation, and more likely to argue that the form and processes of technology-enabled change are worked out through a more complex navigation of the prevailing social, economic and political orders, determining both the direction of change and the experience of inclusion. Therefore, keeping in mind that these orders often do not keep pace with the rate of technology transfer and diffusion, they account for the likelihood of not realising the full impacts of its modernisation potential. For example, Dasuki and Effah (2022) find that despite the widespread use of ICTs amongst internally displaced people (IDPs) in the Global South, the lack of institutional support regimes, particularly compared to the Global North, emerges as a key inequality, impacting the socio-economic stability of IDPs and the corresponding capacity to harness ICTs for social inclusion. Similarly, Prado (2017) finds that when the “right to communicate” is not embedded within the institutional structures that surround news and media practices, citizen journalists reporting from marginal locations in the Global South cannot participate on equal terms with their Global North counterparts. However, for the most part, papers in this category do not doubt that these inequalities can be reduced, nor do they question the fundamental promise of inclusion offered by ICTs. Taking a “progressive” view of ICTs and their potential (Avgerou, 2010), they offer a more prescriptive exercise of understanding “how” to maximise the technology’s developmental benefits (Brown & Grant, 2010) as a key pathway to inequality reduction.

C3. Digital inclusion as contingent on reflexive design and implementation practices (7 papers)

This is the third conceptualisation of digital inclusion, with close to 10% of the papers adopting this view. This category has a primary focus on provisioning of ICTs but is attentive to “power” i.e., it asks critical questions in relation to the interests of those who design or control the design of ICTs and ICT4D interventions. Papers in this category frame their arguments through the lens of power and politics – i.e., they recast the socio-technical assemblages of the ICT4D intervention / ICT artifact as hierarchies and unequal power structures that lead to inequitable benefits. For example, Dearden and Tucker (2016) use the term “bungee research” to highlight the asymmetrical nature of the relationship between researchers and communities, where privileged external researchers participate in community development interventions, largely in the form of short visits to gather data, which they then convert to a knowledge output that furthers their own careers, while communities themselves do not experience any sustainable change. Brand and Schwittay (2006) similarly argue that such research is a particular feature of corporate-led community-centred projects where technology developed in the western world is transported from predominantly western researchers into local contexts that actually have no need for it, in effect leading to what Irani et al. (2010) call “the solution in search of a problem”. For both these papers, as with other papers in this category, the conception of inequality does not hinge on any “exclusion” parameter in relation to unavailability of ICTs, or lack of capacities (as espoused by papers in Category 1 and Category 2) but on a value-centric parameter, i.e.,

a more powerful group (corporate staff, Western researchers) being able to derive a larger share of benefits in comparison with a less powerful group (the local communities).

This view accepts the logic that design and implementation practices have implications for “inclusion”, however it is likely to challenge notions of “modernisation” or “local adaptations” (usually represented as Western paradigms being parachuted into non-Western contexts), tending instead, to view all design and implementation practices as culturally located and power laden, and therefore complicit in setting the standards of marginalisation, inequalities, and exclusion. For example, Hussen et al. (2016) argue that notions of gender gap in women’s participation in ICTs are often informed by gendered notions of what constitutes work. In their study of a telecommunications co-operative in an indigenous community in east Africa, they found that while women rarely attended meetings / workshops or voiced their views on key decisions relating to the telecentre, they continued to play an important “behind-the-scenes” role in sustaining the activities of the telecentre – e.g., charging phones, providing customer service, collecting fees, etc. They argue that in concluding that women are not participating in the telecentre project as much as their male counterparts, the project staff privileged the more “visible” labour performed by men and neglected the “invisible” labour performed by women, thus reinforcing and perpetuating existing inequalities in gender norms.

While papers in this category reject the notion of modernisation as implied in Categories 1 and 2, they believe in the transformative potential of technology and design. They re-imagine ICT4D through theoretical frameworks like design justice (Costanza-Chock, 2018), feminist HCI (Bardzell, 2010), and postcolonial computing (Irani et al., 2010) in order to centre knowledge from the margins and visibilise under-represented objects or subjects. For instance, Tushar et al. (2020) advocate for a shift in ICT4D to view populations dealing with stigmatised health conditions, not as victims, but as empowered individuals capable of amplifying their collective voice through technology. They propose this approach as a form of “counter-surveillance” against those perpetuating stigma. Similarly, Ahmed et al. (2016) argue that achieving gender equality in computing involves not only increasing female representation but also feminising these spaces by valuing traits like repair, rework, and care alongside traditionally masculine values like scale and efficiency. Both Ahmed et al. (2016) and Tushar et al. (2020) make the case for inclusion as a justice-enacting process that challenges existing power inequalities and reshapes the epistemic terrain on which ICTs are constructed.

This is a “critical” view of inclusion – one that challenges the dominant social, political orders that inscribe inequalities and injustices into technologies. It rejects notions of the fundamental goodness of ICTs, seeing them instead as political artifacts imbued with competing interests. It offers a lens to reduce inequalities not through incremental diffusion of ICTs, or by maximising its development potential (as papers in Category 1 and 2 would suggest), but through approaches that recognise the liberating power of design in countering the oppression that technology presents (Masiero, 2023).

C4. Digital inclusion as contingent on addressing structural inequalities in attendant development processes (6 papers)

This is the fourth and final conceptualisation of digital inclusion, with 8% of the papers adopting this view. This category is not only attentive to questions of “value” (i.e., who

benefits), but also examines these questions in the realm of broader development impacts such as poverty, education, and gender / class inequalities. Like papers in Category 3, papers holding this view frame their arguments through the language of power and politics, however their theoretical frameworks tend to borrow from the fields of political economy, platform capitalism, surveillance capitalism, etc., to surface the political and economic dimensions of the development process itself, and the contradictory, often conflicting outcomes it produces (Avgerou, 2010). For example, Siqueira et al. (2023) situate their analysis of a social fintech platform within the political economy of venture capital funding for large data-driven business models, and argue that contrary to the perception that fintech platforms create value that is neutral and beneficial for everyone in the ecosystem, in the context of increasing financialisation of development, it is the fintech platform and its investors who derive a disproportionate share of value because of their ability to control and access vast amounts of micro-entrepreneurs' data on the platform. They show how fintech's wealth accumulation strategies build off the potential of alternative credit scoring models to "include" micro-entrepreneurs into debt cycles that they cannot get out of, forcing them to stay poor, and therefore socially "excluded".

This is a view that contests the even nature of development and is likely to be sceptical of both the ICT-led vision of socio-economic progress that is shared by papers in Category 2, and the design-led vision of justice and transformation that is shared by papers in Category 3. Both these views would be regarded as inadequate because they do not address the more deep-seated inequalities in the structures and processes of development through which conditions of marginalisation and oppression are maintained. For papers in this category, these include but are not limited to, neoliberal commercial logics masquerading as "pro-poor" intent in the delivery of ICT solutions (Kawlra, 2013; Siqueira et al., 2023), state surveillance and datafication agendas recast through contemporary digital financial inclusion programmes (Krishna, 2021; Singh & Jackson, 2017), and gaps in the provision of formal education proxied through ICT vocational training initiatives (Sarkar, 2018).

This contested nature of inclusion is the central argument (and finding) of all papers in this category, and indeed another way in which they starkly differ from the impact-focused Category 2 papers – i.e., this is a view which assumes that inclusion is least likely to materialise under the current economic / political regimes. Here, it comes close to the critical view espoused by papers in Category 3, however, this would qualify as a more structural critique of the development paradigm as a whole, i.e., ICTs as operating within the power structures of the market and / or the state, and therefore as least likely to serve the interests of the most marginalised (Heeks, 2018).

What follows then is an argument for more fundamental / transformational shifts in development structures as a pathway to reduce inequalities. For example, Sarkar (2018) points to the need to strengthen formal education and employment structures as a way to improve social and economic mobility, rather than a pure ICT-led focus, warning that the latter risks becoming a red herring in development. Krishna (2021) offers conceptual framings of justice as a way to re-theorise and study the Indian ID system, Aadhar, as a tool for digital financial inclusion, suggesting that this could be the starting point of envisaging more fundamental structural pathways for change.

D. Analysis of literature (Part 2) - Observations and knowledge gaps

What do these conceptualisations tell us about the state of prevailing theorisations of ICTs, inequalities and inclusion, and the issues they represent for ICT4D? This section presents a summary of the observations and the corresponding knowledge gaps that emerge from an analysis of the four conceptualisations, establishing a base for a future research agenda on this topic.

D1. A predominantly tech-centric, provision-focused worldview of digital inclusion, lacking an engagement with development outcomes

Roughly two-thirds of the papers (66%) were in the provision-focused category, i.e., they focus on issues of ICT provision “in” developing countries as opposed to understanding the issues as they relate directly “to” development impacts (Brown & Grant, 2010). From the perspective of these papers, the dependent variable or “effects” of technologies, are often measures of technology availability, adoption, use or sustainability – while the actual practices that they wish to transform are either peripheral to the analysis, or are assumed to take place automatically. For example, both Wang & Singhal (2018) and Seth (2019) provide statistics of usage, participation and engagement with the IVR tool, but they do not sufficiently engage with the extent to which community participation with the tool was able to transform gender-based norms or civic governance processes respectively.

From an ICT4D perspective, this can be problematic on two counts. Firstly, adoption and engagement with technology says little about its propensity to reduce inequalities (Thapa & Zheng, 2019). Secondly, conflating inclusion with the provision and uptake of technologies, appropriately designed and context sensitive as they may be, conceals the complex ways in which inequalities are created and sustained, narrowing the solution space in development to a tech-first approach. To continue the example cited above on the use of IVR for shifts in gender-based norms, it may certainly be the case that IVR affords more possibilities for marginalised populations to have their voices heard and concerns represented. However, not only is there no causality between participation in the tool and gender equality (which is the outcome that would be of interest to the ICT4D community), there is also a larger fundamental problem of pre-supposing a technical rationality to a problem that is fundamentally structural. For example, is gender-based violence better addressed by investing in IVR-based hotline support for reporting and redressal, or by strengthening women’s economic positions through cash transfer programmes, or through legislation surrounding marital rape? Each of these pathways point to how issues of gender violence intersect with several socio-economic and institutional variables in ways that are not reducible to or have little to do with ICT-based solutioning.

The intention in making this argument is not to suggest that papers espousing these views are naïve about the complexities of socio-economic orders, or techno-deterministic about the emancipatory potential of technologies. On the contrary, many papers espousing this focus are careful to elucidate the socio-technical nature of change, remain astute about its appropriations, and recognise the complex, multifaceted, even contentious nature of the IT-user relationship (see Seth 2019). Many, as evidenced by the views in Category 3, also note how technology tends to become a recalcitrant ally to unequal structures of dominance and

oppression, often producing effects exactly the opposite of what it was intended for; by amplifying inequalities or by causing active harms (Ahmed et al., 2016; Hentschel et al., 2017). This notwithstanding, the point being made here is that an understanding of inclusion that restricts its imagination to the rather slim space of technology-user adoption and engagement and does not explicate its broader impacts for the individual, communities, or society is insufficient from a development perspective, not least because it precludes the possibility of accepting that ICTs may have only some (but maybe no) role to play in inclusion (Bon & Akkermans, 2019).

D2. A divide-led, exclusion-centric view of inequality dominates, with insufficient attention to processes of adverse incorporation (harms)

ICT4D literature continues to demonstrate a high prevalence of “exclusionary” views in framing inequalities, with roughly 82% of the papers falling in the divide-centric category (Categories 1 and 2). The endurance of this classic divide-led view, and indeed, even its continued importance to ICT4D is reflected in the fact that nearly 50% of these papers have been published in the last five years (from 2019 onwards). While exclusion worldviews serve the purpose of expanding the breadth of domains / contexts of ICT4D use and impacts, theorisation of inequalities solely based on such views overlooks the idea that for many of these marginalised groups, inclusion into digital systems is exactly what creates the conditions of marginalisation in the first place, because they are forced to join and remain locked into such systems, leading to what Heeks (2022) calls “adverse digital incorporation”. As many essential services such as identity verifications, food provisioning, humanitarian aid, etc., are increasingly being delivered through digital infrastructures, the risks that could potentially ensue from data-based profiling, including surveillance, state violence, legibility, etc., are now widely recognised (Masiero, 2023). Ironically, even “exclusion” is no longer an option, as in the case of India’s biometric identification system Aadhar that denies food welfare provision to those without an Aadhar ID (Drèze et al., 2017).

Therefore, simply put, a view that restricts itself to emphasising the emancipatory potential of digital technologies to produce improved socio-economic and human development outcomes (papers in Category 2) for, say, a dispossessed farming community, or refugees displaced by war, if bereft of questions of value, i.e., data injustices (Heeks & Shekhar, 2019; Taylor, 2017), is unlikely to be able to come up with an adequate understanding of the full realm of digital impacts, and indeed, who really benefits from digital inclusion. ICT4D is not any more primarily a science of how ICTs can foster development, it is also a science of how the very same technologies can hinder it, producing negative effects that harm the same recipients for whom the production of benefits was intended (Masiero, 2023; Qureshi, 2023). Orthodox frames such as “connecting the unconnected” or “improving economic and human development outcomes” say little about structural improvements to the human condition, an area which is key to inequality reduction, and one in which ICTs have largely failed to deliver (Unwin, 2017).

D3. A simplistic handling of context, with less focus on the role of power asymmetries in creating and maintaining differential advantages / disadvantages within and among groups

Most papers in the SLR were careful to situate their studies in the specific contexts within which ICTs are embedded. Whether in relation to religion and culture-based practices (Elnaggar, 2008; Ibtasam et al., 2018; Ibtasam et al., 2019), economic and financial systems (Biyela et al., 2019), or geographical and political influences (Dunn & Samuels, 2017; Joia & Giarelli, 2023), papers aimed to address early concerns from Information Systems literature that highlighted the a-contextual nature of ICT research, and the need to adopt more socially embedded approaches to ICT-led development (Avgerou, 2010). However, such accounts tend to largely limit themselves to a description of the various socio-economic, spatial or socio-political attributes of contexts, and only go so far as to explain how these produce differences in the adoption, use and impacts of ICTs. As such they tend to be less helpful in understanding the processes through which inequalities are constituted and maintained. Fundamentally speaking, as Zheng and Walsham (2021) argue, inequality needs to be understood in relation to asymmetric socio-economic structures and varying positionalities within these structures.

What is needed therefore, is to identify and explain the workings of the specific processes in the context through which these asymmetries are generated or maintained. For example, in Sarkar (2016), where the experiences of marginalised Muslim women who participated in computer training were examined (Category 4 paper), the context of “Seelampur” was not just analysed in terms of its socio-economic and spatial attributes (i.e., as an urban informal settlement in India) but in terms of the processes through which it participated in the ICT led-development paradigm. Sarkar explains that the ICT model of computer training used the religious, classed, and gendered attributes of Seelampur to construct and diffuse a specific identity category of “computer girls of Seelampur”, which served the dominant trope of empowering poor Muslim women through ICT training. This trope, she argues, helped sustain private-public partnerships in this space, and boosted a neoliberal market agenda, while women themselves continued to be disadvantaged structurally due to the lack of access to social capital for job market participation and upward mobility. Through such an analysis of the context, Sarkar demonstrates how power asymmetries (neoliberal market-led development agendas) limit the potential of ICTs to produce real structural changes and to impact inequalities on ground.

The focus of a contextual analysis therefore needs to be less about developing explanatory accounts of an established category, a group, or community that constitutes a “local culture”, and how these lead to differences in adoption, use and impacts of ICTs (although these can exist), but more on uncovering the mechanics and techniques of power, arising in part from processes of ICT4D, producing differential outcomes within and between groups (Hayes & Westrup, 2012). In a large part, papers in Categories 3 and 4, because of their focus on power asymmetries, were more likely and better able to surface these processes and their workings, however they formed a minority (less than 20%) of the corpus.

D4. Pathways to reduce structural inequalities remain under-developed

Many papers in the corpus acknowledge the role of multi-pronged as well as holistic approaches to reduce inequalities, that go beyond the realm of digital. This is typified by phrases such as “*technology alone cannot increase women’s adoption of digital financial services*” (Ibtasam et al., 2018), or “*technology per se is inadequate to bridge the digital divide*” (Unnikrishnan et al., 2016). While the (near) disappearance of pure techno-determinism is certainly a welcome (and long overdue) shift, these ideas per se are not novel, and certainly do not lend themselves to a productive debate: can anyone in ICT4D really disagree with the notion that technology is not pre-disposed to reduce inequalities? What would instead be useful for the field is a framework to engage with the follow up to this question, which is: if the technology intervention by itself is not pre-disposed to reduce inequalities, how do we additionally shape or transform attendant structures to affect these shifts? What are the pathways to imagine more inclusive and equitable digital futures?

For papers in Category 1 and 3, this question is only answered in a narrow way, to the extent that conceptualisation of inequality reduction itself is restricted to increasing adoption and use of technologies among different populations. Even so, for those in this category that recognise the role that other structural, non-technical pathways can play in achieving digital inclusion, they tend to take a pragmatic approach towards this, for example, classifying barriers as short-term (i.e., technological solutions) and long term (i.e., sociocultural and religious values) – the idea being that there will always be “limits” to achieving inclusion (Ibtasam et al., 2018). For papers in Category 2, ideas about attendant structures are only thinly referenced and significantly underdeveloped, sometimes essentialised as a kind of a higher order change that is “external” to the domain of the technology solution itself, but “intrinsic” nevertheless to the process of change. For example, Frix and Pal (2010) allude to the more fundamental issue of stigma related to disability as a challenge to digital inclusion, and Joia and Giarelli (2023) point to long term government support and strong community networks as pre-requisites for fintech-led inclusion in the favelas of Brazil. The implicit assumption in presenting ideas this way is that these “attendant structures” lie in the seemingly more complex realms of institutional regimes, political stability, policy, social change, that are outside the realm of technology (and technologists) and are therefore beyond its influence. In effect, this comes close to the “pragmatic” view described earlier.

With respect to papers in Category 4, many do develop conceptualisations of attendant structures that shape power asymmetries and inequalities but they primarily focus on critiquing such structures, either to bring out the “dark matter of ICT” (Masiero, 2023), or to politicise the discursive logics of the development process itself (De et al., 2018). For example, Krishna (2021) examines Aadhar use among informal workers who use digital IDs for employment and identifies several class-based and economic hierarchies that reinforce extant inequalities and facilitate unfair value creation and extraction; the implicit assumption being that these power dynamics need to be reversed in order for the informal workers to truly benefit from being included in Aadhar. Similarly, Kawlra (2013) critiques the transnational ICT4D rural empowerment paradigms as serving only “elite” capitalist interests, again implying that digital inclusion is contingent on fundamental shifts in the political economy of funding and aid flows from the North to the South. In both these papers, the processes through which these shifts can be effected are not elucidated, and indeed may not necessarily be the focus, either. Put together, it appears from the literature

that when it comes to reducing inequalities, we are caught between a rock and a hard place – on the one hand is a narrow conceptualisation of inequality along with a pragmatic “limits-based” view of digital inclusion, and on the other, is a critical conception of inequality with a well-developed theory around “harms”, but no corresponding pathways for “good”.

E. Implications for future research

The findings from this SLR have three implications for future research on digital inclusion and inequalities in ICT4D. Firstly, theorisations of inequality need a more explicit focus on its development impacts. While adoption and diffusion of ICTs continue to be important goals to pursue, the mere presence or availability of technology cannot be taken as evidence of equity because its functioning is intertwined with existing socioeconomic inequalities of society (Leye, 2009). Moreover exclusions from ICTs are not the only form of inequality among users and citizens, nor are inequalities produced only in the realm of the digital (i.e., differences in digital literacy, skills, and capacities) (Ragnedda & Muschert, 2016). We need to embrace “thicker descriptions” of inequality that are informed by the lens of social stratification and theorise the workings of ICTs in relation to their interplay with and impact on socio-economic and human development (*Ibid*).

Secondly, future research on inclusion must marry a focus on the development potential of ICTs with a proportionate focus on the processes and mechanisms through which harms may be produced. It needs to explicitly acknowledge this as a fundamental tension that exists today, and devise more robust theorisations of the processes through which inclusion may take on more adverse forms among the most marginalised actors (Heeks, 2022). Fundamentally, this is about moving away from an exclusion-focused, deprivation-based frame to study ICTs, to embracing a more relational, intersectional understanding of inequality, i.e., how inequalities both precede and proceed from digital systems, and how privileges and penalties are shaped in relation to the positionality of individuals and groups within interlocking social, political and economic structures (Heeks, 2022; Zheng & Walsham, 2021). This warrants a much-needed attention to the role of power asymmetries in structuring differential benefits and producing harms. Although the study of power is not new to ICT4D, as this analysis revealed, and as others have observed before (Chipidza & Leidner, 2019; Schelenz & Pawelec, 2022), power has only featured as a somewhat peripheral topic so far in studies of ICT, often appearing more implicitly in approaches such as participatory decision making or co-design (Jasperson et al., 2002). However, an explicit power-based conceptualisation is needed in order to surface the causes, mechanisms, and processes of inequalities.

The final implication relates to the under-theorisation of pathways of inequality reduction. The SLR showed that the much needed “critical” lens appears to be more focused on theorising the role of ICTs in amplifying inequalities. While this has expanded our understanding of “harms” from ICTs and enabled us to move away from the more naïve and simplistic theorisations of “good”, it has come at the cost of a vacuum in knowledge production in the area of reducing inequalities. This has both discursive and theoretical implications. Discursively speaking, a disproportionate focus on highlighting the negative impacts of ICTs has resulted in the sedimentation of failure narratives (Sahay, 2023) or “cultures of paralyzing pessimism”, often directing policy makers to divest their energies

from building new inclusive technologies towards breaking up technology or regulating it through western Euro-centric frames (Arora, 2024). Indeed, in some sense, the binaries of success v/s failure, positive v/s negative, utopia v/s dystopia have overshadowed the space for productively theorising the plurality and the duality of technologies to conceive of “alternate” or “aspirational” approaches to digital development (Arora, 2024; Sahay, 2023). We are missing a constructive, forward looking critique of ICT4D, one that not only engenders a narrative of “hope” (Sahay, 2023), but also enables us to move beyond problematising the role of taken-for-granted assumptions regarding ICT’s role in development, and re-imagining them in more actionable justice-enacting ways (Akbari & Masiero, 2023).

F. Conclusions

Although ICT4D literature has had a long-standing engagement with the concepts of digital inclusion and inequalities, the extent to which these concepts have evolved theoretically has so far received less systematic analysis and scrutiny. Such an analysis is particularly crucial as ICTs become implicated in inequality increases, and much of the future research on reducing inequalities hinges on embracing a nuanced view of how digital interventions shape and are shaped by inequalities. In order to understand the current theorisations and contestations in this space, a systematic literature review was carried out. The review found that dominant conceptions of inequality are tech-centric and divide-led, focusing primarily on the slim space of technology-user adoption and engagement, rather than delineating its broader impacts for individuals, communities, or society. The normative belief in the fundamental goodness of both ICTs and inclusion, i.e., ICTs as having transformative potential and inclusion as a state that developing countries or marginalised contexts should aspire for, continues to maintain a stronghold in ICT4D discourses.

Although in a minority, critical theorisations of inclusion did challenge these notions by engaging with the politics of ICTs and demonstrating their complicity in setting and perpetuating conditions of marginalisation and exclusion. However, they did not focus adequately on how such conditions could be transformed and inequalities can be reduced. Overall, it appears that ICT4D theorisations of inclusion and inequalities are caught between a rock and a hard place - either they take a narrow view of ICTs as instruments of progress and socioeconomic change, failing to engage with how they may simultaneously perpetuate inequalities, or they take a critical view about its role in amplifying inequalities, failing to adequately theorise how such conditions can be transformed. Ultimately, neither of them engage with the double-edged nature of ICTs today, i.e., that of simultaneous improvements and harms, and are therefore less equipped to substantively advance the agenda of imagining a better world, i.e., a more equitable digital future. The shape of future research on digital inclusion very much rests on being able to marry these tensions that are inherent in the field today.

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Appendix 1 - Listing of articles and their classifications

No.	Author(s)	Reference	ICT4D value chain	Conception of inequality
1	Joia & Giarelli, 2023	Joia, L. A., & Giarelli, S. (2023). Criminal factions and ICT-Mediated financial inclusion in Brazilian favelas: the role of context. <i>Information Technology for Development</i> , 29(4), 607–644. https://doi.org/10.1080/02681102.2023.2215718	Impact-focus	Divide-centric
2	McC Campbell et al., 2022	McC Campbell, M., Schumann, C., & Klerkx, L. (2022). Good intentions in complex realities: Challenges for designing responsibly in digital agriculture in low-income countries. <i>Sociologia Ruralis</i> , 62(2), 279-304. https://doi.org/10.1111/soru.12359	Provision-focus	Power-centric
3	Lorini et al., 2022	Lorini, M. R., Ngwenyama, O., & Chigona, W. (2022). Processes of frugal social innovation: Creative approaches in underserved South African communities. <i>The Electronic Journal Of Information Systems in Developing Countries</i> , 88(3), 1-15. https://doi.org/10.1002/isd2.12220	Provision-focus	Divide-centric
4	Dasuki & Effah, 2022	Dasuki, S., & Effah, J. (2022). Mobile phone use for social inclusion: the case of internally displaced people in Nigeria. <i>Information Technology for Development</i> , 28(3), 532-557. https://doi.org/10.1080/02681102.2021.1976714	Impact-focus	Divide-centric
5	Biswas et al., 2022	Biswas, M., Anwar, M., Stillman, L., & Oliver, G. (2022). Understanding Information and Communication Opportunities and Challenges for Rural Women Through the Sustainable Livelihood Framework. In M. Smits (Ed.), <i>Information for a Better World: Shaping the Global Future. iConference 2022. Lecture Notes in Computer Science</i> (pp. 175-191). Springer Cham.	Impact-focus	Divide-centric
6	Tushar et al., 2020	Tushar, A. K., Antara, I. J., Das, D., Chandra, P., Soron, T. R., Haque, M. M., Ahamed, S. I., & Ahmed, S. I. (2020). We need more power to stand up: Designing to combat stigmatization of the caregivers of children with autism in urban Bangladesh. <i>ICTD '20: Proceedings of the 2020 International Conference on Information and Communication Technologies and Development</i> , 1-12. https://doi.org/10.1145/3392561.3394643	Provision-focus	Power-centric
7	Mancilla & Ramos, 2021	Mancilla, Y. M., & Ramos, A. M. G. (2021). Transforming digital inclusion services to enhance women development in Mexico. <i>ACM International Conference Proceeding Series</i> , 181-189. https://doi.org/10.1145/3494193.3494303	Provision-focus	Divide-centric
8	Krishna, 2021	Krishna, S. (2021). Digital identity, datafication and social justice: understanding Aadhaar use among informal workers in south India. <i>Information Technology for Development</i> , 27(1), 67-90. https://doi.org/10.1080/02681102.2020.1818544	Impact-focus	Power-centric
9	Islam & Inan, 2021	Islam, M. N., & Inan, T. T. (2021). Exploring the Fundamental Factors of Digital Inequality in Bangladesh. <i>SAGE Open</i> , 11(2). https://doi.org/10.1177/21582440211021407	Provision-focus	Divide-centric

10	Montero & Kapinga, 2019	Montero, C. S., & Kapinga, A. F. (2019). Design Science Research Strengthened: Integrating Co-creation and Co-design. In P. Nielsen & H. C. Kimaro (Eds.), Information and Communication Technologies for Development. Strengthening Southern-Driven Cooperation as a Catalyst for ICT4D: 15th IFIP WG 9.4 International Conference on Social Implications of Computers in Developing Countries, ICT4D 2019, Dar es Salaam, Tanzania, May 1–3, 2019, Proceedings, Part I (pp. 486-495). Springer Cham.	Provision-focus	Divide-centric
11	Petersen et al., 2020	Petersen, F., Brown, A., Pather, S., & Tucker, W. D. (2020). Challenges for the adoption of ICT for diabetes self-management in South Africa. <i>Electronic Journal of Information Systems in Developing Countries</i> , 86(5), 1-14. https://doi.org/10.1002/isd2.12113	Provision-focus	Divide-centric
12	Pal et al., 2020	Pal, A., Herath, T., De', R., & Rao, H. R. (2020). Contextual facilitators and barriers influencing the continued use of mobile payment services in a developing country: insights from adopters in India. <i>Information Technology for Development</i> , 26(2), 394-420. https://doi.org/10.1080/02681102.2019.1701969	Provision-focus	Divide-centric
13	Pal et al., 2020	Pal, A., De', R., & Herath, T. (2020). The Role of Mobile Payment Technology in Sustainable and Human-Centric Development: Evidence from the Post-Demonetization Period in India. <i>Information Systems Frontiers</i> , 22(3), 607-631. https://doi.org/10.1007/s10796-020-09982-7	Provision-focus	Divide-centric
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15	Okeke et al., 2019	Okeke, F., Nene, L., Muthee, A., Odindo, S., Kane, D., Holeman, I., & Dell, N. (2019). Opportunities and challenges in connecting care recipients to the community health feedback loop. <i>ICTD '19: Proceedings of the Tenth International Conference on Information and Communication Technologies and Development</i> , 1 - 11. https://doi.org/10.1145/3287098.3287111	Provision-focus	Divide-centric
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20	Msendema & Nyirenda, 2019	Msendema, M. B., & Nyirenda, G. B. (2019). Unravelling Development Capabilities Enhanced by ICT in Informal Micro-Finance Settings. Case of Women Village Banks in Blantyre, Malawi. <i>IST-Africa 2019 Conference Proceedings</i> , 1-8. https://doi.org/10.23919/ISTAFRICA.2019.8764871	Impact-focus	Divide-centric
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25	Brown & Mickelson, 2019	Brown, S., & Mickelson, A. (2019). Why some well-planned and community-based ICTD interventions fail. <i>Information Technologies and International Development</i> (15), 49-61.	Provision-focus	Divide-centric

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28	Yu & Ibtasam, 2018	Yu, S., & Ibtasam, S. (2018). A qualitative exploration of mobile money in Ghana. <i>Proceedings of the 1st ACM SIGCAS Conference on Computing and Sustainable Societies, COMPASS 2018</i> , 1-10. https://doi.org/10.1145/3209811.3209863	Provision-focus	Divide-centric
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30	Takavarasha et al., 2018	Takavarasha, S., Cilliers, L., & Chinyamurindi, W. (2018). Assessing ICT access disparities between the institutional and home front: A case of university students in South Africa's eastern cape. In D. Kreps, C. Ess, L. Leenen, & K. Kimppa (Eds.), <i>This Changes Everything – ICT and Climate Change: What Can We Do?</i> HCC13 2018. <i>IFIP Advances in Information and Communication Technology</i> , vol 537 (pp. 45-59). Springer Cham.	Provision-focus	Divide-centric
31	Straubhaar & Davis, 2018	Straubhaar, J., & Davis, S. (2018). Drumming and digital inclusion: music, identity formation, and transformative empowerment in Afro-Brazilian community development NGOs. <i>Development in Practice</i> , 28(3), 374-387. https://doi.org/10.1080/09614524.2018.1435628	Impact-focus	Divide-centric
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36	Singh & Jackson, 2017	Singh, R., & Jackson, S. J. (2017). From margins to seams: Imbrication, inclusion, and torque in the Aadhaar identification project. <i>CHI '17: Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems</i> , 2017-May, 4776-4788. https://doi.org/10.1145/3025453.3025910	Impact-focus	Power-centric
37	Prado, 2017	Figueiredo, M. A., Prado, P., Câmara, M. A., & Albuquerque, A. M. (2009). Empowering rural citizen journalism via web 2.0 technologies. <i>Proceedings of the Fourth International Conference on Communities and Technologies</i> , 77-84. https://doi.org/10.1145/1556460.1556473	Impact-focus	Divide-centric
38	Ibtasam et al., 2017	Ibtasam, S., Mehmood, H., Razaq, L., Webster, J., Yu, S., & Anderson, R. (2017). An exploration of smartphone based mobile money applications in Pakistan. <i>Proceedings of the ACM on Human-Computer Interaction</i> , 3(CSCW), 1-33. https://doi.org/10.1145/3136560.3136571	Provision-focus	Divide-centric
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41	Shroff & Kam, 2011	Shroff, G., & Kam, M. (2011). Towards a design model for women's empowerment in the developing world. <i>CHI '11: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems</i> , 2867-2876. https://doi.org/10.1145/1978942.1979368	Provision-focus	Divide-centric
42	Sarkar, 2016	Sarkar, S. (2016). Beyond the “digital divide”: the “computer girls” of Seelampur. <i>Feminist Media Studies</i> , 16(6), 968-983. https://doi.org/10.1080/14680777.2016.1169207	Impact-focus	Power-centric
43	Frix & Pal, 2010	Frix, M., & Pal, J. (2010). A question of visibility: A rights-based look at ICT centers for persons with disabilities in Latin America. <i>ICTD '19: Proceedings of the Tenth International Conference on Information and Communication Technologies and Development</i> , 1-5. https://doi.org/10.1145/2369220.2369231	Impact-focus	Divide-centric
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46	Ferreira et al., 2016	Ferreira, S. M., Sayago, S., & Blat, J. (2016). Going Beyond Telecenters to Foster the Digital Inclusion of Older People in Brazil: Lessons Learned from a Rapid Ethnographical Study. <i>Information Technology for Development</i> , 22, 26-46. https://doi.org/10.1080/02681102.2015.1091974	Provision-focus	Divide-centric
47	Pal, 2006	Pal, J. (2006). Early-stage practicalities of implementing computer aided education: Experience from India. <i>Fourth IEEE International Workshop on Technology for Education in Developing Countries (TEDC'06)</i> , 26-30. https://doi.org/10.1109/TEDC.2006.10	Provision-focus	Divide-centric
48	Bisht & Mishra, 2016	Bisht, S. S., & Mishra, V. (2016). ICT-driven financial inclusion initiatives for urban poor in a developing economy: implications for public policy. <i>Behaviour and Information Technology</i> , 35(10), 817-832. https://doi.org/10.1080/0144929X.2016.1183711	Impact-focus	Divide-centric
49	Ahmed et al., 2016	Ahmed, S. I., Ahmed, N., Kumar, N., & Hussain, F. (2016). Computing beyond gender-imposed limits. <i>ACM International Conference Proceeding Series</i> , 1-7. https://doi.org/10.1145/2926676.2926681	Provision-focus	Power-centric
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51	Lesame & Seti, 2014	Lesame, Z., & Seti, V. (2014). Technology access centres and community development: The case of the eastern cape province in South Africa. <i>Mediterranean Journal of Social Sciences</i> , 5(10), 303-317. https://doi.org/10.5901/mjss.2014.v5n10p303	Provision-focus	Divide-centric
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53	Mawela & Ochara, 2013	Mawela, T., & Ochara, N. M. (2013). Sustainability of E-participation through mobile technologies. <i>SAICSIT '13: Proceedings of the South African Institute for Computer Scientists and Information Technologists Conference</i> , 131-143. https://doi.org/10.1145/2513456.2513475	Provision-focus	Divide-centric
54	Kawlra, 2013	Kawlra, A. (2013). ICT mediated development for whom? A reflexive ethnography of ICT. <i>Annuaire Roumain d'Anthropologie</i> , 50(1), 39-51.	Impact-focus	Power-centric

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57	Odendaal, 2011	Odendaal, N. (2011). The spaces between: ICT and marginalization in the South African city. C&T '11: Proceedings of the 5th International Conference on Communities and Technologies, 150-158. https://doi.org/10.1145/2103354.2103374	Impact-focus	Divide-centric
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62	Figueiredo et al., 2009	Figueiredo, M. A., Prado, P., Câmara, M. A., & Albuquerque, A. M. (2009). Empowering rural citizen journalism via web 2.0 technologies. Proceedings of the Fourth International Conference on Communities and Technologies, 77-84. https://doi.org/10.1145/1556460.1556473	Impact-focus	Divide-centric
63	Rangaswamy, 2008	Rangaswamy, N. (2008). Telecenters and Internet cafe's: The case of ICTs in small businesses. <i>Asian Journal of Communication</i> , 18(4), 365-378. https://doi.org/10.1080/01292980802344208	Provision-focus	Divide-centric
64	Elnaggar, 2008	Elnaggar, A. (2008). Towards gender equal access to ICT. <i>Information Technology for Development</i> , 14(4), 280-293. https://doi.org/10.1002/itdj.20100	Provision-focus	Divide-centric

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70	Wibella et al., 2018	Wibella, N., Fahmi, I., & Saptono, I. T. (2018). Factors affecting consumer acceptance of digital financial inclusion; an anecdotal evidence from Bogor city, Indonesia. <i>Independent Journal of Management & Production</i> , 9(4), 1338-1353. https://doi.org/10.14807/ijmp.v9i4.824	Provision-focus	Divide-centric
71	Sarkar, 2018	Sarkar, S. (2018). Aspirations and Contestations: ICT Training and Subjectivities Among Marginalized Youth. <i>Information Technologies & International Development</i> , 14, 151-163.	Impact-focus	Power-centric