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Digital Identity and its Link to Socioeconomic Inclusion

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Advancing E-governance for Development:

Digital Identity and its Link to Socioeconomic Inclusion

Abstract

The literature on e-governance has highlighted the potential of ICTs to enable good governance and socioeconomic development by leveraging stakeholders and resources within and outside the government to address specific challenges. A significant challenge in many developing countries is the inability of large segments of the population—notably, the vulnerable poor—to receive and benefit from services or public provisions because they lack a means of formal identification. Various digital identity projects worldwide have attempted to address the problem through an umbrella approach dubbed identification for development (ID4D). However, little is known about how digital identity advances e-governance by enabling socioeconomic development through inclusion. This study examines the inclusion and developmental significance of digital identity by drawing on thematic analysis of secondary data from 40 published studies based on the empirical context of India's Aadhaar—the world's largest digital identity scheme which enables service delivery to over 1.2 billion people. From our analysis, we identify themes of digital identity and socioeconomic inclusion and develop a theoretical account of their relationship. The resulting framework contributes towards advancing e-governance for development by showing how digital identity might enable inclusion.

1. Introduction

E-governance has been embraced in many developing countries to improve traditionally dysfunctional government services and to enable more effective governance arrangements (Banerjee & Jain, 2003; Kannabiran et al., 2008; Madon, 2005, 2009a; Masiero, 2015a; Rose, 2005).[1] Governments in developing countries like India have forcefully pursued e-governance for its developmental benefits (Beniwal & Sikka, 2013; Madon, 2005, 2009a) given the realization that "no single actor, public or private, has [*all*] the knowledge and resource capacity to tackle [public sector and social] problems unilaterally" (Kooiman, 1993b in Stoker (1998, p. 38)). The literature on e-governance in developing countries has focused on the various ways information and communication technologies (ICTs) might transform public administration to achieve efficiency, cost-effectiveness, corruption control, and the modernization of public services (Backus, 2001a; Bhuiyan, 2011b; Kannabiran et al., 2008; Masiero, 2015a). However, it has also recognized that ICTs might promote exclusion by amplifying existing socioeconomic inequalities and power structures (Bhuiyan, 2011a; Harfouch, 2010; A. Singh & Sahu, 2008; Souter, 2007).

Notwithstanding their exclusionary potential, ICTs have been adopted to achieve socioeconomic inclusion for vulnerable groups (Alam & Imran, 2015; Andrade & Doolin, 2016; Phipps, 2000). However, this other side of the 'Janus face' of ICTs (Arnold, 2003)

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[1] Since the 1980s, international development discourses have identified governance and good governance as critical for socio-economic progress (Jessop, 1998; World Bank Group, 2000). Governance involves various stakeholders other than the government, and under intense resource and performance pressures, public administration has migrated in many countries from the government as sole provider to various collaborative models of governance involving elements such as outsourcing, decentralization, and privatization (Bannister & Connolly, 2012; Löffler, 2003). With the global diffusion of ICTs and their application in governance, ICTs have shown the potential to create or alter governance structures and processes, and to improve the quality and outcomes of governance (Bannister & Connolly, 2012, p. 11). Such transformative effects of ICTs on governance, commonly referred to as e-governance, changes the model of service delivery by making it more tailored and proactive (from a 'pull' approach where citizens seek out government services towards a 'push' approach where the government can target citizens with tailored services and programs) (Linders et al., 2018).

remains to be further explored theoretically in the literature on e-governance for development (Adler, 2010; Backus, 2001b; Gianluca Misuraca, 2010; Heeks, 2001; Madon, 2009b).

Of particular interest, ICTs have been proposed as a remedy to a significant developmental challenge in many developing countries, where a vast number of citizens are systemically excluded from public services and socioeconomic participation because they lack a means of formally proving their identity. All but a handful of developing countries in Latin America, Africa, South and Southeast Asia have now embarked upon national digital identity schemes to address this problem (Biscaye et al., 2015). Every country in sub-Saharan Africa has, for example, implemented or committed to a national digital identity project with varying degrees of success (Gelb & Metz, 2018b). However, given the myriad bottlenecks to effective service provision for poor people around the world (Group, 2004), and the range of reported injustices and unintended consequences in practice (Das & Masiero, 2019; Masiero & Bailur, 2021), the fundamental question of how digital identity enables inclusion in the context of government-to-citizen or business-to-citizen interactions remains to be theoretically fleshed out, in order to better understand "the theoretical link between digital identity and development" (Masiero & Bailur, 2021, p. 3).

We explore this question through the theoretical lens of technology affordance (Hutchby, 2001; Markus & Silver, 2008), which scholars of technology and organization commonly understand as the action potential that can be taken with a particular technology (Leonardi, 2011; Majchrzak & Markus, 2013; Pozzi et al., 2014). The lens of technology affordance emphasizes "the mutuality of actor intentions and technology capabilities that provide the potential for a particular action" (Faraj & Azad, 2012), and it takes as a unit of analysis the interplay between human action and technological capability in a given domain of action. Rather than privileging the separate elements in a complex sociotechnical arrangement such as

an e-governance service system,[2] the technology affordance lens explains the implication of technology—not in terms of its intrinsic properties—but in relation to a context of use (Earl & Kimport, 2011). Studies on the uses of ICTs in government processes have employed the theoretical lens of affordance to explore how various aspects of service delivery are enabled, improved, or inhibited through ICTs (Azad & Zablith, 2018; Porwol & Adegboyega, 2017; Riedl, 2003; Stamati et al., 2015). We build upon this line of research by exploring the action potential digital identity provides for socioeconomic inclusion in a developing country's e-governance context. Based on our review of the relevant literature, there is no study that has linked the affordances of digital identity to a theoretically-grounded notion of socioeconomic inclusion and human development through e-governance.

To help address this dark area in the literature, we draw evidence from India's Aadhaar, an archetypal digital identity initiative linked to socioeconomic inclusion (Chin et al., 2015; Muralidharan et al., 2016; UIDAI, 2012b). This paper examines published evidence of how inclusion has been understood and realized through Aadhaar affordances in the Indian socioeconomic context. Relatedly, it reflects on whether similar systems might render positive inclusion outcomes in other developing countries (Raj & Jain, 2016; Zelazny, 2012). The structure of the paper is as follows. We first review relevant literature that positions government digital identity programs in developing countries in relation to the body of work on inclusion and human development. We then present our methodology and findings, followed by a framework of digital identity for socioeconomic inclusion in a developing country context. The implication of our framework is discussed, and the paper ends by reflecting on avenues for further research.

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[2] An e-governance service system or a configuration of e-governance technologies and organizational networks designed to meet the needs of service seekers

2. Background

2.1 The identity gap and digital identity in developing countries

In the developing world, significant numbers of people—up to 1.1 billion, or 15% of the world's population—are unable to reap the benefits of development because they have no means of proving their legal identity in order to receive services, or otherwise fully engage in socioeconomic activities (World Bank, 2017). The figure is even starker for women in developing countries, with almost one in two not having a means of formal identification (World Bank Group, 2019, p. 2). This vast population of vulnerable and marginalized groups (Nemschoff, 2015; Nilekani & Shah, 2015) is indicative of a systemic 'identity gap' (Gelb & Clark, 2013) that poses a challenge to human development, not just economic growth.

The implications of identification and the identity gap are far-reaching, as the World Bank's identification for development (ID4D) program and the Sustainable Development Goals (SDGs) have recognized (United Nations, 2015). SDG target 16.9 aspires to "provide legal identity to all, including through birth registration, by 2030". Towards this objective, more than 40 countries in Africa, Latin America, South, and Southeast Asia are already implementing digital ID systems, with over $1.2 billion committed to such initiatives by the World Bank and its development partners (Biscaye et al., 2015; World Bank Group, 2019).

Two justifications are commonly produced for addressing the identity gap with digital identity systems. Firstly, digital identity is said to provide an effective and cost-efficient way for individuals that are otherwise unknown or 'invisible' to the state and formal organizations to become visible in order for the state to meet its obligations toward them better. Secondly, from the perspective of the state, many developmental hurdles are suggested to be linked to the lack of legal identity, the absence of a national means of unique identification and authentication, and a centralized record of individuals within the state. Problems such as fraud and leakage in public distribution (Masiero, 2015a), as well as inefficient targeting or

mistargeting of welfare beneficiaries are attributable to the lack of unique identification (Nilekani & Shah, 2015). Other phenomena such as absenteeism and 'ghost' workers on public payrolls in developing countries also drain the public purse and might be ameliorated with effective identification systems (Dovlo, 2005; Nafiu et al., 2016).

The first justification linked to addressing the identity gap among the poor and marginalized has frequently been cast in terms of inclusion. In this view, digital identity is the missing link that could potentially connect excluded populations to benefits such as financial services, as well as their entitlements to public goods and services (Gelb & Clark, 2013; Gelb & Decker, 2011; J. Srinivasan & Johri, 2013). Next, we outline the view of inclusion across the social sciences and subsequently link it to perspectives on human development to provide a conceptual lens for the research.

2.2 Inclusion

In recent years, inclusion has become an important pillar in social interventions as well as in fields of studies such as Education, Development, Gender, and Health. Inclusion is a multifaceted and dynamic concept but can simply be understood as people's ability to fully partake in society and to determine their own destinies (Warschauer, 2004). The notion of inclusion has been formulated through neoliberal ideologies that have gained fervency since the 1980s (Gidley et al., 2010). From that perspective, inclusion is about devoting resources to human capital development to address challenges of economic growth for global competitiveness (Gidley et al., 2010).

While inclusion is conceptually linked to exclusion, the former does not mean non-exclusion. Inclusion involves more than the absence of exclusion and points toward putting the needs of individuals, particularly the vulnerable and marginalized, at the center of collective efforts to provide for and address factors relating to their full and equal membership of the society. Inclusion allows people to partake in society fully and to determine who they want to

be, what they want to do, and how they want to live (Warschauer, 2004). The object of inclusion is therefore not only to overcome social exclusion—the denial and inaccessibility of a range of rights as well as lack of social integration of certain groups (Shortall, 2008)—but to also make opportunities available for all groups in society. In short, inclusion occurs where people who wish to do so can fully participate in all aspects of society; granted there might also be others who are unwilling or unable for reasons beyond fixing.[3]

Dimensions of inclusion

Social inclusion is a multidimensional concept that covers aspects of human life such as work, civic engagement, cultural identity, social interaction as well as access to and use of basic necessities like food, healthcare, and shelter (Selwyn 2002). Multiple factors have been identified as determinants of social inclusion such as access and participation (Gidley et al., 2010), choice, affordability, and skills (Alam & Imran, 2015), civic and political participation, cultural identity, social interaction and interpersonal networks (Phipps, 2000; Selwyn, 2002). Although digital technology might enable inclusion, individual capability and involvement are required because social inclusion is essentially individual-oriented (Taket et al., 2009).

Relatedly, economic inclusion is a resource-driven dimension that focuses on the equality of individuals to have opportunities to participate and enjoy benefits of their participation either as employees, entrepreneurs, consumers, or citizens (Bettcher & Mihaylova, 2015; Kim & Hwang, 2019). As the foundation to attaining basic human needs, economic inclusion can be achieved at two complementary levels: community and individual levels (Bettcher & Mihaylova, 2015). Economic inclusion at the community level occurs when individuals' access to opportunities such as markets, employment and entrepreneurship exists irrespective of background. On the other hand, economic inclusion at the individual level occurs when people

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[3] Thanks to an anonymous reviewer for this pithy characterization

acquire requisite skills to be productive and able to exploit market opportunities (Bettcher & Mihaylova, 2015).

Fundamentally, economic inclusion transcends consumption (the capacity to acquire and use goods and services) and production (adding economically valuable activities and outputs) (Burchardt et al., 1999). Thus, for people to be economically included, they must be able to participate in valuable activities that provide them with the ability (income) to purchase goods and services. Although economic inclusion involves access to markets, resources, and opportunities, other equally important constituents such as participation and empowerment are required for full inclusion (Phipps, 2000).

2.3 Human development and socioeconomic inclusion

The notion of inclusion, insofar as it relates to addressing inequality and its underlying causes, can be situated within the human development paradigm in Economics and Development Studies that advocates for the centrality of the individual and their needs in national and international agenda of socioeconomic progress (Anand & Sen, 2000; T. Srinivasan, 1994). The human development paradigm stands in contrast to traditional economic approaches of development that emphasize economic output (as measured by GDP growth), national wealth (as measured by GDP per capita), and to some extent income inequality (as measured by the Gini coefficient)(Elson, 1997). Inclusion might therefore be usefully understood through the human development perspective by attending to important theoretical concerns raised in the literature of the latter.

Human development: the entitlements and capability approaches

In understanding inclusion as a development condition that centers on individual well-being, we turn to the entitlements (Sen, 1981) and the capability approaches (Sen, 1999), two alternative perspectives that have been advanced to help explain poverty and deprivation, and to guide their interventions. Both perspectives build on the notion of basic needs, a construct

for understanding the nature of absolute poverty in developing countries by assessing the minimum resources—typically in terms of consumption goods such as water, food, and shelter —required for physical well-being in the long term (Ghai, 1978; Jolly, 1976).

Defining entitlements as "the set of alternative commodity bundles that a person can command in a society using the totality of rights and opportunities" (Sen, 1984, p. 497), the entitlements approach emphasizes the benefits that the state owes to an individual by virtue of provisions made in law or implied by virtue of the social contract between a state and its citizens. A person's "entitlement set" refers to the range of goods or services that can be acquired legally either by creating something ("production-based entitlement"), by buying ("trade-based entitlement"), working for it ("own-labour entitlement"), or being given ("inheritance and transfer entitlement") (Sen, 1981, p. 2). Poverty or deprivation occurs through 'entitlement failures', the situation where a person's entitlement set does not provide them with adequate resources for subsistence due to any number of reasons.

In its original formulation to explain famines in developing countries, the key contribution of the entitlement approach was to redefine famine from its common (mis)understanding as a lack of food (according to an intuitive Malthusian logic of too many mouths, too little food) – towards an understanding of famine as resulting from entitlement failures and the inability of groups to access adequate food regardless of food availability (for example, because of poverty). The entitlements approach revealed that famine could occur even if food stocks were plentiful and markets operated efficiently, provided individuals lacked access to the food supplies because their entitlements were compromised (Devereux, 2001, p. 246).

In contrast to the entitlements approach which is consumption-oriented, the capability approach emphasizes what an individual can do or be rather than what they can have or what they have a right to. The capability approach focuses on how the capabilities of individuals result in the kind of life they value. At the core of the capability approach are capabilities,

functionings, agency, and well-being (Alkire, 2005; Sen, 1992, 1999). Capability refers to a set of valued choices at the disposal of an individual such as health, freedom and education while functionings represent how people use their capabilities (Sen, 1992). However, for individuals to use capabilities, they must have the freedom and their choices must offer valuable opportunities. Agency refers to the ability of individuals to pursue what they value, while well-being refers to individuals' ability to achieve valuable functionings (Alkire, 2005, 2009; Sen, 1999). Thus, for individuals to achieve well-being, they must first have access to a set of capabilities, freedom, the ability to choose capabilities they value, and to actualize those. Although there may be a variety of capabilities, these need to be valued by individuals as a means of well-being. For instance, food as a resource offers the capability for people to eat and be nourished if this food is valued and eaten. However, for people to eat the food, they must have access, freedom and the ability to choose the type of food they value.

Following Zheng and Walsham (2008), as well as Andrade and Doolin (2016), we consider the tenets of the capability approach to offer important insights for understanding the significance of digital identity for inclusion. We posit inclusion to allow capabilities, and the ability to choose valuable opportunities for well-being (Sen, 1999). Thus, to achieve inclusion through a human development perspective, individuals need access to a wide range of capabilities, as well as the freedom and ability to make choices deemed valuable for well-being and to ultimately realize their selected choices (Alkire, 2005). This is however not to ignore the salience of the entitlements approach that calls attention to the importance of meeting basic needs. We, therefore, suggest a composite lens for examining the role of digital identity in inclusion and socioeconomic development.

Positioning inclusion in relation to the entitlements and capability approaches

Combining the entitlements and capability approaches reveal a picture of human development as underpinned by the existence and exercise of a set of defined entitlements as

well as less-defined capabilities and functionings that extend beyond fulfilling basic needs.

Such a view emphasizes both the objective and subjective manifestations of human well-being in addition to its material and immaterial dimensions. Linking these approaches reveals complementarities that justify the composite lens proposed for this study (Table 1).

Table 1: Linking the entitlements and capabilities approaches to human development

Aspect	Entitlements approach	Capability approach	Composite lens
The conception of human development	Meeting basic needs through one's entitlements	Achieving freedom (what one can be and do (capability) and what one chooses to do (functionings))	Realizing one's entitlements to basic needs while also achieving capabilities and functionings
Analytical focus	What individuals can have (based on entitlements) and why deprivation results (entitlements failure)	What individuals can do or be to achieve their desired level of well-being	What individuals can have, what they can do, and what they can be to achieve objective and subjective well-being
Nature of claims	Descriptive/ empirical (what exists and why)	Normative/ moral/ evaluative (how social arrangements should be made and assessed)	Well-being has objective and subjective facets that touch on positive claims (how things are) and normative claims (how things ought to be)
Key concepts	Commodity bundles (goods and services), legal rights, access	Freedom, capabilities, functionings, agency and well-being, participation	Access to goods and services, and the freedom to participate in their use and to benefit from them

In this study, we explore inclusion in the context of Aadhaar digital identity by examining how and why the system might afford individual entitlements to basic needs in addition to capabilities and functioning for well-being. It is posited that through the continuous achievement of basic needs and the experience of well-being, human development—which we define as the constant enlargement in individuals' freedoms and opportunities to satisfy personal needs (Sein & Harindranath, 2004)—might be achieved.

3. Methodology

We conducted an analysis of themes from a selected corpus of studies on Aadhaar and inclusion. By theme, we mean "something important about the data in relation to the research question and [which] represents some level of patterned meaning within the data set" (Braun & Clarke, 2006, p. 82). Our analysis was guided by the question of how inclusion has been

understood and realized through Aadhaar affordances in the Indian socioeconomic context, and more broadly, how digital identity might enable inclusion in the context of government-to-citizen or business-to-citizen interactions in developing countries.

Thematic analysis was chosen for our study because it is a suitable interpretive method that helps to uncover key concepts and patterns in a well-defined corpus of data (Boyatzis, 1998). It is a dynamic way to develop theory because it can be employed to generate explanations from data (inductively) or to explore *a priori* theoretical understanding of a phenomenon under study (deductively) (Bryman, 2001; Miles & Huberman, 1994). It also exposes the relative importance of concepts in relation to the broader meaning of a whole corpus of data (Ryan & Bernard, 2003). Next, we describe the empirical context of Aadhaar (section 3.1), outline the literature selection that produced our data corpus (section 3.2), and detail how the thematic analysis was conducted (section 3.3).

3.1 The empirical context of India's Aadhaar digital identity system

Aadhaar is an e-governance initiative aimed at promoting socioeconomic development in India (Muttoo et al., 2019; The Economic Times, 2017). Aadhaar, which means 'foundation' in many Indian languages, is among the largest e-governance programs in the world and provides digital identity to enable access to a range of services (Dass, 2011). Launched in 2009 by the Unique Identification Authority of India (UIDAI), a national agency created to develop and implement a unique identification solution for all Indian residents (Gazette on Consitution of Unique Identification Authority of India (UIDAI), 2009), Aadhaar unique identification (UID) consists of a twelve-digit number that is linked to the bearer's demographic data such as date of birth, name, and address, as well as biometric data such as fingerprints, iris scan, and photograph. Physical cards are not needed because what matters is the unique number that identifies the bearer through their enrolled personal information (Unique Identification Authority of India (UIDAI), 2012b). As of May 2020, over 1.21 billion Aadhaar had been

issued (almost 90% uptake) (UIDAI, 2020). By not requiring a physical card, Aadhaar is unusual compared to most national identification schemes that require the issuance of a physical card (Biscaye et al., 2015).

Aadhaar has been trumpeted in the Indian government narratives as a triumph of Indian engineering capabilities, social reformist vision, and formidable leadership (Cohen, 2019; Nilekani & Shah, 2015). It aspires to a kind of 'objectivity' that is deemed lacking from previous identification schemes that relied on caste, religion, ethnicity, language, or other social categorization that have traditionally provided cleavages for conflicts and discrimination (Solinas, 2018). Despite the potential for (Agrawal et al., 2017), and some reports of security and privacy breaches (Jain, 2019), Aadhaar integrates various security considerations to minimize risks and threats (UIDAI, 2009). UIDAI's official characterization of Aadhaar (Table 2) distinguished it from previous identification schemes by emphasizing its infrastructural ambitions and the use of a unique 12-digit number instead of profiling information.

Table 2:Official description of Aadhaar (Unique Identification Authority of India (UIDAI), 2012b)

	Aadhaar is…	Aadhaar isn't
1.	A 12-digit unique identity for every Indian individual, including children and infants	Just another card
2.	Enables identification for every resident Indian	Only one Aadhaar card per family is enough
3.	Establishes uniqueness for every individual based on demographic and biometric information	Collects profiling information such as caste, religion, and language
4.	It is a voluntary service that every resident can avail irrespective of the present documentation	Mandatory for every Indian resident who has identification documents
5.	Everyone will be given a single unique Aadhaar ID number	An individual can obtain multiple Aadhaar ID numbers
6.	Aadhaar will provide a universal identity infrastructure that can be used by any identity-based application (like ration card, passport, etc.)	Aadhaar will replace all other IDs
7.	UIDAI will give yes/no answer to any identity authentication queries	UIDAI information will be accessible to public and private agencies

Aadhaar began as voluntary but became over time a *de facto*, if not a legally mandatory requirement for accessing a range of public and private services. The Supreme Court of India

ruled that Aadhaar should not be mandatory for services like applying for passports, bank, and mobile accounts, but upheld its mandatory use for filing taxes or benefiting from government welfare scheme and subsidy programs (Business Today, 2018; Sharma, 2018). Aadhaar's significance and the general push towards a digital India were based on the fact that 80% of workers, 45% of GDP, and the majority of firms in India were informal and unregistered, thereby making regulation and taxation almost impossible (Lahiri, 2020). Furthermore, most public and private service providers in India required proof of identity before services, benefits, or entitlements could be rendered. Yet, with 68% of Indians living in rural areas, a majority of residents—mostly poor and vulnerable people living in the more than 640,000 villages of India—had no means of formally identifying themselves prior to Aadhaar (Nemschoff, 2015; Nilekani & Shah, 2015; Patankar et al., 2017).

Aadhaar aimed to promote socioeconomic inclusion by providing identification to allow targeted delivery of state subsidies and services under various social protection and welfare schemes (UIDAI, 2012b, 2012a). It was also intended to help fight corruption, leakage, and the waste of public resources that occurred through the exploitation of poor record-keeping in government agencies. This was consequential given India's vast and increasing social protection expenditure that increased by about 12% annually between 1992 and 2012, from $2 billion to $18.3 billion (Kapur & Nangia, 2015). The government of India also annually spent about $50 billion on direct subsidies such as coupons for cooking gas and the distribution of basic food items like rice (Nemschoff, 2015; Nilekani & Shah, 2015). Such expenditures were in line with an increasing emphasis on anti-poverty programs and social protection around the world and recommended policies by the UN and the International Labor Organization for countries to adopt measures that guarantee income security and social services for all (International Labour Organization (ILO), 2014; UN General Assembly, 2012).

Although Aadhaar did not by itself guarantee benefits, services, or citizenship (Unique Identification Authority of India (UIDAI), 2012a; Venkatesan, 2013), its real-time identity verification infrastructure enables access to government services like utilities, the National Rural Employment Guarantee Scheme (NREGS), benefits under the National Social Assistance Program (NSAP), and subsidized rations of daily necessities like kerosene and food from the Indian Public Distribution System (PDS). It also enables access to social-leveling services such as banking and telecom that were previously inaccessible due to the lack of proof of identity (Nair, 2018; Nilekani & Shah, 2015).

3.2 Data corpus of Aadhaar studies

Figure 1: Summary of data approach
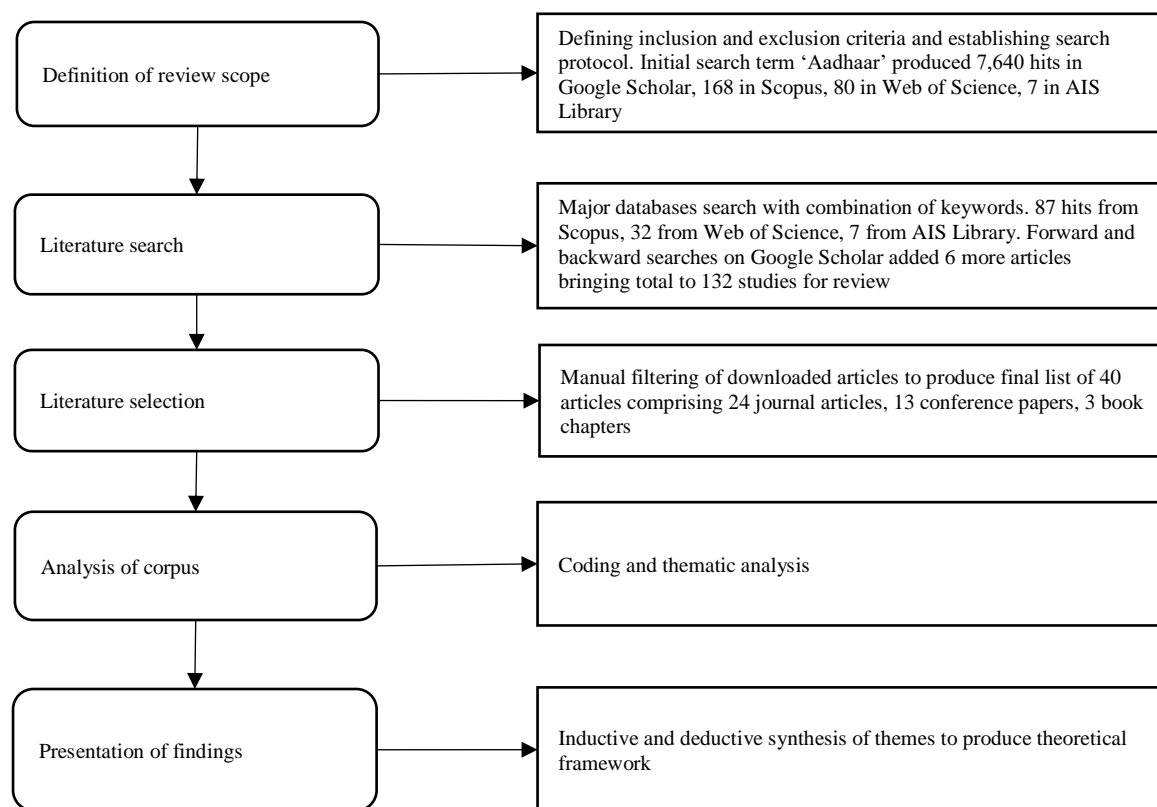
We relied on secondary data as outlined in   Figure 1. In the first step of our data collection, we defined the scope of the literature by establishing our boundaries. We performed an initial search using the keyword "Aadhaar" in Google Scholar (7,640 hits),

Scopus (168 hits), Web of Science (80 hits), and AIS Library (7 hits), to obtain a better understanding of the breadth of studies and their focus. We selected these databases because they cover a significant number of social sciences, management, information systems, and related journals. Based on the result of the initial search, we defined our scope to focus on only peer-reviewed journal and conference articles as well as book chapters. We excluded pure engineering articles, book reviews, books, blogs, newsletters, editorials, non-peer review articles, articles not in English, and working papers.

We conducted the main search in three databases: Scopus, Web of Science, and the AIS Library and supplemented these with searches on Google Scholar. Using the combination of keywords "Aadhaar", "inclusion", "exclusion" (and their variations), the search was conducted on the abstract, keywords, and titles using the advance search feature of the databases to retrieve only relevant studies. We iteratively searched each database (our last search was on 3rd January 2020), and from each search result, we exported the list of studies to a master spreadsheet in Excel. Our search from Scopus returned 87 hits, Web of Science returned 32, and AIS Library returned 7 hits. We also performed forward searches on popular studies that had been cited by other studies and this led to the discovery of 6 more studies. In all, a total of 132 studies were collected for further evaluation.

In line with our selection criteria, two co-authors manually reviewed the collected studies to determine their fit with the scope of the review. We reviewed the title, abstract, and keywords of each article on our list to ascertain the focus and fit with our review. Studies that did not meet our inclusion criteria were excluded. For instance, pure engineering articles that developed systems, models, or frameworks based on Aadhaar were discarded as they did not discuss inclusion or related "soft" issues. We also excluded studies that listed Aadhaar as a keyword or as an example in the abstract without further discussion in the main text. Other excluded studies did not focus on Aadhaar substantively but only on tangential issues.

Next, we filtered for duplicates as a significant number of articles from Scopus were also indexed in Web of Science. After applying all our inclusion and exclusion criteria, we had a total of 40 relevant studies as the final corpus. The corpus consisted of 24 journal articles, 13 conference papers, and 3 book chapters. Publications in our sample that had multiple relevant Aadhaar papers included *South Asia: Journal of South Asian Studies*, *Economic and Political Weekly,* and *Information Communication and Society,* as well as proceedings of conferences like the *ACM International Conference* and the *IFIP 9.4* (Appendix 1). We proceeded to download the selected studies for close reading and analysis.

3.3 Data analysis

Various approaches have been suggested for rigorous thematic analysis but we followed the six-step approach of Braun & Clark (2006) by familiarizing with the data, generating initial codes, searching for themes (patterns), reviewing the themes, defining and naming themes, before finally producing the report.

Two co-authors independently read and re-read the literature corpus to familiarize with the corpus and to determine the range of issues covered. To identify issues related to digital identity and inclusion in the context of Aadhaar, we determined for each study the 'empirical connection to inclusion' by focusing on three aspects: (a) the objectives and research questions of the study (b) its empirical evidence (c) the contribution of the study.

Based on the results of this step, each of the authors coded the corpus manually to identify an initial set of codes that were then discussed and agreed upon to ensure inter-coder reliability. We further clustered the initial codes to identify patterns in the data (themes). Although some studies covered multiple themes we only focused on the dominant theme within each study. The final set of themes were then aggregated according to our theoretical lens of the entitlements and capability approaches presented in Table 1. Coding was completed when each of the studies was categorized, agreed upon, and linked to an appropriate theme.

By combining inductive and deductive coding, our goal was to develop a theoretical framework that links the evidence of Aadhaar's affordances found in the data corpus with an established theoretical understanding of human development. In the analysis, attention was paid to quality and rigor by attending to the trustworthiness criteria of precision, consistency, and exhaustiveness through recording, systematizing, and disclosing the methods of analysis to enable a reader to determine whether the process is credible (Lincoln & Guba, 1985; Nowell et al., 2017). Actions taken to ensure the trustworthiness of our analysis and results are summarized in Table 3 (Nowell et al., 2017).

Table 3: Ensuring trustworthiness in various stages of analysis

Step of thematic analysis	How trustworthiness was pursued by authors
1. Familiarizing with data corpus	• Stored data in well-organized folders • Kept records of any observations or actions taken • Engaged with data in a prolonged way e.g. by actively reading and taking notes • Triangulated various data nodes (comparing similarities and differences) • Documented initial ideas of codes and themes
2. Generating initial codes	• Debriefed previous step • Determined appropriate coding framework (inductive/ deductive approach) • Reflected on detailed notes from the previous step • Created codes and kept audit trail of codes generated
3. Searching for themes	• Aggregated and triangulated codes generated • Diagrammed extensively to identify connections between concepts • Kept notes about hierarchies of concepts and themes • Iterated steps as needed until all studies were satisfactorily associated with themes
4. Reviewing themes	• Vetted themes and sub-themes and revised as appropriate to ensure fit with data • Checked references, adequacy of evidence by returning to data
5. Defining and naming themes	• Debriefed set of themes and discussed their meaning/definition • Reached consensus on themes, sub-themes, and their naming
6. Producing report	• Debriefed report writing approach and necessary exhibits • Wrote up details of the research process from existing notes • Produced narrative of research context in detail • Noted reasons for theoretical, methodological, or analytical choices in the study

4. Findings

Our analysis revealed that most studies in our sample (32) considered Aadhaar inclusion in accordance with an entitlements perspective. Few studies (3) considered aspects related to capabilities and functionings. The remaining studies in our corpus (5) did not suggest a specific underlying notion of human development. Themes from the two streams of research relating to *Aadhaar as a potential enabler of entitlements* and *Aadhaar as a*

potential enabler of capabilities and functions are considered in detail below. Insights from the remaining studies will be briefly outlined.

4.1 Aadhaar as a potential enabler of entitlements

Given that the government of India viewed Aadhaar primarily as a means of extending services and welfare provision to the poor and vulnerable, it is unsurprising that a majority of inclusion related studies focused on an entitlements perspective. Three themes and six sub-themes were identified in this perspective. These are summarized in Table 4 and discussed below.

Table 4: Aadhaar as a potential enabler of entitlements

Aadhaar inclusion theme (second level coding)	Sub-theme (first level coding)	Empirical connection to inclusion	Study
Aadhaar transformative effects as socially embedded	Aadhaar embedded in government programs	Aadhaar potential to reform social protection	Bhatia A., Bhabha J., 2017, Masiero S., 2015, Masiero S., 2018, Masiero S., Das S., 2019, Mukunthan A., Agarwal G., 2019, Parikh K.S., 2013, Sengupta D., Shastri N., 2019
		Discourses that frame Aadhaar are politically biased, which affects representation and responsiveness to citizens	Sen A., Ghatak D., Kumar K., Khanuja G., Bansal D., Gupta M., Rekha K., Bhogale S., Trivedi P., Seth A., 2019
		Aadhaar presents a trade-off between open data and privacy preservation	Kotwal V., Parsheera S., Kak A., 2017
		Aadhaar helps achieve distributive justice by promoting access and participation across a range of governance initiatives	Srivastava A.K., Sharma S., 2017
		Aadhaar effects and societal implications are not straightforward but riddled with tensions and conflicts	Mali N.V., Avila-Maravilla M.A., 2018
	Human discretion and mediation important for the effective functioning of Aadhaar	Aadhaar inclusion is a function of beneficiary perception and subjective experience	Masiero S., 2016
		Human mediation is vital for Aadhaar to achieve inclusion among certain marginalized populations	Baxi, P, 2019
		Discretion and collaborative practices of human intermediaries are important for stabilizing the technology of Aadhaar and enabling effective usage	Chaudhuri B., 2019
Aadhaar as a mediator of access	Aadhaar can hinder access	Aadhaar's potential to exclude might be exacerbated in rural contexts	Drèze J., Khalid N., Khera R., Somanchi A., 2017
		Aadhaar presents a trade-off between transparency and control on the one hand and hindering rather than enabling access on the other hand	Dandurand G., 2019
		Aadhaar is becoming a tool of exclusion rather than achieving its stated objectives	Khera R., 2017
		Aadhaar, by itself, is merely part of broader historical trends shaping status, rights, and identity in India. It is only meaningful considering these	Jayal N.G., 2019
		Aadhaar's access restriction logic shapes state-citizen interaction and what inclusion means	Seetharaman P., Pant A., 2018
		Aadhaar creates anxieties when authentication attempts fail or are falsified. Frictions such as physical mobility to enroll or update records under conditions of physical disability and meager resources can also limit access and eventually compromise dignity.	Singh P., 2019
		Aadhaar brings new costs for the poor to access their entitlements, making them worse in some cases. Also, new risks like the expropriation of benefits and the loss of existing assets are introduced	Abraham I., Rajadhyaksha A., 2015
		Aadhaar inclusion is not a one-time process such as enrolment or seeding in a government program. Rather, it is experienced regularly each time authentication occurs	Singh R., Jackson S.J., 2017

	Access is conditional	Aadhaar promotes financial inclusion through its link with complementary programs like the Jan Dhan program and mobile access	Ghosh S., 2017
		Aadhaar effectiveness on access and inclusion depends on material and perceptual conditions shaping entitlement failures through technology	Mukherjee A., Sahay S., 2019
		Aadhaar underpins a socially-mediated process for establishing conditions of belonging by emphasizing recognition of personal uniqueness and status	Rao U., 2019
	Access linked to identity and belonging	Aadhaar mediates a new citizenship regime by creating new inclusion/exclusion criteria	Chaudhuri B., König L., 2018
		Aadhaar is a means of identification but raises questions about whom it identifies and the community of belonging it allows or refuses access	Nair V., 2018
Aadhaar outcomes associated with design and implementation	Design and implementation critical to success	Aadhaar had a vast local network of human actors and technical artifacts that sustained political support and flow of funds to achieve its objectives	Rawat P., Morris J.C., 2019
		Uniqueness, security, and privacy are key success factors in Aadhaar that enables it to achieve its objectives. Scalability is important but of lesser priority	Mir U.B., Kar A.K., Dwivedi Y.K., Gupta M.P., Sharma R.S., 2019
		Aadhaar's design and implementation are conceived by its engineers as a technical effort to redefine a new kind of 'social' that is more inclusive	Cohen, L, 2019
	Aadhaar platform architecture underpins outcomes	Effective design and architecture are at the core of Aadhaar's scalability and the broad-based access it enables	Mukhopadhyay S., Bouwman H., Jaiswal M.P., 2019
		Aadhaar's platform design and architecture enables a complex network of data-based state-citizen interactions and services	Singh R., 2019

Aadhaar transformative effects as socially embedded

Although Aadhaar is frequently discussed as an innovation that reflects the technical ingenuity of India's globally-recognized engineering and technology industries, a key theme concerns how Aadhaar's effects are realized through socially embedded processes rather than accomplished deterministically through technical artefacts alone. Most Aadhaar-enabled processes are human-mediated, and such mediation is important for effectively addressing the needs of marginalized groups who may lack the skills or know-how (Baxi, 2019), in addition to enabling positive perceptions and enhancing the subjective well-being of beneficiaries (Masiero, 2016). Discretion and collaborative practices are also essential to stabilize Aadhaar infrastructure and allow its effective usage (Chaudhuri, 2019).

Aadhaar's significance unfolds through its embeddedness (or seeding) into various government programs. Aadhaar by itself does not guarantee social protection (Bhatia & Bhabha, 2017), but could in combination with other programs and technologies, transform the nature of social protection. A key implication has been the potential to reform the existing structures and functioning of social protection programs in India, with the benefit of promoting distributive justice through enhanced access and participation (Srivastava & Sharma, 2017). For example, the JAM trinity (the combination of the Jan Dhan Yojana, Aadhaar, and Mobile) enabled a shift from the leakage-prone traditional public distribution

system (PDS) based on price subsidies towards the direct transfer of cash to beneficiaries, in a move that cut out intermediaries and tackled corruption-related losses (Masiero, 2015b; Mukunthan & Agarwal, 2019). Similar benefits of Aadhaar-enabled cash transfer programs are claimed to improve the efficiency of last-mile delivery to beneficiaries and to improve the quality of public financial management generally (Parikh, 2013; Sengupta & Shastri, 2019).

Aadhaar strengthened schemes such as the National Rural Employment Guarantee Act (NREGA), a program that provides up to 100 days of guaranteed, unskilled, waged employment to poor rural households as a way to improve their livelihoods while achieving local development objectives through public works (Reetika Khera, 2017). NREGA made significant cash transfers successfully to poor households (Aiyar & Samji, 2009; Bhattacharya et al., 2010), and in 2012-2013 provided employment for over 4.4 million households (Government of India (Ministry of Rural Development), 2013).

However, the transformational effects of Aadhaar on government programs are not without drawbacks. They have been suggested to foster data injustices (Masiero, 2018; Masiero & Das, 2019) and to promote economic policies that are themselves biased against certain segments of the population (Sen et al., 2019). Aadhaar transformation of social protection programs is also riddled with tensions and contradictions, such as the potential for data breaches and cybercrime (Avila-Maravilla & Mali, 2018), as well as the trade-off between the openness of data and the need for privacy preservation (Kotwal et al., 2017).

Aadhaar as a mediator of access

Access remains a key theme of Aadhaar studies related to inclusion, in part because Aadhaar is mandatory for government welfare and subsidy programs. Three important insights emerged from our analysis of the theme of access. First, studies point out that the promise of universal access remains challenging because Aadhaar is merely part of broader historical developments shaping status, rights, and identity in India, and is thus meaningful

only in light of those (Jayal, 2019). Aadhaar continues to hinder access for some particular communities. For example, Aadhaar is said to impose new costs and risks to the poor in obtaining their benefits, and in some cases, leaves them worse off than before (Abraham & Rajadhyaksha, 2015).

Aadhaar inclusion is also not a one-time process as often perceived, but is accomplished numerous times whenever authentication needs to occur (R. Singh & Jackson, 2017); a fact that creates anxieties and precarious livelihoods for the poor whenever their authentication attempts fail or are falsified (P. Singh, 2019). Furthermore, in the government's zeal to stamp out corruption and weed out ineligible beneficiaries of social benefits, there is a trade-off between transparency and control on the one hand and the hindering of access on the other hand (Dandurand, 2019). Such 'access restriction' logic of Aadhaar supersedes its complementary service logic and ultimately shapes state-citizen interaction and the degree of inclusion achieved. For example, in rural Jharkhand where Aadhaar-based biometric authentication is now compulsory for most users of the public distribution system, participation remains a problem due to high transaction costs, authentication problems, and the focusing of the system to fight corruption (Drèze et al., 2017). Ultimately, Aadhaar under certain conditions becomes a tool for exclusion (R Khera, 2017), and this potential to exclude is made worse in contexts where deprivation is greatest (Drèze et al., 2017).

Secondly, studies note that access is conditional and not deterministically achieved through Aadhaar use. For example, Mukherjee & Sahay (2019) observe that the developmental and inclusion outcomes of Aadhaar are a function of the effectiveness of the relationship between the state and citizens and that material and perceptual conditions shape whether entitlement failures occur through technology or not. Besides, because Aadhaar is linked to various government programmes and their associated structures and technological

infrastructures, effective access depends on the effectiveness of these other complementary systems. A classic example is the Jan Dhan-Aadhaar-Mobile (JAM) program that combines cash accounts with Aadhaar and mobile technologies to increase uptake of financial services among the poor and marginalized (Ghosh, 2017). In such an instance, the effectiveness of access and utilization is coterminous with the effectiveness of access and utilization of mobile devices and services. Although Aadhaar is issued to all Indian residents and not just citizens, Aadhaar has been suggested to introduce technical conditions that must be navigated for bearers to realize their rights (Rao, 2019).

Aadhaar access has also been linked to identity and belonging by raising questions about whom it identifies and into what community of belonging. Furthermore, Aadhaar mediates citizenship by introducing new technical conditions that define inclusion and exclusion criteria (Nair, 2018).

Aadhaar outcomes associated with design and implementation

The third Aadhaar inclusion theme related to the entitlements view of human development emphasises the architectural and technical properties of Aadhaar that are associated with various affordances. The stream of literature points out the critical importance of Aadhaar's design and implementation in its overall success. With the 12-digit Aadhaar number that uniquely identifies its bearer, and that could empower the state to effectively govern through, and with a database (Cohen, 2019), Aadhaar's engineers created a new kind of social identification that overcomes historical limitations of family, caste, religion, ethnicity and other traditional markers of social identity. This vision was realized through the scalability of Aadhaar infrastructure, which had been designed to have open interfaces that allowed the rapid enrolment of a vast network of local human actors and technical artefacts (Rawat & Morris, 2019). In addition to scalability, the uniqueness, security and privacy of Aadhaar were of even greater concern in the design and implementation (Mir

et al., 2019). Other digital platform architectural principles such as modularity, lean core and open standards further allowed the development of a distinctly large database that supported the creation of a vibrant ecosystem of goods and services (Mukhopadhyay, Bouwman, & Jaiswal, 2019; R. Singh, 2019).

4.2 Aadhaar as a potential enabler of capabilities and functionings

Given the dominant focus on Aadhaar's application for fulfilling basic needs and social protection objectives, few studies explored Aadhaar inclusion in terms of the capabilities and functionings it might enable beyond the attainment of basic needs (Table 5).

Table 5: Aadhaar as a potential enabler of capabilities and functionings

Aadhaar inclusion theme (second level coding)	Sub-theme (first level coding)	Empirical connection to Inclusion	Study
Aadhaar as mediator of participation	Interventions at scale enable participation	Aadhaar enables effective interventions such as the Digital India literacy program that improves socioeconomic outcomes through participation	Patankar R., Vyas S.K., Tyagi D., 2017
		Aadhaar complements initiatives like the Indian Postal department utilizing its large Postal Network and high penetration in the rural areas to extend financial services to all citizens thereby promoting financial inclusion to the rural populations.	Jayaprakash, P and Pillai, R, 2018
	Aadhaar does not neutralize underlying hurdles to participation	Aadhaar reinforces inequalities by enabling unequal access that limits women's participation	Sinha S., 2018

Studies point out the benefits of Aadhaar's large scale and ubiquity for broad-based participation in programs such as the Digital India literacy program (Patankar et al., 2017), and the financial services extension scheme pursued by the Indian Postal Department to leverage its vast postal network to reach remote and underserved rural areas with financial services (Jayaprakash & Pillai, 2018). In the Digital India literacy program, Aadhaar helped to register eligible candidates, enable authentication and access to content and services, and to create a database to support program analytics and reporting to stakeholders (Patankar et al., 2017).

However, although Aadhaar-enabled capabilities like digital literacy and financial services could drive a multitude of developmental functionings, such potential is undercut by

existing gender and other divides that limit the participation of women and marginalized

groups (Sinha, 2018). This is despite the fact that transfers to women of the household

through Aadhaar could reduce diversions and improve overall outcomes (Parikh, 2013).

4.3 Other issues of Aadhaar and inclusion

A stream of Aadhaar studies consider how the developmental effects of the system

should be understood and studied (Table 6).

Table 6: Other themes of Aadhaar inclusion

Aadhaar inclusion theme (second level coding)	Sub-theme (first level coding)	Empirical connection to inclusion	Study
Aadhaar effects should be understood and studied in particular ways	Aadhaar effects materialize in relation to layers of the organizational and broader context	Aadhaar's attainment of inclusion is socially embedded, contingent, and therefore indeterminate	Avgerou C., Addo A., 2017
		Aadhaar objectives have shifted from biopolitics (linking biometric data to government policies) towards geopolitics (using biometric data to distinguish citizens from residents) under tensions between the central government's mandates and the rulings of the court	Abraham I., 2018
	Aadhaar as a social construction	Aadhaar's evolution towards inclusion and other goals have been shaped by the interpretations and alignment of various stakeholders	Sivamalai L., 2013
Aadhaar should be considered critically	Aadhaar serves vested interests	Rather than being a tool for effective governance, Aadhaar serves to subjugate citizens and to turn them into customers for corporate interests	Dattani K., 2019
		Aadhaar's promise of inclusion is a 'false pretense to cover collusion of the central government and moneyed interests to push their own interests	Satpathy T., 2017

Avgerou & Addo (2017) note that the developmental effects of digital innovations

like Aadhaar are embedded in layers of organizational and broader contexts, contingent, and

therefore indeterminate. For these reasons, the inclusion effects of Aadhaar should be

considered in relation to specific organizational and broader concerns.

The role of social shaping should also be considered in explanations of the effects of

Aadhaar because Aadhaar is a social construction that reflects the interpretations and

alignment of various stakeholders (Sivamalai, 2013). Such alignments play out at different

levels and should be considered over a long historical trajectory. For example, under tensions

between the central government's push and the rulings of the Supreme court of India,

Aadhaar has shifted from its initial biopolitical goals (linking biometrics to government

policy) towards a geopolitical one (using biometrics to distinguish between citizens and residents)(Abraham, 2018).

Studies also adopt a critical perspective on Aadhaar, noting that Aadhaar appears to serve vested interests rather than the interests of the poor. Dattani (2019) points out that Aadhaar turns citizens into customers for corporate interests and by so doing subjugates them and their data. In short, from an inclusion perspective, Aadhaar is criticized as a pretense to cover up shared goals by the government and moneyed interests (Satpathy, 2017).

5. Discussion

Returning to the question of how inclusion has been understood and realized through Aadhaar affordances in the Indian socioeconomic context, our analysis of Aadhaar inclusion studies inductively identified 6 key themes and 12 sub-themes and linked these deductively to the theoretical lens of human development suggested in section 2.3 (Table 7).

Table 7: Summary of Aadhaar inclusion studies in relation to human development

The underlying notion of human development (third level coding)	Theme of Aadhaar inclusion (second level coding)	Sub-theme (first level coding)	Number of studies
Aadhaar as a potential enabler of entitlements	Aadhaar transformative effects as socially embedded	Aadhaar embedded in government programs	11
		Human discretion and mediation important for the effective functioning of Aadhaar	3
	Aadhaar as mediator of access	Aadhaar can hinder access	8
		Access is conditional	3
		Access linked to identity and belonging	2
	Aadhaar outcomes associated with design and implementation	Design and implementation critical to success	3
		Aadhaar platform architecture underpins outcomes	2
Subtotal			**32**
Aadhaar as a potential enabler of capabilities and functionings	Aadhaar as mediator of participation	Interventions at scale enable participation	2
		Aadhaar does not neutralize underlying hurdles to participation	1
Subtotal			**3**
Unclear	Aadhaar effects to be understood and studied in particular ways	Aadhaar effects materialize in relation to layers of organizational and broader context	2
		Aadhaar as a social construction	1
	Aadhaar to be considered critically	Aadhaar serves vested interests	2
Subtotal			**5**
Grand Total			**40**

Given the high incidence of poverty in India, with 175 million people living below the international poverty line of $1.9 per capita per day (World Bank Group, 2020), and the

primary objective of Aadhaar to support social protection initiatives for the poor and marginalized, it is not surprising that entitlements have been the locus of Aadhaar inclusion. By comparison, few studies have focused on the potential of Aadhaar to enable human development through expansion of capabilities and functionings.

However, to conclude that the relative lack of focus on capabilities and functionings is indicative of its lack of importance will be erroneous. In our sample of reviewed literature, the Digital India literacy program is an example of a core capability that did not only produce intrinsic benefits (digital literacy) but also had knock-on effects in terms of the capabilities and functionings it allows within a range of socioeconomic spheres, especially among the 830 million people in India (68% of the population) who live in rural areas (Patankar et al., 2017).

Given the high illiteracy rate of 25-30% in India and almost non-existent digital literacy among over 90% of the population (DEF, 2019), such educational capability could aid the attainment of sustainable development goals related to education (Dejaeghere, 2020; Hart, 2012). As evidence of the potential knock-on effects of the capability of digital literacy, an impact assessment of the Digital India literacy program revealed that 40% of respondents in the 25,000-30,000-person survey sample used digital services on a day-to-day basis for various purposes after the program, 49.4% of unemployed respondents felt confident to explore and apply for jobs online, and 80.9% felt more aware about their educational needs (Patankar et al., 2017, p. 529).

In relation to the literature on inclusion (Bettcher & Mihaylova, 2015; Kim & Hwang, 2019), such digital identity affordances for enabling capabilities and functionings can support economic inclusion by enabling skills and opportunities to participate and to enjoy benefits of participation in various socioeconomic activities. Such participation and empowerment to

potentially earn their own income are crucial if the poor are to be economically included through the access digital identity provides to various opportunities.

However, critical for both the entitlements and capabilities approaches to inclusion is the need to address challenges to effective participation such as underlying social biases and hurdles along caste, gender, socioeconomic status, ethnicity or other social markers. Given the pervasive human mediation of Aadhaar infrastructure, it might be asking too much to expect technology *per se* to neutralize such social biases without fundamental socioeconomic reforms and improvements in government and society. Nonetheless, targeted remedies focused on specific participation barriers faced by marginalized groups and communities might usefully build upon the broad access afforded by universal digital identity such as India's Aadhaar.

5.1 Towards a framework of digital identity for inclusion

Motivated by our research question of how digital identity enables inclusion in the context of government-to-citizen or business-to-citizen interactions in developing countries, our findings show that inclusion through digital identity occurs through a combination of e-governance and human development processes.

The literature on e-governance has already highlighted the importance of collaboration between government and various stakeholders to enable good governance with ICTs. In the context of developing countries, such ICT-mediated collaboration is important because of the resource constraints and enormity of challenges governments face in addressing the complex needs of citizens and residents. Yet, so far in the literature of digital identity for inclusion, a clear theoretical link has been missing between the e-governance dimension of digital identity, and the human development dimension. Based on our findings, this paper proposes such a framework (Figure 2).

Figure 2: The role of digital identity in socioeconomic inclusion
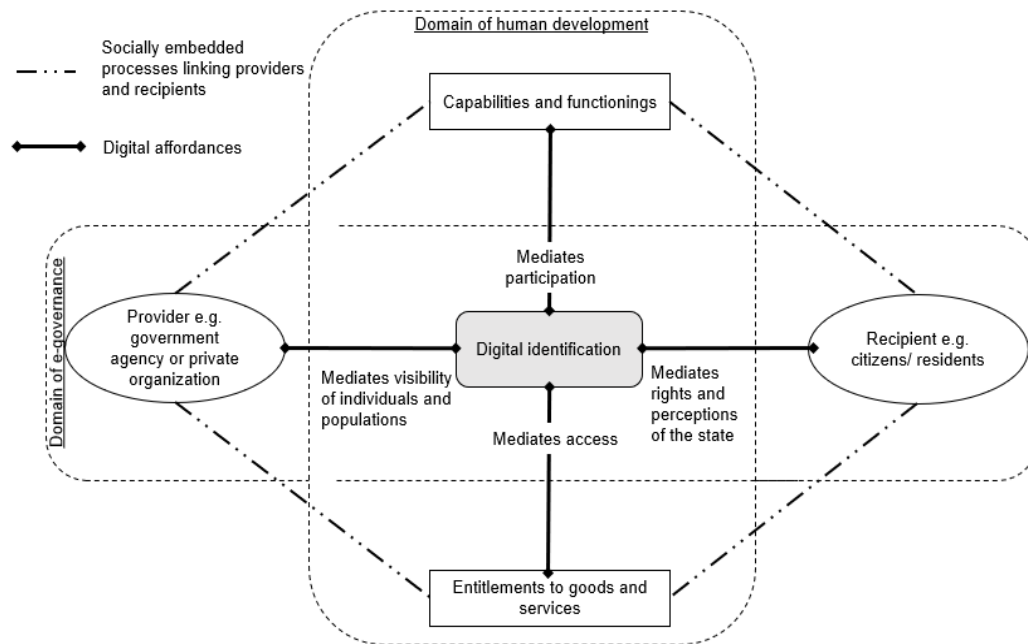
The framework suggests an overlap of two organizational domains—the domain of e-governance and the domain of human development—in the realization of inclusion through digital identity. Both organizational domains are underpinned by government processes insofar as government orchestrates or facilitates (in conjunction with other stakeholders) the provision of goods and services to recipients (citizens or residents) to fulfil their entitlements or to expand their capabilities and functionings.

Entitlements, capabilities and functioning represent objective and subjective aspects of human development that might be realized through a range of goods, services, and socioeconomic arrangements. Various socially embedded processes that require information and social coordination connect providers like the government or businesses to recipients during the exchange of goods and services. Such socially embedded processes might occur within hierarchies (e.g. government agencies), markets (e.g. businesses) or networks (e.g. communities and cooperatives) (Grahame et al., 1991), and might include everyday activities such as qualifying for government benefits (within the government hierarchy), proving identity to open a bank or mobile phone account (within the markets), or registering to participate in a local savings cooperative (within networks).

Our findings suggest that digital identity could mediate inclusion through 4 key ways: (1) the mediation of recipient visibility for providers like the government or business through *datafication,* that is, the collection and aggregation of individual data and its linking to service delivery (Das & Masiero, 2019; Mukherjee & Sahay, 2019; Mukhopadhyay, Bouwman, & Prasad, 2019) (2) the mediation of rights and recipients' perception of the state by *reconfiguring the interfaces with governance* (Masiero, 2014, 2016; Rao, 2019) (3) the mediation of access to entitlements (Mukhopadhyay, Bouwman, & Jaiswal, 2019; Srivastava & Sharma, 2017) by providing *authentication* thereby materializing identity and making it less negotiable, and (4) the mediation of participation for capabilities and functionings by *tailoring programs to target particular beneficiaries* (Jayaprakash & Pillai, 2018; Patankar et al., 2017).

These 4 inclusion mediation channels could be conceptualized as inclusion affordances of digital identity because rather than being inherent properties of digital identity systems, they are potentials that emerge and are realized as a result of the nature of interactions between actors and the technical artefacts of digital identity in particular action domains.

Relatedly, findings of the 6 Aadhaar inclusion themes suggest that the espoused effects of Aadhaar are not straightforwardly determined by technology alone. As has been suggested by decades of information systems research, social and organizational phenomena like inclusion through digital identity unfolds through complex interactions between social and technical factors whose outcomes are not always as expected by design (Damodaran et al., 2005; Sawyer & Jarrahi, 2014). Outcomes are socially conditioned, historically shaped, and influenced by the organizational and broader contexts within which change happens (Avgerou & Addo, 2017). Furthermore, as the work of activists and the Indian Supreme Court demonstrate, critical vigilance is needed across government and society to safeguard

against the dark sides and unintended effects of digital identity such as exclusion or the harmful encroachments that enhanced, near-universal visibility allows the state.

5.2 Contributions

The proposed framework contributes a theoretical explanation of how digital identity might enable inclusion in a developing country context through 4 main inclusion affordances that connect e-governance and human development processes. By combining insights and theoretical perspectives from e-governance and human development, the framework enriches the literature on e-governance for development (Adler, 2010; Backus, 2001b; Gianluca Misuraca, 2010; Heeks, 2001; Madon, 2009b) by showing how digital identity might enable inclusion as both an objective and subjective condition of human development. More specifically, our framework answers an important call on "the need to unpack the theoretical link between digital identity and development, visualising the routes through which different elements of development may be entailed" (Masiero & Bailur, 2021, p. 3). This could have relevance for government policymakers, development practitioners, and service providers, as it makes more explicit the potential relationships between digital identity, e-governance, and human development, and in so doing, provides direction for digital identity program development.

Implications and limitations

So far, in development contexts like India's, the notion of inclusion has been shaped through social and political discourses that are rooted in the country's historical, socioeconomic, political, and cultural context. Such discourses tend to reflect and therefore reproduce ongoing dynamics or existing biases in the society (Sen et al., 2019). Digital identity has been deployed so serve such socially shaped notions of inclusion, without theoretical underpinning that connects the broader e-governance domain within which digital identity affordances are embedded, and the human development domain where the effects of

inclusion are expected to be realized. As a result, as per our findings from extant studies of Aadhaar, the approaches of inclusion do not comprehensively attend to objective and subjective aspects of human development but tends to overemphasize inclusion as merely the attainment of basic needs.

In our study, the bias towards inclusion as entitlements-based rather than expansion of capabilities and functionings relates to the specific developmental and socio-political context of India which has significant populations of vulnerable poor and a long history of state commitment to social protection. Given that developing countries span a broad spectrum of socioeconomic and political conditions, it is possible and perhaps likely that the balance in emphasis between an entitlements versus capability approach might vary significantly as countries pursue different priorities and strategies at different stages of their development. Consequently, the single empirical setting upon which the framework is based (India's Aadhaar) might be critiqued as a limitation of the study.

Cases of digital identity in other developing countries might reveal important differences and noteworthy considerations. For example, unlike the Indian government that has actively pursued a strategy of seeding Aadhaar into various government programs as part of a broader inclusion vision, developing countries have miscellaneous motivations for implementing national identification schemes such as surveillance and security, fair and democratic elections, and fostering national unity (Biscaye et al., 2015). This emphasizes the point that without an explicit objective by governments to link national identification schemes to socioeconomic objectives, and specifically to inclusion as has been the case with India's Aadhaar, there can be no automatic expectations of inclusion or human development effects resulting from digital identity (Avgerou & Addo, 2017).

Nonetheless, within the broader discourse of digital identity, inclusion and human development (Gelb & Metz, 2018a; World Bank Group, 2019), the case of India's Aadhaar is

revelatory (Yin, 2009) and richly illuminates the potential implications of digital identity for socioeconomic inclusion. As a result, our framework identifies the key theoretical issues related to digital identity and inclusion and further points to the crucial complementarity between objective basic-needs inclusion through entitlements and broader capabilities and functionings to promote subjective well-being.

6. Conclusion

National digital identity schemes are notoriously difficult to get right even in richer countries. With few exceptions such as Hong Kong's e-identity card, the principal narrative is typically one of low adoption and failure to meet objectives (Goodstadt et al., 2015). Yet, Aadhaar has not only achieved near-universal adoption in India, but more importantly, it appears to have defied an important cautionary tale from the standpoint of development: the tendency of large centralized government projects to fail in advancing their developmental objectives (Scott, 1998). In doing so, it shows promise for other developing countries aspiring to improve the lives of the vulnerable poor through digital identity and e-governance.

Aadhaar's main promise of inclusion—a significant undertaking from a socioeconomic perspective (Nilekani & Shah, 2015; Unique Identification Authority of India (UIDAI), 2012c)—has however been underexplored from a theoretical standpoint. The notion of inclusion has not been explored in relation to theories of human development and the affordances of digital identity in e-governance.

This study has taken up this problem by reviewing the extant literature on Aadhaar inclusion to map out its set of themes in relation to what is known from a diverse body of literature on inclusion and human development. The resulting framework that identifies inclusion affordances of digital identity, combines insights from the e-governance literature and human development to improve understanding of the implication of digital identity for inclusion.

As in the example of Aadhaar, national digital identity can occasion profound organizational, economic, political and social changes on a large scale in a relatively short period. While such changes are not without conflicts, criticisms, and agitation, they might offer a path for advancing human development. The challenge, therefore, may be to critically engage with "how Aadhaar [and digital identity systems generally] can be made to work [better] in practice while supporting broader development objectives rather than debating whether they are inherently good or bad" (Mukherjee & Sahay, 2019).

Future studies may explore digital identity projects in other developing countries and their link to inclusion to extend understanding of inclusion affordances in a wider range of contexts. The link between digital identity and human development through expanded capabilities and functionings should also be further researched, particularly in terms of the contributions of the markets and networks to provide alternative or complementary goods and services to government's.

In addition, although Sen's entitlements and capability approach provide a useful basis to explore the developmental and inclusion implications of digital identity, they are in no way exhaustive or exclusive theoretical foundations and should not be considered as precluding other perspectives. For example, even though the emphasis on socioeconomic inclusion is coherent with Sen's theoretical positions on human development as drawn upon in this paper, there are other theoretical positions and aspects of human development and well-being that have not been considered. Future work could usefully contribute by exploring these.

Finally, while this study has sought to present the view of digital identity and inclusion emerging from the range of themes in extant research, it is important to critically examine and act upon the potential of technology to actively exclude (or more often, to fail to bring about inclusion). For digital identity and e-governance to contribute effectively to

building a better world (Walsham, 2005), efforts to realize the potential of digital identity for

inclusion could be usefully accompanied by vigilance against potential injustices, abuse, and

perverse outcomes.

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Appendix

Appendix 1: List of Aadhaar studies reviewed

Publication Type	Publication Outlet	Study
Journal article	South Asia: Journal of South Asia Studies	Baxi, P, 2019
		Chaudhuri B., 2019
		Cohen, L, 2019
		Jayal N.G., 2019
		Rao U., 2019
		Singh R., 2019
	Economic and Political Weekly	Drèze J., Khalid N., Khera R., Somanchi A., 2017
		Khera R., 2017
		Masiero S., 2015
		Parikh K.S., 2013
	Information Communication and Society	Masiero S., Das S., 2019
		Singh P., 2019
	Contemporary South Asia	Chaudhuri B., König L., 2018
		Nair V., 2018
	East Asian Science, Technology and Society	Abraham I., 2018
		Abraham I., Rajadhyaksha A., 2015
	Government Information Quarterly	Mir U.B., Kar A.K., Dwivedi Y.K., Gupta M.P., Sharma R.S., 2019
		Mukhopadhyay S., Bouwman H., Jaiswal M.P., 2019
	Political and Legal Anthropology Review	Dandurand G., 2019
	Oxford Development Studies	Bhatia A., Bhabha J., 2017
	Politics and Policy	Rawat P., Morris J.C., 2019
	International Journal of Development Issues	Ghosh S., 2017
	Area	Dattani K., 2019
	Health and Technology	Satpathy T., 2017
Conference Paper	ACM International Conference Proceeding Series	Mali N.V., Avila-Maravilla M.A., 2018
		Mukunthan A., Agarwal G., 2019
		Patankar R., Vyas S.K., Tyagi D., 2017
		Sengupta D., Shastri N., 2019
	IFIP Advances in Information and Communication Technology	Mukherjee A., Sahay S., 2019
		Sivamalai L., 2013
	International Conference on Information Systems 2018, ICIS 2018	Seetharaman P., Pant A., 2018
	Americas Conference on Information Systems,	Masiero S., 2016

	International Conference on Information Resources Management	Jayaprakash, P and Pillai, R, 2018
	COMPASS 2019 - Proceedings of the 2019 Conference on Computing and Sustainable Societies	Sen A., Ghatak D., Kumar K., Khanuja G., Bansal D., Gupta M., Rekha K., Bhogale S., Trivedi P., Seth A., 2019
	Proceedings of the 2017 ITU Kaleidoscope Academic Conference: Challenges for a Data-Driven Society, ITU K 2017	Kotwal V., Parsheera S., Kak A., 2017
	Conference on Human Factors in Computing Systems - Proceedings	Singh R., Jackson S.J., 2017
	Electronic Journal of Information Systems in Developing Countries	Masiero S., 2018
Book Chapter	Reflecting on India's Development: Employment, Skill and Health	Sinha S., 2018
	The Routledge Companion to Management Information Systems	Avgerou C., Addo A., 2017
	Technology, Society and Sustainability: Selected Concepts, Issues and Cases	Srivastava A.K., Sharma S., 2017

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