

Technochange and Identity Politics: Aadhaar and the Reform of Social Protection in India

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ABSTRACT

The vision of technology as a “carrier” of policy shapes much of the existing discourse on e-governance for development. In this paper we explore the reverse relation, i.e. the feedback effects that IT infrastructures yield on the social policies that they are supposed to advance. We do so with a case study of the Unique ID Project (Aadhaar), which is augmenting India's Public Distribution System (PDS) with biometric recognition of its users. Drawing on a pilot project of Aadhaar-enabled PDS in Kerala, south India, we discover a set of mechanisms through which IT infrastructures affect the reform of social protection, hence influencing the development trajectories of the states adopting them. Implications are observed in terms of the synergies that development managers need to help establishing, if ICT-based reform of social protection is to function properly for beneficiaries.

Keywords: ICT4D, e-governance, social protection, food security, Aadhaar, India

INTRODUCTION

The theme of e-governance is central to the study of information and communication technologies (ICTs) for development. The potential for ICTs to improve governance has been widely recognised in the literature: as synthesised by Heeks (2001), e-governance has been viewed as the “ICT-enabled route to good governance”, and seen as a practical tool to tackle institutional frailty. In the early days of the field’s history, a “tool-and-effect” logic led the discussion, seeing technology as the heart of the solution to problems of effectiveness and accountability of governance (World Bank, 1999; UNDP, 2001). This is important especially in developing nations, where state failure can have very severe consequences on the lives of the poor and vulnerable (Corbridge, Srivastava, Williams & Vèron, 2005).

Yet, a tool-and-effect logic proved unable to tell the full story of ICTs’ participation in governance. Over the last 10-15 years, literature on failure in ICT4D projects has been growing fast, and posed theoretical problems with which research in the field has engaged directly (Heeks, 2002; Dodson, Sterling & Bennett, 2012; Masiero, 2016). In particular, it leads to question the “tool-and effect” logic of the early days: it does instead inform a different set of hypotheses on ICT4D, according to which technology is only as good as the policy decisions that it embodies. The idea of technology as a “carrier of policy” (Cordella & Iannacci, 2010) is at the heart of this line of reasoning, stating that ICTs embody the decisions of governors, who inform the design of artefacts to advance their own agendas.

So devised, the vision of technology as a “carrier of policy” has loomed large in ICT4D. The question is, to what extent does this paradigm capture the theoretical link between ICTs and governance? On the one hand, compared to a deterministic tool view, it seems to provide a more faithful representation of reality. Yet on the other hand, the rationale for investigating the matter further is twofold. First, the logic of technology as a “carrier of policy” describes how artefacts are informed by governors’ ideas, but says little about the reverse process, i.e. how technology may in turn reshape the policies that it is supposed to advance. Second, the effect of this mutual shaping on socio-economic development is unclear: yet, if we are to take Walsham’s (2012)

invitation to “make a better world” with ICTs, the feedback of ICT-based policy reform on development should be openly taken into account.

This paper advances the hypothesis that technology does not only “carry” policy, but actively “reshapes” it in ways that affect the development trajectories of the countries involved. To explore this hypothesis, it presents a study of the ongoing computerisation of the Indian Public Distribution System (PDS), the main food security programme in the nation, under the aegis of the Unique ID project (Aadhaar), a central governments’ scheme enabling the biometric identification of all the citizens enrolled. The most recent Economic Survey (Government of India, 2015) openly recommends radical reform of the social protection system on Aadhaar’s basis: here we explore the rationale and dynamics of reform, using data from a state (Kerala) which conducted a pilot project of biometric transformation of the PDS.

Studying Aadhaar’s role in social protection, we discover a set of mechanisms through which biometric technology affects its underlying policies, in turn reshaping the development trajectories in which it participates. At the micro-level, the system leads to monitoring a specific part of the PDS supply chain, i.e. the *ration dealers* (last-mile retailers) on whom much of the corruption in the programme is blamed. At the macro-level, states can appropriate the same technology, aimed at reshaping the PDS with a cash transfers’ programme, to protect the programme in its existing form, and defend the values of resource redistribution that it advances. Aadhaar’s infrastructure hence envisages a new direction for development, which states can partially renegotiate according to local visions and priorities.

Viewed in normative terms, this argument is crucial for the making of alliances, intended as the synergies that inform the good functioning of anti-poverty schemes. In particular, we identify three critical sets of alliances to be established between policymakers and frontline providers, between policymakers and system designers, and between policymakers/frontline providers and the beneficiaries of social safety schemes, whose entitlements need to be guaranteed by social protection. If anti-poverty programmes are to be reshaped by ICTs, these sets of alliances need to work together, and the case reviewed here yields lessons of alliance management for other states computerising their anti-poverty programmes.

This paper is structured as follows. We first explore the logic of e-governance as a “carrier of policy”, and its implications for the study of ICT adoption and social protection reform. We then articulate the idea that technology may instead “reshape” policy in a deeper way, and illustrate it through the example of the PDS reforms advanced by Aadhaar in Kerala and in India at large. We then illustrate the micro- and macro-level effects of the adoption of biometrics on anti-poverty policy, detailing the impact that this has on the development trajectories of its adopters. On this basis, we sketch out the main alliances that operate in e-governance for development, and highlight the synergies that need to be enhanced for ICT-based social protection to function properly.

THEORETICAL PERSPECTIVE: TECHNOLOGY AS A SHAPER OF POLICY

Over the last two decades, developing nations have increasingly adopted ICTs to improve the effectiveness of government processes, a widely studied phenomenon in information systems literature. In this domain, the study of computerisation of anti-poverty programmes is a relatively recent trend, called for by diffusion of ICT usage in social safety nets (Bussell, 2012; Pritchard et al., 2013). This has generated a novel sub-domain of e-governance, in which the IT artefact plays a central role as an enabler of social safety schemes and ultimately of greater poverty reduction.

In the early days, a tool-and-effect logic dominated the discourse on ICTs and poverty alleviation (Heeks, 2014). At this time there was, if at all, little problematisation of context and conditions: e-governance found its rationale, at large, in the improvement of effectiveness and accountability of social safety nets. Albeit deterministic in nature, this logic fitted the early-days purpose of the discourse, leading to identification of best practice for ICTs to improve social security mechanisms. This was, as of Orlikowski and Iacono (2001), a “tool view” of technology for poverty reduction, depicting technology in terms of the objectives that its material features were meant to pursue.

However, this logic soon proved suboptimal to account for the use of technology in anti-poverty programmes. This was because a “tool view” ended up neglecting relevant mechanisms instead

of unpacking them, preventing the observer from making sense of the conditions under which ICT-based intervention could actually work. Data from the last World Development Report (World Bank, 2016), according to which one third of development projects worldwide are rated unsuccessful, are familiar to scholars in ICT4D: as noted by Heeks (2003), most projects in this area result in failure, and taking stock of this is important for any constructive intervention to be designed. Heeks' seminal explanation of failure points to "gaps" between reality and the perceptions held by designers, which prevent them from providing interventions tailored to the actual needs and requirements of beneficiaries.

As theorised again by Orlikowski and Iacono (2001), moving beyond a tool-and-effect logic leads to a vision in which technology is *embedded* in its context of action, and emerges from it while at the same time influencing its dynamics. The notion of social embeddedness, widely affirmed in information systems (Madon, 2009; Anifalaje, 2011; Avgerou & Li, 2013), is itself predicated on the ensemble view: technology is not simply a dependent variable, but generates feedback mechanisms that shape the dynamics around it. Over the last decade, social embeddedness has gained substantial grounds in ICT4D, countering (as in Avgerou 2008) the notion of "technology transfer" in this domain. According to a socially embedded vision, technology is not necessarily *transferred* to the developing world, but conceptualised and constructed according to locally relevant needs.

And still, here we are dealing with the specific theme of social protection of the poor and vulnerable. It should be observed that, in this domain, a theory of technology as socially embedded needs more specific propositions, as social policy principles (seldom considered openly in ICT4D) need to be taken into consideration. There are, in particular, two principles that matter highly to construction of a theoretical perspective on this topic.

First, social safety schemes are informed by an intrinsic *rationale*, that is the core objective for which they were conceived (Subbarao, Del Ninno, Andrews, and Rodriguez-Alas, 2013). For example, a food security programme finds its rationale in guaranteeing people's right to adequate nutrition, and a workfare scheme has the ultimate purpose of ensuring employment in change for a wage. The rationale of a programme informs the way in which the scheme is designed, and the

policy mechanisms that it involves. As a result, IT artefacts should be designed in continuity with their rationale.

Second, social safety nets are the expression of underlying *political* programmes, put forward by their policymakers (Cordella & Iannacci, 2010). Social policy design is indeed a political exercise: different views will lead, for example, to more or less narrow targeting of schemes, or to different propensities to rights-based approaches. Furthermore, social safety nets are often at the core of electoral promises: their making is an integral part of electoral competition, and mobilises existing party interests around them (Mooij, 1999). The discourse that views technology as a “carrier of policy” hence considers IT artefacts beyond their physicality, depicting them as the material embodiments of the policy agendas that they put forward.

The logic of technology as a “carrier of policy” has become deeply entrenched in ICT4D. But the field has evolved rapidly over the last decade, leading us to suspect that this logic may not fully account for the intertwining of technology and policymaking. On the one hand, it is reasonable to assume that technology embodies the objectives of the policymakers behind it: yet on the other hand, this logic blackboxes the feedback effect that ICT systems may yield on the policies themselves. Information systems literature reminds the reader that technology invites human action along specific guidelines: to say that with Kallinikos (2011), contemporary politics are “governed” through technology, and overlooking the feedback effects of ICTs would mean bracketing an important part of the picture.

This is the type of dynamics that we seek to explore in this paper. In a world in which technology is, if not ubiquitous, more and more entrenched in development efforts, the effects of its adoption on long-term development has to move to the center of scholarly attention (Davison, 2012; Qureshi, 2015). When it comes to poverty reduction, consequences of technology uptake on the “substantial unfreedoms” that affect poorer people’s lives (Sen, 2001) are paramount. It is hence important to consider the idea that technology, beyond carrying policy, may act as a *shaper* that directs it towards specific routes and objectives.

On this basis, the working hypothesis examined here is that ICT adoption may influence the course of social protection reform in a developing nation. To study this we need an IT infrastructure entrenched in the making of social welfare schemes, and this led us to focus on adoption of biometrics in the Indian Public Distribution System (PDS), the largest food security net in the country.

FIELDWORK, DATA AND METHODS

Across eight months in 2011-2012, we have conducted an interpretive case study of the biometric PDS in the state of Kerala, using a qualitative method of data collection and analysis. Our data collection has relied primarily on 126 in-depth interviews with actors participating in the processes of interest, with particular reference to three social groups:

- Actors involved in the PDS, that is, the state-, district-, and village-level implementers of this anti-poverty scheme. These include state level actors, based at Department of Food and Supplies that administers the program, and the micro-level actors within villages, in particular PDS shop owners and local officers. Data collection has been performed in 18 ration shops and 9 panchayat offices (village offices) across the state.
- Actors involved in digitalisation of the PDS, ranging from the software developers of the programme (based at the National Informatics Centre – NIC Kerala) to its primary implementers, both at the level of ration shops and at that of telecentres, where registration for biometric recognition under the Aadhaar project is conducted. Collection of narrative data has been conducted in 16 telecentres across the state.
- Recipients of the PDS, that is, citizens that benefit from it. The large majority of interviews with users were conducted in the ration shops where they access the food security system. A total of 56 interviews were conducted with beneficiaries.

The choice of interviewing users inside ration shops was for two reasons. First, the pilot project of inscription of biometric recognition in the PDS was first introduced in a set of ration shops in Trivandrum, and the shop is hence the state-citizen interface that the adoption of biometrics aims to transform. Second, while all below-poverty-line (BPL) citizens are entitled to the PDS, not all of them actually use it (Khera, 2011): working in the ration shops, where they physically access the PDS, allowed us to select actual users of the programme to be interviewed. In addition, we have interacted with respondents revolving around the system in different ways, such as politicians, volunteers at pro-poor organisations, and activists campaigning for people's right to food.

The narrative method, as codified in Mishler (1986), has inspired our data collection and analysis. In particular, Mishler defines the interview as a *co-constructed* situation, in which the respondent and the interviewer share equal power in the construction of meaning. In this technique, the two pre-codified roles of respondent and interviewer leave room for a broader, partially unstructured schedule of action: the questions asked by the interviewer are designed to trigger narrative recounts, which the respondent can articulate as preferred. As a result, the narrative is configured as what emerges from the account of the interviewee, and is developed according to her choices, in terms of the order and relevance of the narrated events. Conceiving our interviews as co-constructed "narrative events" has allowed us to maximise input from respondents, and obtain rich descriptions of their interpretations of the phenomena that we aimed to make sense of.

Our interview data have been triangulated with participant observation in the sites where narratives were collected, as well as with the use of statistics, press releases, and government information on the program. The corpus of data obtained from fieldwork has then been subjected to thematic analysis, intended as the examination of content through categories clustered around thematic units (Riessman, 2008). In particular, we have identified a set of thematic units referred to the relation between Aadhaar and the food security system, which allowed, as described in the Analysis, to juxtapose a view of technology as a "carrier" of policy to a view of technology as a proactive "shaper" of it. Narrative data, integrated with observation of the dynamics at work,

have provided the basis on which to examine the multiple links between Aadhaar and social protection.

Finally, the last year has seen the publication of the Economic Survey (Government of India 2015), marking an open veer of the Indian central government towards adoption of Aadhaar to radically transform the PDS. This has required an additional round of policy analysis, conducted to compare and contrast the decisions of the central government with those taken at the state level. Our findings have been re-read in the light of the new policy agenda, which has been instructive in unpacking the adoption of the very same technology for different policy objectives.

CASE STUDY: AADHAAR AND THE INDIAN FOOD SECURITY SYSTEM

The purpose of the PDS is that of providing primary necessity goods (mainly rice, wheat, sugar and kerosene) at subsidised prices to households below the poverty line, thereby improving their nutritional levels and welfare. Rather than on imports, the PDS relies on internal redistribution of commodities: foodgrains are reallocated from surplus states to food-deficit ones, through a centralised redistribution system. The reallocation mechanism is governed by the Food Corporation of India (FCI), a central government agency that buys goods from private producers at the minimum support price, and redistributes them to all states based on theoretical requirement (Tritah, 2003).

The PDS supply chain has three main phases. Firstly, goods procured from the FCI and private producers are distributed at the district level through Authorised Wholesale Dealers (AWDs). These are then lifted from the local AWD by fair-price shop owners, and finally, beneficiaries buy them at subsidised prices from fair-price shops, again known as *ration shops* as goods are rationed on a monthly basis. In the shops citizens encounter the *ration dealers*, who are the agents in charge of selling them subsidised items under the PDS. Encounters with ration dealers, whether well-functioning or ridden with frustration, play a major role in poorer people's sightings of the state.

The PDS was originally universal, meaning that all citizens could access it. Yet in the fiscal crisis of the 1990s, international funding institutions criticised the scheme's leakage to the non-poor, which resulted in "meagre transfer at exorbitant cost" (Radakrishna & Subbarao, 1997). This was at the root of the move to a targeted system in 1997: in the targeted PDS, entitlement is related to poverty status, and aimed specifically to the households classified as below the poverty line (BPL). However, the policy shift determined a set of perverse effects, of which the case of Kerala is paradigmatic.

Before 1997, Kerala operated the best PDS in India (Swaminathan, 2002; Khera, 2011). In fact, under the universal system, it catered to 97% of the state's population (George, 1979), and its impact on beneficiaries' nutritional status was high and significant (Kumar, 1979). This was very relevant in Kerala, a state whose food-deficit situation, *per se*, would put people's nutritional security in peril. The Keralite system, and the operational efficiency that characterised it, were based exactly on the universality of PDS, and on its capability to serve almost the totality of the population.

And yet, the shift to a targeted system in 1997 overturned the situation, causing major ruptures in the scheme. The new system, allocating goods to each state based on poverty incidence, reduced supply of PDS goods to Kerala to less than 10% of the pre-targeting amount (Swaminathan, 2002). In parallel, users termed as above-poverty-line (APL) were *de facto* phased out, as they were subjected to only very limited subsidy on food.¹ As per Khera's estimates (2011: 107), state-wide purchases of foodgrains from the PDS have dropped from 4.64 tonnes in 1997 to 1.71 in 2001, largely because many APL households abandoned the system, as left with meagre subsidies on lower-quality PDS goods. As a result of the drop in their customer base, many ration shops became unviable and closed down, resulting in a wave of suicides among the indebted ration dealers (Suchitra, 2004).

¹ In Kerala, as in most Indian states (with the exception of Tamil Nadu, which maintained a universal PDS), the move to a targeted system resulted in the dichotomy between the APL, left with a very limited subsidy, and the BPL households, for whom the subsidy remains substantial. In 2000, the Antyodaya Anna Yojana (AAY) scheme was introduced, for the poorest of the poor to receive greater quantities of subsidised foodgrains.

What targeting has left in Kerala is a collapsed system, ridden with issues that were not there at the time of universal coverage. One of the symptoms of collapse is leakage, which is severe at the national level too. Indeed, as commodities flow from FCI and private producers to AWDs, and from there to ration shops, a high share of goods is lost in the process, mainly due to illegal sales on the private market.² This phenomenon, popularly known as *rice mafia* (rice is the staple commodity in the PDS), may put the whole PDS at risk, and persistence of leakage in spite of reform is the core argument by those advocating substitution of the PDS with cash transfers (Bhalla, 2011; Gulati & Saini, 2015). And still, leakage has triggered reforms at the state level, which in several cases have been successful (Himanshu, 2013; Drèze & Khera, 2015).

In Kerala the digitalisation of PDS, delegated to the National Informatics Centre (NIC), has been at the core of the programme's reconstruction. Computerisation was conceived to monitor the PDS supply chain, hence detecting and preventing foodgrain diversion. Government officials, and the NIC staff that we have followed during implementation, were adamant on the anti-leakage nature of the effort, and the IT-based PDS was indeed built with the purpose of combating the rice mafia, by detecting diversion through digital monitoring. To achieve this purpose, reconstruction of the programme was phased in two parts, a first one in which infrastructure was built and a second one, still ongoing, in which it is being augmented with Aadhaar's biometric recognition.

In the first phase, NIC developed a suite of software articulated in three modules, out of which a front-end one involving citizens, and two back-end ones used by staff at TSOs. The front-end interface consisted in a Ration Card Management System (RCMS), a workflow-based application for ration card requests: once received through the registration counter, applications are verified by rationing inspectors, who then submit them to the TSO for approval. Applications are performed through Akshaya centres, the telecentres (Internet kiosks managed by the state government, but owned by private entrepreneurs) operating across the state. This has shifted the *locus* of application from busy public offices to more citizen-centric e-kiosks (Madon, 2005).

² As noted by Khera (2011b), even if losses occur in transportation and storage too, the standard methodological procedure is that of attributing all leakage to diversion, as a result of the frequency of this practice.

The two back-end functions pertain, respectively, to allocation of goods and inspection of the ration shops in the state. Through a programme named Allocation 2.0, TSOs can ascertain the requirement of each ration dealer in their area, and allocate PDS goods to them consequently. As a result, all shops should have enough stock to deliver monthly rations to all households registered with them. Another application, called an Inspection Monitoring System, is a database of inspections conducted by officers in all ration shops, to combat involvement of ration dealers in illicit trade of PDS commodities. These functions, while back-end, are instrumental in combating leakage.

But it is the second phase of digitalisation, aimed at rebuilding state-citizen encounters in the ration shops, that affects the beneficiaries most visibly. This phase involves integrating PDS with Aadhaar, the unique identification system devised by the Unique Identification Authority of India (UIDAI).³ The Aadhaar project aims at solving identification issues, by endowing each citizen with a 12-digit number and registered biometric details (fingerprints and an iris scan). Massively high rates (above 95%) of Aadhaar enrollment in Kerala, strongly fostered by the current government, make it technically possible to use it for access to anti-poverty schemes. While debate around the ethics/legality of this is fervent, a pilot project in Trivandrum has started this phase: a set of ration shops have been endowed with point-of-sale machines, performing Aadhaar identification to ascertain users' entitlement to the PDS. In this way, at least on paper, only registered users can be sold subsidised goods.

The policy rationale behind this measure is quite straightforward. A frequent practice of ration dealers is that of attaching bogus cards, whose number is not registered in the system, to their shops. By registering sales to fake users as real, they can mask illegal sales to the market, and make their activity appear normal in the registers checked by the inspectors. Biometric recognition, by linking each user to its own biometric details, ensures that sales are only made to real beneficiaries, as all transactions, in the new system, need to be matched by a valid Aadhaar number. This implies a twofold accountability mechanism: first, non-genuine beneficiaries are

³ In September 2013, an order by the Supreme Court of India has forbidden states to make enrolment in social programs conditional to Aadhaar registration. Hence, if biometric recognition of PDS users is rolled out, a mechanism will be needed to guarantee PDS access to those who are not enrolled in Aadhaar.

excluded from subsidy, and second, ration dealers are prevented from selling goods to non-entitled users.

Our fieldwork was conducted before a new national government, led by Narendra Modi's National Democratic Alliance (NDA), openly voiced the intention to replace the PDS with a cash transfers programme, and envisaged operational measures to conduct the shift. To do so, Aadhaar is being combined with a financial inclusion programme (Jan Dhan Yojana) and mobile technologies: Jan Dhan Yojana aims at providing each household with a bank account, which will be the backbone infrastructure to transfer benefits to those entitled. The combination of Jan Dhan Yojana, Aadhaar and mobile payments, acronymised as "JAM trinity" in the government's narrative, is being planned with the explicit purpose of rebuilding the nation's anti-poverty system, converting existing subsidies into a lump-sum transfer to the BPL. This new intentionality is taking shape in the present debate, and needs to be considered as we analyse the link between technology and policymaking in the PDS.

ANALYSIS

Having described the programme's functioning, we now analyse it according to two complementary paradigms, respectively seeing technology as a "carrier" and a "shaper" of social policy. The former paradigm details the rationale and policy agenda embodied in Aadhaar's inscription in the PDS. The latter explains the feedback effects of Aadhaar's adoption on food security policy, demonstrating its actual and potential effects on the development trajectory in which it participates. This leads us to introduce the paradigm of technology as a "shaper" of policies in ICT4D.

Technology as a Carrier of Policy

The rationale for using Aadhaar in the PDS is stated clearly by policymakers, and lies in a problem-solution nexus between what is depicted as the root cause of PDS leakage and the biometric technology devised to fight it. Government staff is very explicit on the presence of

leakage, which is uniformly seen as due to the ubiquity of the rice mafia within the state. While losses in transportation and storage are acknowledged, they are almost never cited as a reason for leakage: this is blamed on the black market networks, on which BPL rice is sold for much higher prices.

Crucially, the causal mechanism goes even further than that. A core question is on *which* actors are actually involved in the rice mafia: while PDS supply chains can be long, we found almost unanimous attribution of blame to the ration dealers. All too often, ration shop customers are turned down with the excuse of having “ran out” of stock, and shop sometimes remain closed for many weeks. Government officials are adamant on ration dealers’ guilt, and this surfaces in their words:

In Kerala there are a lot of bogus cards, which copy existing ones or make up households that do not exist (...) it is the ration dealers that fabricate bogus cards, not the customers. So they can pretend having sold goods to the BPL, when instead they have sold them elsewhere. (Rationing Inspector, Trivandrum)

This thread of narrative, centred on ration dealers’ guilt for diversion, constitutes the first side of the problem-solution nexus explored here. The solution is embodied in the integration of Aadhaar in the PDS, and is grounded on a link between biometric technology and the nature of diversion. This link is in turn articulated into three mechanisms, all embedded in the functioning of the Aadhaar system.

The first mechanism lies in secure identification of customers through biometrics. As noted above, the main means for ration dealers to divert foodgrains is based on bogus cards: these are registered in the shops, in order to mask illegal sales to the black market. By linking each card to the biological data of the owner, biometrics will make this virtually impossible: point-of-sale machines, as they are constructed, require recognition of customers’ fingerprints for transactions to be allowed. As reported by a senior member of staff at the Kerala State IT Mission (KSITM):

Ration cards have barcodes (...) often they are copied, and ration dealers claim false sales as a result. With Aadhaar, there is no risk of this, because control will be biometric.

Yet, this mechanism would *per se* be insufficient, if the e-PDS did not provide a way to check that *all* transactions happen through point-of-sale machines. And this is where the second mechanism comes about: beyond checking the identity of buyers, point-of-sale machines register exactly the amount of goods sold at every transaction. This makes it possible to determine the requirement of each shop, and to allocate commodities on a monthly basis: the monthly bill, summing up all transactions conducted through Aadhaar, is the basis on which allocation for the subsequent month is provided. This leaves no room for “inventing” sales, as noted by another senior official at KSITM:

The system will reveal what goods are sold, and to whom. Ration dealers (...) claim that stocks have finished, and sell them on the market. But now, the system will be able to track exactly who buys what.

To conclude, the third mechanism acts on the incentive of ration dealers to cheat their customers, by pretending having run out of goods – or selling them at above PDS prices. At present, all households are registered with a ration shop, and cannot decide to opt out of it in case that irregular behaviour is suspected. Aadhaar is instead constructed to imply “portability”, as biometric authentication can be performed from everywhere. This means that citizens, once this is scaled up to the whole state, will be able to access the system from any ration shop: as a NIC officer told us,

Ration dealers will be unable to count on their usual customers, because people will be able to buy [PDS] food from everywhere (...) they won't be able to compete if they continue their cheating.

These three mechanisms, attached to Aadhaar and its integration in the programme, complete the narrative used by the government to present the biometric PDS. The two elements characterising the logic of technology as a “carrier of policy” are evident here: the rationale is that of combating leakage in the programme, targeting the last mile constituted by transactions in the ration shops. The policy agenda behind this is evident too, embodying specific assumptions and priorities: this depicts the ration dealers as the guilty part, and informs a system that monitors them closely, as opposed to enabling holistic monitoring along the whole PDS supply chain.

Technology as Shaper of Policy

From the above, we understand the embodiment of policy decisions into ICT infrastructures. Yet, our study of Aadhaar's inscription in the PDS has led us to focus on the reverse mechanism, namely the feedback effect of technology on the food security policies in which it participates. For the working hypothesis examined in this work, these are the feedback loops in which we are interested, and we observe them both at the micro (intra-state) and at the macro (national) level of operation. This leads us to a more complete story of interaction between technology and pro-poor policymaking.

At the micro-level, we have described the action of Aadhaar-enabled monitoring on ration dealers. There are, however, at least two issues in the logic underlying its implementation: first, the PDS is characterised by long supply chains, which involve many steps before foodgrains actually arrive to the shops. The technology is predicated on ration dealers' guilt for diversion, however recipients often point to the agents *before* ration shops, along the PDS supply chain, as guilty. In particular, citizens are concerned with a *border mafia* that subtracts commodities before they even reach the shops:

A lot of goods are stolen at the border (...) the goods that get to the shop, and are not sold somewhere else, are just a small share. It is easy to say, the ration dealers are causing the system not to work, but we should talk more about goods being stolen during transportation. (Ayesha, PDS user)

These concerns are augmented by the discussion, often found in the media, of border mafia and diversion happening before the ration shops. Early-stage diversion is reported by many ration dealers, who claim to be unable to lift the amount of foodgrains they need in order to serve all users:

When I go to the godown [for the monthly collection of foodgrains], I never get enough rice for all households registered in the shop. So in the first ten days of the month, a lot of people come to the shop (...) after that if there are more people, I may have run out. (Chaitram, ration dealer)

While it is hard to verify these assertions, on the field we have observed that the back-end modules of the e-PDS are still in an early stage of development, and in several TSOs they are not at all used or known. Monitoring of the AWDs, and of all the phases occurring before the ration shops, is implemented very seldom and weakly: on the one hand, investing in this would

probably be comparatively less popular, as these modules do not “transform” the ration shop directly – hence they do not affect people’s *direct* sightings of the state. Still, the current strategy trades visibility for effectiveness, as it focuses on the last mile alone rather than on holistic monitoring of the PDS.

Second, what is the *root cause* of corruption? Ration dealers’ narratives establish a close causal relation between market diversion and its root cause. The main reason that they identify is the shift to a targeted PDS: this has put the shops at serious risk of unviability, taking away a large share of their customers and the financial sustainability that was previously assured. As noted above, this happened due to a system that, as a result of relatively low estimates of poverty incidence, classified the majority of Kerala households as APL. Given the low subsidies, these households have massively moved to the private market, leaving ration dealers with a limited customer base:

We get a commission on the goods we sell, but that is not enough to make a living. If we were allowed to sell other goods, other than just PDS, that would help a lot, but the government has not yet authorised us to do so. This is why many shops close down, and people do not trust us anymore. (Pratap, ration dealer)

The need to resort to market diversion to survive strongly emerges from the narratives of PDS actors, including the Taluk Supply Officers. The loss of customers that followed the move to a targeted system still conditions ration dealers’ activity, and narratives cluster strongly around this point: leading a ration shop business, and preserving its viability, means indulging in a certain amount of exchanges with the private market. This is the only way for many ration dealers to keep their businesses in operation.

The problem with Aadhaar is that the system does control ration dealers’ behaviour and detect illegal transactions, but it does not act on the root cause of the problem, namely the perverse consequences of targeting. With Aadhaar, the invitation for shop owners to comply with the law will be technologically enforced: but still, the system does not offer them an alternative, in terms of how to make a living without market diversion. In this way, technology comes across as both partial and mistargeted: partial, because it only targets the ration dealers and not the other actors

in the supply chain, and mistargeted, as it addresses the effect of the problem and not its root cause.

Third, Aadhaar's infrastructure enforces another policy decision, that of defending and sustaining a narrowly targeted PDS. Kerala has indeed opted for a targeted system, with narrow criteria for BPL status and reservation of food subsidies to BPL/AAY. Narrow targeting is in line with the electoral promises of the coalition (United Democratic Front) that is currently in power, and its rationale is that of protecting the poor by reserving substantial food subsidies for them. Advocates of the opposite policy (a universal PDS) remark that the right to food is *per se* universal, and abolishing the duality of prices also reduces incentive to market diversion (Sen & Himanshu, 2011). Still, the current state government preferred a targeted PDS, in which the entitlements of the poor would be preserved.

Kerala's choice of narrow targeting emerges in the design of the biometric PDS. In targeted systems, determination of beneficiaries can incur in two types of errors: inclusion errors, based on incorporation of non-entitled citizens, and exclusion errors, consisting in the exclusion of genuinely entitled ones. The biometric PDS is designed to prevent the inclusion error, but no mechanism is in place for the opposite problem, despite the fact that exclusion errors occur:

In Karimadom [Trivandrum's main slum], still a lot of families have pink cards [APL]. People in abject poverty still fail to be recognised as poor (...) Aadhaar will make it worse, because it will add one more layer of exclusion. (Vijaya, community volunteer)

As it emerges from the data, technology designed for the Kerala PDS focuses on last-mile monitoring, and targets the system narrowly to the poor. Here is the feedback of technology on policymaking: by putting responsibilities on the shoulders of specific actors, and enforcing a system that tackles the inclusion error as its top priority, Aadhaar's infrastructure directly participates in the development trajectory of the state. It leads to a more selective PDS, and shapes monitoring mechanisms in a way that implicitly blames the ration dealers for corruption. At the micro-level of everyday access, technology already works as an active shaper, rather than a passive carrier of policy decisions.

As we move to the macro-level, the policy choices of the central government should be considered. As noted above, the last Economic Survey presents an open argument for dismantling the PDS, according to which moving to cash transfers would eliminate distortions and minimise opportunities for leakage. However, actors interviewed across Kerala present a more complex picture, whose nuances are influenced by the effect that a transition to cash transfers would have on their entitlements:

Aadhaar is not at all inclusive, in fact it excludes the poor (...) because it excludes all those that are not registered, and many poorer citizens are among these. (Julian, PDS user)

Aadhaar will make cash transfers mandatory for everyone. This is very difficult for the poor, who may have never used a bank at all. (Swetha, right-to-food activist)

The real problem with Aadhaar (...) will be in the long term. Since people can use every ration shop, ration dealers will not know how many customers they have, and so they will not be able to require the right amount [of foodgrains]. The only way is giving licences to grocery shops (...) the PDS will disappear, and people will have to use the market. (Rajesh, right-to-food activist)

Fears of exclusion of the poor, lack of protection from inflation, and lack of familiarity of vulnerable groups with banking systems are the main practical concerns surrounding a potential shift to cash transfers. These need to be added to political understandings of the shift, based on the unwanted involvement of the market in a system that was isolated from it since the beginning. Crucially, political readings of the move to cash transfers have been found recurrently among respondents, and are by no means confined to activists and volunteers: users' concerns, in terms of the effects that the demise of the PDS would have on their entitlements, seem to be quite independent of political affiliation.

Citizens' surveys, conducted across India, generally reveal strong preference for the current PDS, as compared to a hypothetical move to cash transfers (Aggarwal, 2011; Puri, 2012; Khera, 2014). Our fieldwork was conducted before a new national government, led by Narendra Modi's National Democratic Alliance (NDA), openly voiced the intention to replace the PDS with cash transfers, and envisaged operational measures to conduct the shift. What is striking in Kerala is that with the adoption of biometric technologies, the state government is building infrastructures

to reduce leakage, hence attempting to improve the programme without disrupting it. This entails a strong position taken by the government of Kerala: Aadhaar is being used to *protect* the system, rather than dismantling it in favour of cash transfers as the new central government would recommend.

CONCLUSION

Based on the case of Aadhaar's inscription in the PDS, we have devised a way to unpack the theoretical link between e-governance and social policy, observing multiple feedback effects of ICT adoption on development trajectories. While theorisation is indeed important, taking Walsham's (2012) invitation to contribute to "making a better world" with ICTs implies focusing on its practical consequences, and on the ways in which these inform development practice on a global scale. If technology adoption yields effects on policymaking, it is crucial to manage governance relations accordingly: for social safety schemes, this means harmonising the multiple synergies that exist among the actors involved.

At the micro level, technology shapes the functioning of the PDS, closely monitoring ration dealers and enforcing a targeted system. At the macro level, IT infrastructures sustain the decisions of policymakers on the programme, and in this way they directly affect the development route in which they participate. Aadhaar's infrastructure hence envisages a new direction for development, however the case reviewed here demonstrates that states can partially renegotiate it, according to their own visions and priorities. In all these instances, technology does much more than simply "carrying" policy, as it reshapes the anti-poverty system in ways that affect existing development routes.

Normative implications revolve around the making of alliances and synergies, which are crucial in the practice of ICT4D. As implied by Qureshi (2015), a "better world" is not constructed by individuals working alone, but by collaboration among actors that share common goals of development. A complex web of actors concurs to the implementation of anti-poverty schemes: yet, simply stating that technology feeds back on development policies may be insufficient, as

this does not translate into advice on how to make technology work better for poverty reduction. Instead, “making a better world” means understanding how ICTs may work better to guarantee the good functioning of pro-poor policies.

For this reason, a set of alliances needs to be managed. More specifically, the lessons learned through our study of Aadhaar in the PDS lead us to identify three different clusters of synergies.

First, smooth interaction should be achieved between policymakers and frontline providers, who constitute the physical interface between the state and programme beneficiaries. In the case of the PDS, state governments are in charge of policymaking, while the frontline providers are the ration dealers who interact directly with PDS beneficiaries. If the synergy between these actors works properly, the policies dictated by the state will make sense to the frontline providers, who will accommodate technology to properly implement them. But if the state builds its policies without considering providers’ needs, these can be subjected to perverse incentives that IT-based monitoring per se may be unable to bypass. As noted above, ration dealers in Kerala are generally unable to make a living with their shops’ profits: should the state not intervene, for example by increasing their commissions on the goods sold, their incentive to divert PDS goods on the market will remain.

Second, continued collaboration should be established between policymakers and system designers, who are in charge of the practicalities of computerisation. This is because technology, to prevent mistargeting, should embody the intentionality behind its creation, and translate that specific intentionality into practice. Policymakers at Kerala’s Ministry of Food and Civil Supplies were fully aware of their decision, when they adopted a biometric system that prioritised the monitoring of ration dealers (over other actors) and inclusion errors (over exclusion ones). Whether the rationale behind this was right or wrong, and more or less close to the real needs of users, constitutes a different set of concerns: what matters is that policymakers’ intention is properly inscribed in technology, and for this to happen the collaboration between state and designers should be fully institutionalised.

There is a final cluster of synergies, and it captures a paramount aspect of social policy. Whatever decisions policymakers may take on the design and management of anti-poverty systems, they should never lose sight of the beneficiaries, for whom anti-poverty programmes are conceived and designed. All too often we encounter situations in which, in taking decisions that maximise the political visibility of interventions, the interest of the final user is sacrificed: this is the case of a biometric system that is directly visible by citizens, but is unable to combat corruption in the early, crucial stages of the PDS supply chain. This results in suboptimal outcomes for citizens, because for visible that Aadhaar can be in monitoring ration shops, it does not act on the root cause of the problem.

Anti-poverty systems are being integrated with ICTs on a world scale, and if technology is to become an integral part of them, the clusters of synergies considered above should be monitored and harmonised. Making technology work well for pro-poor policy requires a concerted effort, which may demand compromises that the counterparts involved will not always easily accept. ICT4D practitioners should hence take into account the interests of different actors, and go beyond system design to fully appreciate its relation with different layers of context. In this respect, the field needs to transcend the theoretical mandate inspiring it, and engage in devising constructive ways for diverse synergies to work in practice.

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