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PDS 'To Go'? 'Portability' of Rights through Real-time Monitoring: the Centralised Online Real-time Electronic PDS in Chhattisgarh, India

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PDS 'TO GO'? 'PORTABILITY' OF RIGHTS THROUGH REAL-TIME MONITORING: THE CENTRALISED ONLINE REAL-TIME ELECTRONIC PDS IN CHHATTISGARH, INDIA

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Contents

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Abbreviations

BPL	below the poverty line
CFSA	Chhattisgarh Food Security Act
CORE	Centralised Online Real-time Electronic
DFID	Department for International Development
FPS	fair price shop
ICT	information and communications technology
IDS	Institute of Development Studies
IT	information technology
MIS	management information system
NFSA	National Food Security Act
NIC	National Informatics Centre
PDS	Public Distribution System
PoS	point of sale
RSBY	Rashtriya Swasthya Bima Yojana
RTM	real-time monitoring
SHG	self-help group
SMS	short message service
SRC	smart ration card
UID	unique identity

Abstract

Information and communications technology (ICT)-based reforms are increasingly being used to improve the delivery of public services. These reforms have taken the form of crowd-sourcing information (election monitoring), using ICTs to increase efficiency (e.g. computerised land registry systems), and connecting users to providers (e.g. mobile phone-based health services). These different approaches attempt to improve delivery through either (a) improving the quality of information, (b) reducing corruption or (c) making access more convenient and simple. The main question which the research reported here addressed was: through what processes, and under what conditions, do real-time monitoring technology-based reforms strengthen accountability and affect the delivery of public services? This was done by examining the Centralised Online Real-time Electronic (CORE) Public Distribution System (PDS) reforms introduced by the State Government of Chhattisgarh, India.

Since 2012, Chhattisgarh has been experimenting with improved delivery of subsidised food grains by creating 'portability' of entitlements through the use of smart cards, combined with real-time monitoring. This paper is aimed at assessing the ability of real-time monitoring of a large-scale food security programme to improve delivery in terms of: (a) reduced corruption and diversion of food, (b) increased efficiency of delivery logistics, and (c) empowerment of beneficiaries through portability.

It was found that CORE PDS reforms had a limited influence on the effectiveness and efficiency of the PDS, because the scope for improvements after the earlier two phases of reforms, which introduced de-privatisation and computerisation of the supply chain, was small. CORE reforms appear to have taken earlier reforms to their logical end point, and further reduced corruption by capturing transactions at the shop level. Second, the portability offered by the CORE reforms was low, due to a variety of reasons related to awareness, illiteracy and power imbalances between fair price shop (FPS) operators and cardholders. Most significantly, for entitlements to be portable, the programme needed to be universal, covering the whole state. Finally, although the CORE reforms seem to have improved the behaviour of FPS operators towards cardholders in a few cases due to the incentives (and monitoring) provided by portability, these cases are few. For the most part, CORE reforms seem to have increased time burdens on the FPS operators and users, and in the absence of reforms to tackle fundamental socio-political processes through which development programmes are implemented at the local level, CORE reforms do nothing to change the behaviour of FPS shop owners. Instead, a more significant finding which emerged was that technological fixes for poor performing social protection programmes are only feasible in so far as they work within the political logic of the context in question.

1 Introduction

Over the past decades, new technologies have offered innovative ways to improve the delivery of public services, and tackle old problems of corruption and accountability in the public sector. Increasingly, a range of information and communications technology (ICT)-based reforms are being implemented throughout the developing world. These include forms of crowd-sourcing information (election monitoring), using ICTs to increase efficiency (e.g. computerised land registry systems) and connecting users to providers (e.g. mobile phone-based health services). The different approaches attempt to improve delivery through (a) improving the quality of information, (b) reducing corruption and/or (c) making access more convenient and simple. Together they represent the advent of a new era in public management, beyond market and competition-oriented reforms to a phase where monitoring of performance of the public sector is co-produced by public managers and the public (Dunleavy *et al.* 2005).

One such innovation that is increasingly being introduced is real-time monitoring (RTM) using ICTs. While there are differing definitions of RTM,[1] here we use it to mean a system in which relevant data on transactions useful for monitoring are available to managers as close to real time as possible, given technological limitations. Others have defined RTM as any system that meets two key characteristics: higher frequency relative to traditional data, and the generation of a response (Greeley, Lucas and Chai 2013a). RTM is usually made possible by a combination of hardware, software and connectivity advances that enable the storage, communication, processing and recall of large data sets at relatively low cost. The potential for ICT-based RTM systems to be 'game changers' in the delivery of services is huge. Yet, especially in developing countries, several questions regarding their use and effectiveness remain as technology use is often limited by infrastructure and awareness.

This paper examines the use of RTM in improving the portability of welfare entitlements in Chhattisgarh, a relatively underdeveloped state in India. Since 2012, the Government of Chhattisgarh has been experimenting with improving the delivery of subsidised food through the Public Distribution System (PDS) (for an introduction to PDS see Box 1.1) by creating 'portability' of entitlements, through the use of smart ration cards (SRCs), in combination with RTM. The reform programme – the Centralised Online Real-time Electronic (CORE) PDS – was piloted initially in the capital city, Raipur, and later extended to four districts. The key element of the reform was to capture in real time the transactions between beneficiaries and fair price shop (FPS) operators who sell subsidised grain. (FPSs are shops set up under the PDS which are meant to exclusively sell the subsidised grain provided by the government.)

[1] A definition commonly used in the computer sciences is: Real-time data monitoring (RTDM) is a process through which an administrator can review, evaluate and modify the addition, deletion, modification and use of data on software, a database or a system. It enables data administrators to review the overall processes and functions performed on the data in real time, or as it happens, through graphical charts and bars on a central interface/dashboard. www.techopedia.com/definition/12274/real-time-data-monitoring-rtdm (accessed 28 April 2015).

Box 1.1 The Public Distribution System in India

The Public Distribution System (PDS) was introduced in 1942 by the colonial administration as a response to the food shortages of the Second World War (Mooij 1998). Initially a mainly urban-based programme, it was extended in post-independent India in a universal manner after the droughts of 1965–66. From then on until the late 1990s, the PDS was a key programme for the government's anti-poverty strategy. In 1997, the PDS was reformed from being a universal entitlement to a targeted programme for households below the poverty line (BPL). The BPL beneficiaries were entitled to higher quantities of grains at lower prices. In 2013, most of the government-run food security programmes in India, including the PDS, were brought under one umbrella, and given a statutory basis under the National Food Security Act (NFSA). Under the NFSA 75 per cent of the rural population and 50 per cent of the urban population are entitled to 5kg of food grains per month per person at highly subsidised rates.

Conventionally, the distribution of subsidised food has been realised through a network of fair price shops (FPSs), colloquially called *ration shops* (the subsidised food is known as ration), that are run by licensees who are private operators and in some states collectives such as women's self-help groups (SHGs). The licensee, called the *ration shop dealer*, is allocated food grain at the beginning of the month based on the number of ration card households assigned to his/her shop. Ration cards (booklets similar to bank passbooks) given to households provide proof of entitlement and maintain a record of the quantity of subsidised grain (mainly wheat and rice) purchased by cardholders. The *ration dealer* receives a commission based on the quantity of grains distributed. Usually this commission is very low and not enough to run the shop (which is, for the most part, not allowed to sell other commodities) as a business on a full-time basis.

The PDS seeks to fulfil two key aims: to maintain grain prices through a buying programme based on a minimum support price for farmers and to provide grain at heavily subsidised prices, particularly to the poor. In addition, the government can stabilise market prices by releasing the buffer stock held by the Food Corporation of India in case of price spikes and inflation.

The main question that the research reported here addressed was: through what processes, and under what conditions, do real time monitoring technology-based reforms strengthen accountability and affect the delivery of public services? We also examined three sub-questions: (a) what impact do the CORE reforms have on the efficiency and effectiveness of the delivery of the PDS?, (b) how does the portability implied by CORE reforms enable citizens to better access services and monitor shop holders?, and (c) how do CORE reforms affect the incentives, perceptions and behaviour of frontline officials?

Based on qualitative research combined with the examination of state-level quantitative data in three districts of Chhattisgarh, we found that CORE PDS reforms had a limited impact in relation to all of these questions, although different reasons hold for each. First, CORE reforms have had limited influence on the effectiveness and efficiency of the PDS, because the scope for improvements after the first two phases of reforms which introduced de-privatisation and computerisation of the supply chain were small. Major efficiencies had already been achieved through these earlier reforms. CORE reforms appear to have taken earlier reforms to their logical end point, and further reduced corruption by capturing transactions at the shop level. However, corruption related to the issuing of ration cards and smart ration cards (SRCs), and problems of duplication, were not tackled by either sets of reform, leaving scope for malfeasance.

Second, the portability offered by the CORE reforms was low for a variety of reasons related to awareness, illiteracy and power imbalances between FPS operators and cardholders. Most significantly, for entitlements to be portable, the programme needed to be universal, covering all geographic areas of the state, otherwise it is unlikely to benefit those, e.g. migrants, who might want to collect their subsidised food in areas not covered by the programme. Because of the limited choice of shops to change to, people did not seek to use

the portability offered. Although estimating real portability is impossible, the limited choice, combined with low awareness suggests that portability would have been higher if the programme was universal with greater awareness.

Finally, although the CORE reforms seem to have improved the behaviour of FPS operators towards cardholders in a few cases due to the incentives (and monitoring) provided by portability, these cases are small in number. For the most part, CORE reforms seem to have increased time burdens on the FPS operators and users, and in the absence of reforms to tackle fundamental socio-political processes through which development programmes are implemented at the local level, CORE reforms do nothing to change the behaviour of FPS shop owners.

Instead, a more significant finding which emerged was that technological fixes for poor performing social protection programmes are only feasible in so far as they work within the political logic of the context in question. The CORE PDS reforms were initiated by the Raman Singh-led BJP state government (which started its second term in 2008) with strong political support. By the autumn of 2013, however, with elections looming, there was a strong push to offer a new populist programme to retain electoral support from the poor. The result was the issuing of a large number of additional ration cards.[2] While electorally successful, the large number of new cards was untenable. Soon after the elections, portability was temporarily halted and a verification drive of all ration cards was initiated. This has resulted in a situation where real-time capturing of shop sales has continued, without the portability element. As we shall see, this enables monitoring of transactions without the benefits of portability – resulting in a more unsatisfactory customer experience than before.

These findings are presented in the following sections. Section 2 examines the literature on the perceived benefits of using ICTs in improving public services, particularly the potential of real-time monitoring systems. Section 3 explains the background of the food subsidy programme in question and outlines the problems that it has faced over the years. In Section 4, we take up the case of Chhattisgarh state and the PDS reforms implemented by the state. Section 5 outlines the methodology used for this study and the research findings are presented in Section 6, organised around the effects on corruption and on portability. The limitations of the CORE PDS and the reasons for these limitations are highlighted in Section 7, with recent post-election developments and their impact on the functioning of the PDS reported in Section 8. In Section 9, we conclude with some reflections on the implications of this case for technology-oriented service delivery reforms.

[2] For example, see http://indianexpress.com/article/india/politics/fake-ration-cards-pile-up-in-model-pds-state/ and http://indianexpress.com/article/india/politics/not-just-2013-in-2008-too-chhattisgarhs-fake-ration-cards-given-as-election-sop/ (accessed 28 April 2015).

2 The role of ICTs and real-time monitoring in improving public services

The use of ICTs in developing countries in the service delivery arena has proliferated. Their use ranges from data gathering technologies (including crowd-sourcing) to the supply of public information through to citizens' websites, computerised service delivery including bill payments, official document provisions and complaint mechanisms (Brito 2008; Harris and Rajora 2006; Hogge 2010). One of the most important perceived virtues of ICTs is their ability to increase transparency by making information widely and simultaneously available, often in real time. Other benefits (dependent upon the technology and interface used) include reduction in transactions costs, improved credibility and verifiability of information, user-friendly interfaces for complex information, data sorting and analysis, and allocation of data points to geographic locations. These potential benefits have been established in the literature, with different technologies emphasising different benefits (Harris and Rajora 2006).

Beyond these obvious virtues, when applied to public sector reform efforts, there are other effects that are worth noting. ICT projects can open doors to larger public sector reform because they are difficult to openly oppose since they are about modernisation and enhance the professional status of the implementing officials (Chand 2006). Circumventing their effects, or resisting their implementation, is possible but often requires a certain level of technical knowledge (Bovens and Zouridis 2002). Moreover, high-level expertise in ICTs often lies outside government, thus opening the door to non-state involvement in monitoring outcomes (Masud 2002; PRAJA 2000). Finally, the use of ICTs requires a certain level of digital literacy which can generate a cadre of information brokers that link users to technology (whether within government or outside it). Given these challenges, many ICT-based reform projects fail (Heeks 2003).

In recent years, the use of real-time digital information for monitoring has proliferated across the social sectors and has been increasingly viewed as a 'game changer' in the quest to improve public services. Most commonly, such real-time monitoring (RTM) initiatives involve partnerships between a range of stakeholders: states, private sector operators, civil society groups, individual consumers and, in some cases, donors (Pueyo 2013). The expectations are that RTM projects can help to (a) increase efficiency, (b) reduce corruption, (c) enhance effectiveness, (d) improve governance, (e) boost trust between citizens and the state, and (f) give citizens an active role in the monitoring of public services (Shim and Eom 2008; Bertot, Jaeger and Grimes 2012).

Real-time monitoring is particularly promising (as opposed to previous systems of information gathering and monitoring) because foremost, by definition, it removes the time lag between an event occurring and a potential response from managers by conveying real-time information. In addition, RTM technology enables multiple users to access the same information simultaneously. By centralising information, RTM also allows the aggregation and subsequent disaggregation of data to enable managers to discern patterns that might require flexibility in reactions (Greeley *et al.* 2013b). Finally, if required, RTM can, depending upon the technology used, allow for anonymous reporting of events – thus reducing the vulnerability of whistle-blowers.

However, as yet we do not have enough robust evidence on the conditions under which these positive benefits are likely to be realised. Lucas, Greeley and Roelen (2013) report on a variety of potential sources of data that might be adapted for real-time monitoring, including community-based participatory monitoring, sentinel sites, routine data systems, and rapid

surveys. They find that a variety of technologies have been used to reap these potential data sources – e.g. one study found that smart phones could be used by lay people to develop applications for surveys which provided reliable in-field use for extended periods; another from South Africa used simple phones to upload survey data that could be used to assess the work of community health workers. These studies were intended to capture information on various indicators from the community (e.g. nutrition or disaster affectedness) rather than assessing public service quality or the degree of corruption. Such accountability-related real-time monitoring poses additional challenges in that those generating the data have incentives to misreport or otherwise undermine the system to prevent exposure. There are relatively few examples of in-depth analysis of how real-time monitoring reforms play out in different contexts. Besides concerns about the digital divide and access to technology, the literature is largely optimistic.

Perhaps because of this, governments throughout the world are racing ahead with all kinds of e-governance initiatives. In India, where the information technology (IT) sector is highly advanced and relatively sophisticated, innovations have emerged through both the public and private sectors (Bhatnagar and Singh 2009; Madon 2009). In Andhra Pradesh, *E-seva* (computerised service) shops have improved efficiencies in consumer responsiveness (Krishna and Walsham 2005). A campaign for electoral transparency in Bangalore has been hailed for cleaning up the electoral rolls of bogus voters (*Times of India* 2010).

Besides these smaller initiatives, some large-scale development programmes have adopted ICT and real-time monitoring type reforms. India's flagship programme, the National Rural Employment Guarantee Scheme, which provides employment to millions of people in rural areas, is using real-time technology to track processes and outcomes via a centralised software platform. The software can track, in real time, the flow of funds from the point of approval to disbursement and also provides information about defaults, delays and breach of guarantees. A separate system developed for workers enables them to authenticate their registration through a biometric reader and to access information about their work history (allotment, attendance, wages, etc). Similarly, the national health insurance programme for the poor, the Rashtriya Swasthya Bima Yojana (RSBY), also uses biometric technology to authenticate their identity. Some state governments are also using ICTs in their PDS reforms. In Kerala's PDS, ICT reforms have been applied to the ration card allocation system, the allocation of commodities to shops, and to inspection monitoring and information, plus grievance redress. An assessment of the reforms suggests that the programme has been designed to combat the problem of diversion of food grains by the rice mafia, yet problems of coverage and mistargeting remain (Masiero 2015).

Despite the numerous initiatives, good impact studies are scarce and few initiatives are using real-time monitoring to enable portability. Although the RSBY has enabled portability, there is little real-time monitoring in the programme. It is hoped that in the future the Kerala PDS reforms will use biometric authentication and real-time technology to create portability of entitlements, thus delinking ration cards from specific FPSs (Masiero 2015). This paper aims to fill a gap in our understanding of how real-time technology-based reforms interact with existing implementation systems and shape the outcomes of reforms in different contexts.

3 The Public Distribution System (PDS) in India

The PDS in India currently covers about 190 million households with ration cards and distributes food grains through a network of about half a million FPSs across the country. With the implementation of the National Food Security Act (NFSA) – the deadline for which is April 2015 – there is expected to be an expansion in the number of households covered. The NFSA also recommends a number of reforms to be undertaken by the PDS in order to improve its efficiency and reduce leakages.

The underlying structure of the supply chain for distribution (described in Box 1.1) has led to a number of problems with the PDS, which have been highlighted by various observers (Drèze and Khera 2013). Foremost, the monopoly over the distribution in specific locations by licensed ration shop dealers and the low commission paid have led to large-scale corruption in the form of diversion of grains from the PDS to the open market. The problem is magnified in times when there is a substantial difference between the market price and the PDS price of grain. A Planning Commission report put leakages in the PDS as high as 58 per cent and subsequent studies have pegged it between 24 and 54 per cent (Programme Evaluation Organisation 2005; Khera 2011). Second, as the shops are not profitable, ration shop dealers tend to open them only for a few days at the beginning of the month when the grains arrive, leaving those unable to buy grain then without access to the PDS. Finally, the PDS is one of the few programmes where there is no clear independent information or management of transactions at the end of the supply chain which could be verified for accuracy. It is not possible for illiterate and poor ration cardholders to monitor the accuracy of the records kept in the books.

While the overall structure of the PDS is nationally determined, individual states can choose to tailor their PDS programmes as they wish. Thus, there is a wide range of operational diversity as states attempt to resolve the problems with the PDS outlined above. Reforms attempted by states include expanding coverage, reducing prices, having uniform prices for all categories or cardholders, using real-time monitoring through end-to-end computerisation, toll-free complaint numbers, and enhancing transparency of the supply chain. Among states, the relatively new state of Chhattisgarh (formed in 2000) has been at the forefront of reforms.

4 PDS reforms in Chhattisgarh

Reforms in Chhattisgarh related to the PDS can be divided into three phases. In the first phase, starting in 2004, reforms centred around de-privatisation of the FPS network and handing it over to public bodies, including *panchayats* (elected local councils), co-operatives, forest production committees and women's self-help groups. Along with de-privatisation, there was an effort to make the shops viable by increasing the commission received by shop operators, earmarking (where possible) public buildings for PDS shops, training in accounting and providing soft loans for infrastructure and working capital.

It was only after these first phase reforms took root that the Chhattisgarh state government began what we can call the second phase: ICT-based reforms. The initial years of the ICT reforms focused on improving accountability and transparency in the delivery chain, including: computerisation of the entire procurement process; issuing bar-coded ration cards to reduce fraud and duplication; developing a web-based management information system (MIS) to track the supply chain; using short message service (SMS) technologies to strengthen community-based monitoring (by sending alerts of the date, time and quantities of food grains supplied to specific FPSs); call centre hotlines to deal with grievances; and publicly listing entitlements on the internet as well as pasting physical copies on public buildings. These two phases of initial reforms managed to significantly reduce corruption in the PDS and streamline the supply chain. Some estimates based on field surveys suggest that leakages came down to 5 per cent (Right to Food Campaign 2013).

However, these two phases of reforms stopped short of tracking transactions to the last mile, leaving the shop-level transactions unseen. This was primarily because the information system adopted in the second phase was not capable of handling this kind of information. Yet, several of the problems with the PDS lie precisely at the shop level. Shops are often not open during official hours when beneficiaries want to use the service. Shop operators declare that they have 'no stock available', despite having stocks. Shop operators can under weigh or overcharge for food grains, a problem that illiterate users cannot detect. Shop operators can be rude and discriminatory towards beneficiaries who are at the shop operators' mercy as their cards are registered to specific shops. Migrants have to travel great distances to collect their rations, or lose their entitlements as, again, rations can only be collected from specifically assigned shops.

4.1 CORE PDS reforms

To deal with these problems, in 2012 the government experimented with the idea of the 'portability' of household entitlement to subsidised grain through Centralised Online Real-time Electronic (CORE) PDS reforms. The main objectives of the reforms were (a) to capture transactions between the ration cardholders and the FPS shops, (b) to make the FPS accountable to beneficiaries by offering 'portability' and (c) to eliminate the diversion of PDS stocks by authentication of the beneficiary at the FPS before the transaction and carrying out regular physical verification of the transactions (Vaidya and Somasekhar 2014). The CORE PDS effectively made the transaction between rights holders and the shop operator one that is similar in nature to, for example, the use of an automated teller machine (ATM) card. Ration cardholders could access their entitlements, and check how much had been used, from any FPS (which was CORE-enabled, as initially this was only started on a pilot basis in a few areas) using their smart ration cards (SRCs). Every transaction was recorded immediately online on a central server by a swipe of the SRC via a point of sale (PoS) device. Making entitlements portable while resolving shop-level problems by introducing competition (as a dissatisfied customer can go to a different shop) left the problem of how to

deal with the logistics of fluctuating demand for food grains in different shops, an issue which was dealt with through real-time monitoring technology. By developing a system of restocking shops when stocks ran low (depending upon their uptake), the problem of fluctuating demand could be met without inconveniencing users or shop operators. Shop operators had incentives to attract a larger customer base as their commission was related to the number of people using their shop.

Any real-time monitoring of shop-level transactions requires three essential conditions to be met: (a) a fool-proof system of authentication of the rights holder in real time, (b) an online platform that records transactions in real time, and (c) a PoS device that can connect to the online grid from the shop.

First, to deal with the issue of authentication, initially the government considered using the unique identity (UID) number that was being rolled out across the country under a national streamlining of the identity programme (Government of India 2010). The advantages of using the UID included leveraging its biometric authentication system and also creating the possibility of de-duplicating cards. Additionally, as the UID was a Government of India programme, using it would result in savings for the Chhattisgarh government. However, it soon became obvious that the UID was not taking off. In Chhattisgarh, less than 1 per cent of the population had UIDs at the time the reforms were being launched. The alternative was to use the smart cards issued by the national health insurance programme, the RSBY, which had already been issued to households considered to be below the poverty line. This was the path chosen. In addition, fresh smart card-type ration cards were also issued under the CORE PDS programme.

Second, the government needed an online platform to record real-time transactions. Centralised software was developed, in line with the national-level software developed by the National Informatics Centre (NIC), the information technology wing of the Government of India. This was done to ensure that if CORE PDS was adopted nationally, it would be compatible and based on the national-level platforms of the NIC.

Third, the CORE PDS required a device to record transactions at the shop level which would be able to use the smart cards (and in future biometric authentication). PoS devices that could do this were easily available off the shelf and connected to the centralised server by using a mobile phone SIM card. Given the relatively widespread coverage of mobile phone signals in India, this was a sensible choice. The devices could be used offline when signals were weak or electricity failed and would synchronise the data when connectivity was restored. The real-time information on subsidised grain sales provided through these devices enabled the restocking of shops in keeping with their level of use.

In cases where cardholders had lost their cards, they were still able to access their entitlements, although only at the shop where they were registered. Moreover, in case of lack of electricity, or problems with the SRC, the shop operators were able to enter transactions manually, although they were discouraged from doing so. Cardholders could take their entitlements all at once, or in instalments as they wished, as the remaining entitlements would be recorded on the central server.

Initially, the CORE PDS was implemented in the summer of 2012 in five selected pilot FPSs in the state capital, Raipur. In August 2012, it was extended to 151 shops covering 150,000 ration cardholders. On average, early data indicated that portability was around 20–25 per cent. Moreover, due to the increase in custom at some shops and the decline in others, 33 FPSs were closed down in Raipur, of which 18 licence holders surrendered and 15 were cancelled due to malpractice. Given this early success, by the end of 2012 the programme was extended to include 151 FPSs in Raipur, 69 in Durg city and 49 in Rajnandgaon city. In 2013, it was further extended to include 60 FPSs in Mahasamund city and some villages.

Later, all FPSs in all of the municipal corporation (urban) areas of the state were brought under the CORE PDS. There were plans for further expansion and universalisation of the programme across all the state but these were somewhat derailed by events related to the state elections in November 2013.

Preceding the elections in November 2013, in a populist measure the state government massively expanded the number of ration cards allocated under the Chhattisgarh Food Security Act (CFSA). The CFSA preceded the National Food Security Act that was passed later that year and was more generous than the national Act, providing 35kg of rice per month per household at a nominal price. Post the elections, it was discovered that ration cards had been given in an indiscriminate manner, with the result that the number of ration cards in existence exceeded the number of households in the state. One of the ways in which this happened was that individual members of households declared themselves as independent households in order to benefit from the generous PDS rations. The situation was clearly untenable and was bound to place a heavy burden on the state exchequer. The government thus decided to conduct verification drives and cancel the 'bogus cards'. The entire exercise created a lot of confusion on the ground, with allegations of ration card cancellation for genuine beneficiaries as well as fraudulent ones.

The uncertainties surrounding the cancellation of cards meant that the PDS dealers got an opportunity to send back entitlement-holders claiming that their names were not on the eligibility list and therefore their rations had not been allocated. Ironically, an exercise which was meant to check corruption may have ended up facilitating it. Many households reported not being able to access the PDS food grains at all. The resulting public hue and cry, including reports in the newspapers, forced the government to undertake a second verification drive which sought to re-issue some of the ration cards that had been erroneously cancelled. To simplify things, the government also suspended the portability facility from July 2014 onwards. Thus, during our fieldwork from August 2014 onwards, there was no portability actually in operation. We therefore focused on ways in which portability had functioned during the period between January and December 2013. In addition, the verification drive was ongoing during the fieldwork, creating a lot of confusion as well as opportunities for corruption and denial of rights at the local level. These issues infiltrated interviewee responses. It was difficult in some cases to separate findings on portability from the issues raised by the over-issue of ration cards, and the later verification processes.

5 Methodology

The research reported here was carried out over a six-month period from July to December 2014. In order to understand the influence of the CORE PDS reforms on the behaviour of public officials (food inspectors, fair price shop operators) and citizens, we explored the research questions in three districts – Raipur, Mahasamund and Durg. These represent different aspects of the way the CORE PDS was implemented. Raipur, which is the capital of Chhattisgarh, is where the reforms have been operational for the longest time. In addition to being an urban area, it was expected to be the location where portability would be the highest due to higher literacy and awareness and as people could choose to change their PDS shop without major inconvenience. Mahasamund is the district where CORE PDS reforms were implemented in a rural area. Here, our expectation was that portability was likely to be low and less likely to have a major influence on the way the programme operated. In Durg district, the CORE PDS operated on both the PDS smart cards as well as on the pre-existing RSBY cards, which we hoped would provide some insights into how integrating smart card technology across different government schemes worked.

The PDS in Chhattisgarh involves a hierarchical structure from the state-level Directorate at the highest level to the food inspectors at the lowest level. We interviewed officials within this structure including Directorate officials, Secretariat officials, food inspectors and FPS operators. These were semi-structured interviews to understand how the reforms have changed the incentives, perceptions and behaviour of frontline officials.

At the state Directorate and Secretariat, we interviewed three key officials who were directly involved with the conceptualisation and implementation of the scheme. We also interviewed one food inspector in each of the three selected districts. In each district we chose four FPSs around which we organised our fieldwork. These were chosen on the basis of portability – two shops with the highest portability and two with the lowest portability were chosen, providing a total of 12 FPSs.[3]

Once these 12 FPSs were chosen, unannounced visits were made during the first ten days of the month when the ration sales are the highest. Either the salespeople or the owners (depending upon availability) were interviewed.[4] The interview guide for the FPS shop personnel is presented in Annex 2.

In order to understand citizens' perceptions about the reforms and understand whether they have been able to reap the potential of portability, we interviewed PDS beneficiaries. Although the initial plan was to carry out focus group discussions in each district (around each FPS selected) this was not feasible as these were urban areas with busy and transient populations. We therefore decided to conduct individual interviews. Five beneficiary households from the catchment area of each of the sample FPSs were selected for the beneficiary interviews.

[3] The metric of portability was calculated as follows. The ratio of outsider-beneficiaries collecting rice (those who had been assigned to a shop other than where they chose to buy their rations) to the total number of beneficiaries in a shop each month was calculated. This ratio was calculated for each month for 2013 and an average monthly portability ratio was derived. All the shops in each district were ranked according to this measure in order to choose the top and bottom two FPSs for the study. Annex 1 gives the details of the shops selected and their level of portability in each district.

[4] Most FPSs were owned by a committee or a self-help group, headed by a president who appointed salespeople at the shops.

The first step involved identifying the *basti* (locality) furthest away from the FPS in the catchment area. We assumed that the usage of portability would be highest amongst those who lived furthest away based on our initial conversations with government officials and civil society activists. In each locality, standing in the centre of the locality (by identifying a *chowk* or temple) the researchers would primarily spin a pen to decide the direction in which to start interviewing households. The counting was started from the right-hand side and by counting houses on both sides of the lane, the sixth house was chosen to be the first house and so forth. If the house member was eligible (i.e. had a ration card) and was ready and willing to talk, the interview was conducted. If the respondent refused or was unavailable, the next house on the same side was chosen as the next sample case. In this manner, five beneficiaries were chosen in each village or locality.

In the event, after three unsuccessful attempts to find the necessary number of eligible respondents by this method, the snowballing method was adopted. The interviewees were asked to direct the researchers towards other customers from the locality belonging to that FPS. In all, 60 beneficiaries were interviewed. Details are present in Annex 3.

The interview data was then input into an Excel spreadsheet and coded according to themes that emerged as responses to our main research questions. These were then collated and analysed collectively in conjunction with the interviews with the public officials at the state Directorate and Secretariat. The research strategy we chose has two limitations: (a) there are likely recall errors in field interviews as beneficiaries were more preoccupied with the card cancellation issues that they currently faced and (b) we had difficulty in accessing the quantitative data related to the shops for the year 2013 because the web pages for the period were down most of the time.

6 Findings

The main finding from the research was that the CORE PDS did not have a major impact on improving the efficiency and effectiveness of the PDS in Chhattisgarh. This is mainly because, even at the start, the CORE PDS could only make a marginal contribution to efficiency as most of the scope for improvements had already been achieved with the reforms of the first two phases. The second finding is that CORE PDS reforms, for various reasons described below, were only partially able to achieve their objective of portability and related improvements in the beneficiary-FPS operator interface. Rather, the use of technology has generated some other challenges in the smooth operation of the PDS, which will need to be tackled if and when portability in the PDS is restored. Finally, a key finding is that technology fixes for service delivery problems are only effective to the extent that they go with the grain of prevalent politics. As we show from the Chhattisgarh case, populist political strategies aimed at capturing votes can derail well-planned policies to create new avenues for uncertainty, inefficiency and corruption.

6.1 Earlier gains

Evidence suggests that reforms from the two earlier phases resulted in substantial reduction in the diversion of food grains through corruption. A study based on National Sample Survey (NSS) data by Khera (2011) found that the level of leakage (in food grains) in Chhattisgarh's PDS decreased from 51.8 per cent to minus 1.5 per cent, coinciding with the period of the first two phases of reforms in the state.

Most of the earlier gains were the result of an increase in accountability by undertaking additional transparency measures through SMS alerts, the toll-free helpline, online listing of the entitlement holders, and prompt administrative action wherever any slippages in delivery occurred.

6.2 Assessing the CORE PDS

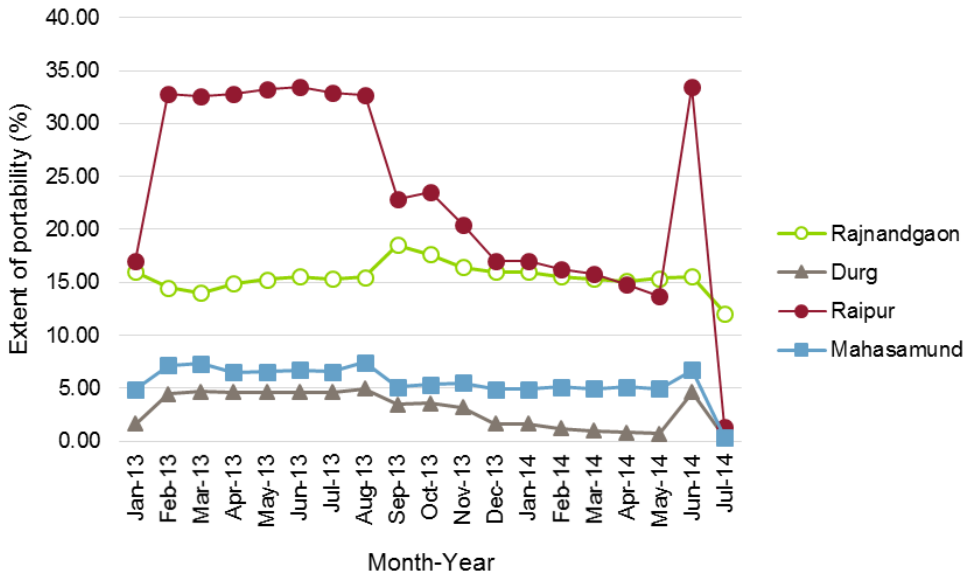
The CORE PDS reforms have meant that transactions between the FPS and cardholders can be captured, thus completing computerisation of the last mile of the supply chain and enabling real-time tracking of subsidised food from procurement to purchase by cardholders. The online platform gathers and presents information about utilisation of the PDS by each individual cardholder by name on a monthly basis. This information allows the state to understand patterns of use, bottlenecks in supply or delivery, and portability. At first, implementation of the CORE PDS presented technology-related teething problems. For example, connectivity posed a challenge – as the Reliance company SIM cards were not reliable. A recent survey shows, however, that only around 30 per cent of the FPSs currently face problems, since moving to an alternative SIM provider, IDEA (Gupta 2014). Reliable electricity for operating the PoS device remains a challenge in some areas. However, resolving this problem is outside the control of the PDS bureaucracy. As of now, the PoS device can work off the battery for eight hours. Repair and replacement of PoS devices was initially time consuming but, over time, this has been streamlined.

6.2.1 Impact on portability and leakage

One of the key objectives of the reforms was to enable portability. As regards this, evidence suggests that, from the outset, portability has been used only in a limited fashion. Of the four districts where CORE PDS reforms have been implemented, only in Raipur and Rajnandgaon does portability seem to be prevalent. In the other two districts it was quite low. In Durg, the CORE PDS was operational only with RSBY cards and in Mahasamund, the

FPSs included were mainly in rural areas. In Raipur, as well, after the initial enthusiasm, there is a fall in portability usage from mid-2013 onwards. Figure 6.1 below shows the extent of portability over 18 months starting from January 2013.

Figure 6.1 Portability of the PDS in Chhattisgarh, January 2013–July 2014 (four districts)



Source: Authors' own, based on Government of Chhattisgarh monthly reports (Government of Chhattisgarh 2014).

A previous survey in 2013 of 474 respondents in Raipur city found that around 27 per cent of the respondents had used portability (Right to Food Campaign 2013). Other studies suggest similar findings of use, with around 25 per cent moving to shops other than their original shops. In addition, the number of trips that beneficiaries had to make also seem to have reduced: from two to one (Sheel 2013). In our much smaller sample of 60 respondents over three districts, we found an even smaller percentage had used their cards in shops other than those they were assigned to. We did not find any significant differences between the urban and rural populations in either awareness of portability or actual use of portability.

By contrast, the evidence on reduction in leakages is much more positive. A study conducted by the government as part of an exercise to document best practices compared the utilisation of grain in the period just before the implementation of the CORE PDS and six months after. It found that while the data showed almost 100 per cent of food grains allocated as being sold in the period prior to the CORE PDS, this decreased to 95.50 per cent after six months (Vaidya and Somasekhar 2014). The authors interpret this to show that the missing 5 per cent represents the amount that would have been leaked to the black market earlier by showing false entries, which was now not possible because of the smart card-based transactions. They argue, therefore, that the value of this 5 per cent can be counted as the savings due to the CORE PDS. Using a similar methodology for kerosene, they find a saving of 40 per cent. Furthermore, they find that the introduction of the CORE PDS has reduced the average number of visits made by cardholders from four to five to around 1.8.[5] In fact, 15 FPS licences were cancelled by the government due to the malpractices unearthed through real-time transaction monitoring.

[5] It is common practice for a beneficiary to visit the FPS several times in a month to collect parts of their quota depending on the stock situation of their respective FPS. Such inconvenience due to erratic availability of different commodities at the FPS was identified as a significant issue in the National Institute for Smart Government paper (Vaidya and Somasekhar 2014) and a reduction in the number of visits was therefore included as an indicator for improvement due to CORE PDS.

Our field research showed that while in some cases there were complaints about the time taken to get PDS commodities, most beneficiaries were getting their entire quota of rice every month and were satisfied that they were getting correct weights. Sometimes, beneficiaries helped with the weighing due to a lack of staff at the FPS. Moreover, people did not expect that the shop operator would fleece them when weighing occurred in front of the large crowds gathered.

However, the story was quite different in relation to the PDS kerosene. A quarter of our respondents reported getting food grains as per demand, but not kerosene. Many FPSs made kerosene available only towards the end of the month, by which time people have already made several trips for other commodities. Several interviewees admitted to forgoing their quota of kerosene due to uncertainty about its availability. Some were told that the stock of kerosene had run out at the beginning of the month, while others were repeatedly told to return until they gave up hope and stopped asking for kerosene altogether. In one case, an old woman told us, 'my card had entries for kerosene even when I had never received any kerosene from the FPS'. One possible reason for the difference between the availability and leakage of kerosene and food grains is that while the supply chain of food grains has been computerised, the kerosene supply chain involves totally different departments and has not been subject to similar reforms. Moreover, kerosene is valuable because it is not officially available in the open market.

6.2.2 Rationale for reduced leakages and limited portability

The CORE PDS, through tracking shop-level transactions, has certainly further reduced the possibilities of corruption. Food inspectors we spoke to were emphatic that diversion was very rare due to the various features of the CORE system. The entitlements of each cardholder, and how much has already been collected, are available instantly on the PoS device. The food inspectors argued that this was better than the earlier written instructions that were open to interpretation. E-*panchanamas* (documents) that shop operators have to file with Nagrik Apruti Nigam (NAN), the state civil supplies corporation, on receipt of the ration from the warehouse prevents leakage. It is not possible to enter new false names into the system. The food inspectors also mentioned that the system had reduced the ability of powerful local politicians to interfere with distribution. As one interviewee mentioned, 'earlier, powerful people in villages like the MLAs and MPs [members of legislative assemblies and members of Parliament], *netas* (leaders, politicians), etc. used to ask for rations from the shop. Now this has stopped as all the entries are online'.

In contrast to the overall positive findings on corruption, portability seems to be limited. Although there were no estimates made of how much portability might be used or be in demand, we did find in our study that awareness on portability is very low. Further, as the data above show, over time portability usage decreased, even in Raipur where there was some portability in the early months following its introduction. In general, there can be three motivations for using portability: (1) dissatisfaction with the services provided in the current shop being used, therefore moving to another nearby shop, (2) a different shop being more convenient in terms of distance and access (which was a common finding in Raipur where people moved houses within the city), and (3) to access PDS entitlements in case of temporary migration to another location in search of work, etc. While the first and second kinds of demand might be difficult to predict, the third could be mapped by studying migration patterns. However, no such exercise was carried out and since the CORE PDS was started in only a few districts, mostly in urban areas, it can be expected that it was not very useful as far as catering to the demand of migrant populations is concerned.

A positive interpretation of low portability might be that the potential for taking rations from other shops acts as a background threat, leading FPS operators to automatically improve their service and reduce corruption due to fears that they might lose business. Only migrants,

or those for whom current FPS shops are inconvenient in some way, would act on the option of portability. Such an interpretation might be strengthened by evidence of high beneficiary satisfaction. We do not have robust evidence to support this claim. Rather, as we shall see below, it appears that there are other reasons why portability remains low.

One of the reasons for the lack of portability was the lack of smart cards. Among the people we interviewed, nearly half (29) did not have either the RSBY card or smart ration card (SRC). Some who had RSBY cards reported never having to take them to the FPS. Without an RSBY card or an SRC, it was not possible to access rations in a shop where one was not registered. Such a low coverage of cards has not been found in earlier surveys. The reason for this was that, in the period preceding our fieldwork, prior to the elections, a large number of new ration cards had been issued, with the total number of ration cards in the state doubling from 420,000 to 750,000. These new ration cardholders had not been provided with SRCs that would enable portability.

Another reason for the limited portability was the low level of awareness. Earlier surveys in Raipur in 2013 had reported a relatively high level of awareness regarding portability, around 79 per cent (Right to Food Campaign 2013). Only 17 of our 60 respondents knew about the possibility of portability. A common refrain is captured by the statement of one villager, '*Jahan par naam hai, wahi ward mein milega*' ('we can only get it in the ward where our name is registered'). Five people in our sample knew that they could go to other shops if they had an SRC, but they did not possess one. Two respondents thought that portability was only allowed between shops if both shops were operated by the same self-help group (SHG). In some cases, discrepancies between the paper ration card and the SRC prevented portability, as only the FPS where the cardholder was registered was willing to accept the discrepancies.[6] Further misunderstandings had been created by the relatively recent stoppage of portability while the post-election card verification drive was happening. One respondent who tried to migrate to another shop because of proximity to his house (and the Food Corporation storage facility, making him believe that the shop would always be well stocked) was denied access as the FPS operator claimed to only receive stocks for those registered at his shop. Thus, there remains major confusion about the usefulness of both the RSBY and the SRCs among beneficiaries.

Further, the low level of portability, especially in rural areas, can be explained by the prevailing power differentials between poor, often illiterate, cardholders and FPS operators. In many locations, the overt display of faith in the FPS dealer despite numerous issues with the functioning of the shops is evidence of the considerable social influence of the FPS operator and the vulnerability of cardholders. While the reforms had envisaged independent SHGs, run autonomously as a collective by the women in the local area, in many instances, especially for those SHGs operating the Integrated Child Development Scheme (ICDS), it was reported that de facto control of these SHGs is with the men of the household. Although we did not document this systematically for all our cases, we found it to be common in the field. One woman, explaining why she did not attempt to use her SRC in shops other than her home shop, said that the home FPS operator threatened cardholders that if they went to other shops for rations once, they should not expect to come to him in the future. Given the embedded nature of FPS shops and their operators in local politics, it would be unwise to displease the local FPS operator. External interventions attempting to restructure this relationship through technical fixes such as real-time monitoring and portability fail to take into account the deep, institutionalised and persistent patterns that are very difficult to break.

Finally, even if some cardholders were willing to challenge the poor performance of their FPSs, they were faced with limited channels for effective grievance redress. The CORE PDS

[6] In one case, the paper ration card was issued in a woman's name whereas the SRC had been issued in the name of her husband. She had tried getting rations from another shop which was known to stock all commodities regularly, several times, but failed due to this discrepancy.

provided a toll-free helpline number for grievance redress, and complaints were to be resolved within 15 days, after which an explanation for the delay would be sought by the state food controller. However, there was little awareness of the toll-free number. Only five of our 60 respondents had heard of the toll-free number, which was supposed to be posted on the walls of each FPS. Asked whether their FPS had the number on their noticeboards, people's views were tellingly captured by one response: 'If it is written, we do not know'. For the most part, people were not interested in complaining. As one interviewee stated, 'What will I complain about?' Not surprisingly, only three of our respondents had ever filed a complaint against their FPS dealer. One cardholder pointed out that it was very difficult to actually raise issues with the shop operator as the shop gets very crowded when the rations are disbursed, a point we will return to later. And as one food inspector admitted, there were no real consequences of delays or non-resolution of complaints.

Another avenue of monitoring performance locally was the locally constituted vigilance committees (*Nigrani Samiti*). These were largely nominal, politically constituted, and there were allegations in our field sites that positions on these committees were sold for bribes. One food inspector concurred, stating that these were a new avenue for corrupt people to gain from the PDS programme. In fact, one FPS dealer described the inspection visits of the *Nigrani Samiti* as a 'comedy performance'.

Rather than the official channels provided (such as the hotline), people preferred using traditional channels such as approaching their elected representatives. Other avenues included the district collectors open public hearings (*Jan Darshan*), writing letters to prominent politicians, making verbal complaints to food department officials and other relevant government offices, and even posting on the government website, *Hamar Gohar* (Our Call).

This attitude towards grievance redress rests in the prevailing politics of entitlement and patronage. The social embeddedness of the FPS operator and the entitlement holders on the one hand, and the active involvement of the local elected representatives in the PDS on the other, leads to a situation where discontent is mediated rather than allowed to explode. As one interviewee put it, 'We adjust a bit with the shopkeeper. We don't complain'. In one ward, the FPS operator displayed the telephone number of the elected ward councillor rather than the toll free number. In some cases, dissatisfied cardholders were asked to approach the elected leader by the FPS dealer himself. Thus, inconsistencies in the operation of the PDS are contained through informal and political negotiations between all concerned. In fact, FPS dealers and elected local politicians are often closely tied. In one case, an FPS dealer was the *up-Sarpanch* (deputy village head).

Parallel to the faith in elected representatives, there was also faith in collective action. For example, provoked by the constant delaying tactics and non-availability of kerosene, one village employed a strategy of collective action. 'When the people of the *mohalla* (district) go together they get two litres of kerosene, otherwise only one litre'.

In sum, despite the well-intentioned design of the CORE PDS, several factors undermine its effectiveness. People lack awareness and do not view a well-functioning PDS as their right. The state seems to do little more than fire-fighting in an *ad hoc* fashion. And local politics ensures that the transformative potential of the CORE PDS is not realised.

Given these findings, it appears that the PoS devices and related real-time monitoring systems serve more as a method for collecting transactions data for government management and for monitoring purposes, rather than as a way of empowering beneficiaries vis á vis FPS operators. And, given the additional challenges posed by the CORE PDS in terms of time and resources required, the question of its effectiveness in the absence of portability remains.

7 Limitations of the CORE PDS

Despite the overall reduction in perceived leakages, the manner of implementation of the CORE PDS left scope for corruption. First, the CORE PDS did not address the problem of fake and duplicate cards. There has always been a percentage of ghost or duplicate cards circulating in the PDS which have been used to divert grains to the open market. The problem of such cards was compounded by the over-issue of ration cards in a populist move prior to the 2013 elections. Since the issuing of SRCs did not verify the authenticity of the original cards, the tracking of store-level transactions through the core PDS did not fix the problem of duplicate cards or address the opportunities for corruption in the issuing of cards that existed in the previous system.

Second, the CORE PDS, since it is currently operating without portability, creates more inefficiencies than it resolves. The number of situations in which the PoS device does not work (because of problems with the device, lack of connectivity, lack of electricity, lack of paper for receipts) or the person who knows how to operate it is not around, increases the chances of cardholders not receiving their rations. Moreover, the process of receiving rations now takes longer as each cardholder's transactions are now recorded both in the book as well as on the central server through the SRC. This prolongs the waiting time for each customer. Without portability, there is no way to avoid situations of PoSs not working or the increased waiting times.

Third, one of the advantages of the CORE PDS was supposed to be that, because of real-time data, stock management would improve to make stocks available throughout the month. Many shop operators reported that stock management had become easier as once 50 per cent of the stocks were used the central supply office was alerted. All the shop operator had to do was deposit the money (via bank draft) and the stock was released in a few days. The benefit to consumers was that if stock was available throughout the month, they would not need to crowd the shop at the beginning of the month when the food stocks first arrived. A study carried out in 2013 found crowding remained a problem, but predicted that this would improve as people became used to stocks becoming available throughout the month (Gupta 2014). A year later, however, we found that crowding continued to be a major problem as people feared that stocks would run out. As one interviewee put it, 'Shop too crowded so we go the next day. The shopkeeper says it's over'.

Fourth, a key underlying assumption behind the system was that the smart card would be swiped in the presence of the customer, the customer would be given an automatically generated receipt, and the transaction would be automatically uploaded to the central server. In theory, the system allows for constant monitoring, making it difficult for the shop operator to fudge the records. In practice, however, we found that the act of receiving food grains and the swiping of the smart card were not done at the same time.

As FPSs receive most food stock during the first week of each month, cardholders arrive to collect rations as soon as there is word that stocks have arrived. As mentioned earlier, this results in large crowds arriving as soon as the shop opens each day. In order to save time and manage the crowds, shop operators provided people with their entitlements and asked them to leave their smart cards to be updated later. This was also done when the PoS device was not working or there was no electricity.[7] At the end of the day or the next day, the operator would then swipe all the cards, one after the other, and make the entries into the system. We found one instance where the RSBY card details were stored with the FPS

[7] Although the PoS device has a capacity to run on battery for eight hours, shopkeepers mentioned not having a proper electricity supply as a problem in some places.

operator who fed them into the PoS whenever he chose. Some respondents reported that the FPS dealers asked them not to bring their RSBY cards as they had already saved their details. Receipts were seldom given (operators reported that they did not have paper rolls for the receipts) and the customers did not demand them either. While people were aware that the card was needed for the machine, there was little awareness of why. Only three of our respondents out of 60 observed that the card contained the details of their monthly quota and how much had been already given. Occasionally, cardholders are party to collusion. In Mahasamund, some people reported that people would mortgage their cards with the FPS operators in order to access short-term loans. The operator entered food grains on these cards, selling the related rations in the open market. As a result of these practices, despite real-time monitoring, the system is still open to the possibility of shop operators entering higher amounts than were given or entering food grains that had not been provided.[8]

Another point at which corruption is possible is in the issuing of the new ration cards. At the time of distributing the new smart cards, public officials can demand payments from cardholders. This was the case in Mahasamund, when one *sarpanch* (elected village head), demanded Rs.100 from each cardholder before he would give them their cards, referring to it as 'tax money'. Verifying the extent to which these practices occurred was beyond the scope of this study.

[8] One food inspector suggested that perhaps making ration cards password protected might be a way of checking such corruption.

8 Recent developments in Chhattisgarh PDS

The politics of the PDS in Chhattisgarh cannot be isolated from the overall political situation in the state, more so since it was a major electoral plank for the state government in two successive elections. The second phase of reforms and the well-functioning PDS was amongst the main electoral planks of the government. It is widely believed that the expansion of coverage, low prices, and other reforms in the PDS are largely responsible for the incumbent party twice winning State Assembly elections, entering into their third term in government in 2013. An oft-repeated cynical analysis of the PDS reforms has been that the government has successfully capitalised (electorally) on the success of the PDS reforms, which provides an alibi for their (non)performance in other spheres, including a crumbling public health system, which claimed the lives of 13 women who used a government facility for sterilisation operations in November 2014, and the (continuing) violent state reprisals against the Maoists, which have claimed hundreds of innocent lives over the past few years and displaced thousands of people from their villages.

Yet the benefits, if any, which may have accrued to the present government, are now producing very marginal returns. The gap in vote share between the two largest parties is just 0.7 per cent (compared to 1.75 per cent in the 2008 assembly elections and a 1.25 per cent difference in the 2013 assembly elections) and the recent elections to urban local bodies saw the ruling party receive a major electoral setback. It is not clear whether this is a harbinger of things to follow and if it will be reflected in further electoral defeats, but what is clear is that political will to deepen the reforms is now floundering.

The fiscal sustainability of providing higher and higher prices for public procurement of paddy from farmers on the one side and distributing the grains to expanded populations at decreasing prices on the other is also under question. Budgetary support from the state exchequer for procurement, and the enlarged PDS, has exceeded US$1bn annually. Since the Chhattisgarh Food Security Act provisioned 35kg of food grains to each household, even if it had a single person, there were a number of instances, particularly in the state's non-tribal areas, where multiple members of the same family registered as single-member households to get additional benefits.[9] Although not empirically established, there have been a number of media reports on entitlement holders (falsely) registering themselves as single families, which further provides fuel to critics of the PDS. Given these reports, support is being questioned, even from within the administration, as the PDS has now been seen as a drain on resources, especially given the tight fiscal situation that Chhattisgarh is currently facing.

The situation is complicated further by national-state dynamics. The tectonic shift in national politics in which the BJP-led coalition has come to power after ten years out of office, ironically, has not helped Chhattisgarh's case to further innovate in the PDS either. Whilst the past ten years was a decade of 'rights legislations', which fit the rights-based approach implied by portability and the expansion of entitlements, the present government seems way less inclined to continue along the same path. The practical impact of this change in approach was immediately felt when the Government of India dis-incentivised the additional support, known as a 'bonus', which Chhattisgarh was providing to farmers, thereby severely curtailing procurement operations in the state. There is also increasing talk of reducing the Government of India's food subsidy and shifting to cash transfers, measures which the state government of Chhattisgarh has resisted in the past and which do not portend well for the deepening of reforms in the PDS.

[9] This prompted the state government to launch a cancellation drive in order to eliminate such cases. However, this process was not carried out with the rigour required and a number of genuine entitlement holders had to suffer a temporary loss of their entitlements.

9 Conclusions

This paper attempted an assessment of the reported impacts of a real-time monitoring system of a food subsidy programme in India – the CORE PDS in Chhattisgarh state – on reducing corruption and empowering consumers through an entitlements and rights-based approach to portability. What do the PDS reforms described tell us about the potential of ICT reforms, such as using real-time monitoring? First, as a lesson for PDS reforms in other states in the country, it is clear that real-time monitoring cannot be seen in isolation from either the current political context or from other reforms required in the PDS. Reforms such as portability and real-time monitoring would be more effective when part of a larger package of reforms involving corrective actions at all stages of the supply chain. Chhattisgarh was able to address the leakages in its PDS substantially by improving the mechanisms in delivery from state level to the level of the FPSs, while at the same time putting in place better systems for community monitoring and ownership. The CORE PDS undertook the logical next step of extending the computerisation and real-time monitoring to include the last mile transaction between the FPS and the consumer. This could be introduced alongside the other reforms and need not necessarily be sequential. However, what is important for any of these reforms to be truly effective is to set in place an effective and equitable distribution system for ration cards and the identification of beneficiaries. The Indian state of Kerala has started with reforms related to the distribution of ration cards first, and is hoping to introduce portability at a later stage (Masiero 2015). Many have argued that universal coverage or a near universal system which excludes the rich and includes everyone else is the best way forward (Drèze and Khera 2010; Sen and Himanshu 2011), but this is beyond the scope of the present paper. In Chhattisgarh, the ill-planned attempts to modify the beneficiary lists have threatened to undermine all the other reforms that have been undertaken earlier.

As far as the CORE PDS is concerned, there are two main implications, one at the local and one at the political level. It would be fair to say that the well-intentioned technological interventions of the CORE PDS have not been able to overcome the limitations imposed by local social power structures. Consider the following observations that emerged from our research. First, the allocation of FPS dealership remains a function of local power struggles that more often than not advantage the dominant political elites. Hence, the expectation of transparency and accountability from the FPS dealer, who in general is found enjoying a status of considerable social and political influence in the local community cannot stand on technocratic stilts alone. Second, community-based monitoring mechanisms like the *Nigrani Samiti* can only be as effective as the politics within the community allow them to be. When systems of grievance redress have been captured by a powerful elite, one can expect business as usual. Third, the historically politically entrenched evolution of the PDS as a vote-capturing tool fails to inspire any hope for empowerment based on a few alien (and often malfunctioning) PoS devices. A positive transformation among the people is cynically sustained by local elites for political gains. Fourth, such overbearing politicisation of the PDS implies that collective action on PDS issues in effect functions to contain any discontent and potential disruption to the local power structures rather than supporting empowerment. Lastly, all this transpires under the watch of the risk-averse government agencies and high-level bureaucracy that, at least in our observation, have failed to make significant positive interventions against the local political gradient in order to achieve the advertised objectives of the CORE PDS.

Finally, the research shows us that even technological reforms with political backing can lose traction with changes in the underlying politics. A renewed need for populism, and a national-level dynamic that is more concerned with prudent fiscal policy than open-ended rights-based policies, have undermined general support for the CORE PDS reforms in different

ways. Expanding indiscriminately the number of cards issued in a bid to win electoral support, subsequent verification drives that created confusion and enabled corruption, and, finally, the high fiscal burden in the face of a limited appetite for social programmes like the PDS at the national level mean that an effective and functioning PDS no longer fits within the political logic of the state or the centre. Rather, we have a situation where real-time capturing of shop sales has continued, without the portability element – resulting in greater dissatisfaction on the part of beneficiaries. State officials (with one or two exceptions) express little enthusiasm for portability, compared to when the programme was started. In the current climate, it is difficult to see the CORE PDS experiment being extended further unless there are some significant changes in the political context.

Annex 1 Selection of sample FPSs for the study

S. no.	Fair price shop	Portability percentage (January to December 2013)
RAIPUR URBAN		
Top 2 category FPS		
1	Raipur 1	72.02
2	Raipur 2	72.07
Bottom 2 category FPS		
1	Raipur 3	2.83
2	Raipur 4	3.47
DURG URBAN		
Top 2 category FPS		
1	Durg 1	27.71
2	Durg 2	15.57
Bottom 2 category FPS		
1	Durg 3	0.07
2	Durg 4	0.11
MAHASAMUND RURAL		
Top 2 category FPS		
1	Mahasamund 1	12.47
2	Mahasamund 2	6.88
Bottom 2 category FPS		
1	Mahasamund 3	0
2	Mahasamund 4	0.07

Annex 2 Interview schedule for the FPS owners

Name of interviewer:
Top 5 Questionnaire_ FPS Owners Bottom 5

General information about FPS:	
Name of FPS	Place
Name of owner(s)	
Code:	

Type of ownership:

Panchayat	Primary Agriculture Cooperative Credit Society	Women's SHGs
Large AadimJaati Multipurpose Cooperative Societies (LAMPS)	Other cooperative society	Forest Protection Agencies
Any other:		

Any other FPS ownership & where:

Name of FPS	Ownership type	Place

Observations:

- *Black on yellow details of FPS: name of owner, code of FPS, timings*
- *Whether located in govt. building*
- *Electronic weighing machine [Yes/No]*
- *How many people running the FPS present today?*
- *Other goods being sold (vegetables, other basic commodities)*
- *Does the space seem adequate for the number of beneficiaries?*
- *Is toll free number for complaints displayed prominently on shop?*

Villages/hamlets covered:

a.	Number	
b.	Average distance from each	

1. Did you receive any benefits/take any loans, etc. at time of setting up the FPS?

	Provision	**Yes (1) / No (0)**
a.	Interest-free loan of Rs.75000 for working capital. Payable in 20 years in EMIs	
b.	1 month stock on credit (except kerosene)	
c.	Commission on food grains and kerosene increased	
d.	Any other	

2. No. of beneficiaries assigned to this shop_____
3. How many beneficiaries accessed last month (August 2014)? _____
4. Of these, how many beneficiaries avail PDS rations through:

Tool	**No. / %**
Ration Card	
Smart Ration Card	
RSBY card	
Aadhaar card	
One-Time-Password (OTP) i.e. mobile phones	

About Smart Ration Cards & other cards:

5. Why were beneficiaries issued Smart Ration Cards (SRCs) in this shop?
6. How many/no. of Smart Ration Cards (SRCs) issued to beneficiaries from this shop?
7. What happens when someone does not get their Smart Ration Card (SRC)?
8. What happens when someone does not get their Paper Ration Card?
9. Can family members bring ration card/smart cards/other proof of identity to buy ration?
   a. Do people try? Is it an issue? (*for senior citizens/lost cards*)
10. What happens when their Ration Card is lost?
11. A lot of ration cards were cancelled recently, are you aware of it?
    a. Do you know what the criteria were for cancelling cards? What was the process?
    b. Were you consulted?
    c. How did it affect you and your sales?
    d. What complications did you face?

About CORE PDS & PoS device:

12. Do you know about CORE PDS?/What does CORE PDS mean? (*try to extract information whether he knows that any beneficiary can go to any FPS - Don't prompt directly that any beneficiary can go to any PDS – check their awareness*)
    a. If yes, what are the main features [मुख्यविशेषताएं]?
    b. Since when do you know of CORE PDS?
13. Were you ever trained for the use of PoS (Point of Sales) device?
    a. When?
    b. Where?
    c. Any refresher training?
    d. After how long/what is the gap between training sessions?
14. Has your POS device ever needed repair/replacement?
    a. How long the repair/replacement processes take?
    b. Procedure details
    c. What happens to beneficiaries while the PoS is out of action?
15. Can beneficiaries buy:
    a. Some part of the ration from you and some other commodities from another shop?
    b. Some rations for a month in installments?

16. Post implementation [लागू] of CORE PDS, are you making more profit [लाभ/ मुनाफ़ा] / less profit [नुकसान/ घाटा] / Same as before [सतत]?
    a. If making less profit, how do you think you can increase traffic to your FPS?
    b. What do you tell beneficiaries to encourage them to stay with your shop (*in this way we may check how many are saying that if beneficiaries go elsewhere, they will never get rations again from the local shop*)
    c. If making more profit, did/do you need take extra assistance in such months?

FPS functioning:

17. When is the ration received by the FPS?
18. Does the ration received need transportation costs to be endured by the FPS keeper?
    a. If yes, how often and how much/procedure details?
19. For how many days is the FPS kept open in a month?
    a. Why for only some days
    b. Why for entire month?
20. Is it becoming/has it ever been difficult to maintain this shop? Have you felt the need for more assistance (labour wise/any other difficulty)?
21. In the past year [January 2013 – Dec 13] which has been your best [लाभदायक] business month?
    a. Why according to you?
    b. How many times did you need to restock your supplies in the month?
    c. Was there ration left with you at the end of the month?
    d. What did you do with the left over ration?
22. In the past year [January 2013 – Dec 13] which has been your worst business [हानिकारक] month?
    a. Why according to you?
    b. How many times did you need to restock your supplies in the month?
23. Have you ever lost business because of lack of ration availability in your shop?
24. What is the time required before restocking? Is it predictable? How do you monitor?
25. If a beneficiary doesn't lift its entitlement [पात्रता/ हकदारी], the stock is….
26. Do you allow others to take ration from this shop IF people assigned to this shop don't take it from you sometimes? Have you heard of such instances?
    (Report is supposed to be sent back after the end of that month within one month. Also, a beneficiary is entitled to lift grains for not more than past 2 months of entitlements. What happens after? Where does entitlement go/be submitted to or deposited at?)

Complaints & inspection:

27. Have you ever been in a situation where you have been blamed for a fault of somebody else?
    a. Details
28. Have you ever lodged a complaint?
    a. Details
29. How many times has inspection take place here in the last year [Jan 13 – Dec 13]?
    a. How do the food inspectors behave?
    b. What happens during inspections?
30. Have the officers ever asked you to produce/submit any documents?
    a. When? What?
    b. Do you have any copies of the same?
31. Have you ever faced any sort of harassment/pressure from the Panchayat/members of Sarpanch or urban local bodies?
    a. Of what sort?
    b. When? How do you tackle?
32. How do think the ration system may improve to suit your needs?

Annex 3 Interview schedule for the beneficiaries of PDS

Name of interviewer:
Top 5 Questionnaire_Beneficiaries Bottom 5

General information about respondent	
a. Name of respondent:	
b. Education:	c. Caste:
d. No. of family members:	
Ration Card details	
a. Type of Ration Card: Yellow ☐ Saffron ☐ Blue ☐ White ☐	
b. Do you use any card to take rations? Yes ☐ No ☐	
(If yes) Which type of card do you use? Smart Ration Card ☐ RSBY card ☐ Aadhaar card ☐ OTP ☐ Other (please specify):…….	
Do you have your card(s) with you now? Can we see it? ***(Note any observations/comments:*** *photograph of HH head, number of names listed with relation, FPS No., address, verification details)*	
Fair Price Shop (FPS) details	
Name of parent FPS:	
Code: ☐☐☐☐☐☐☐☐☐☐☐☐	
Location:	
Name of owner(s):	

1. How far is the closest FPS? How long does it take you to reach? How do you commute?
2. What commodities do you buy from FPS in what quantities?

Rice:	Sugar:
Wheat:	Kerosene:
Salt:	Pulses:
Any other:	

3. Do you buy all these commodities every month?
4. If not, which ones do you not? Why?

Rice ☐ Sugar ☐ Wheat ☐ Kerosene ☐
Any other:

5. Do you buy different commodities from different FPS/in installments? Which ones? Why? (*availability issues*)

Rice ☐ Sugar ☐ Wheat ☐ Kerosene ☐
Any other:

6. Has there ever been a problem where you wanted to buy a commodity but it was not available?
    a. How frequently? Which commodity?
    b. What is the reason?
7. Do you face a problem with the FPS owner when you go to get your ration? What are the kinds of difficulties you face in dealing with your FPS shopkeeper?

Smart Ration Card:

8. When did you get it? How (procedure details)?
9. Did it get cancelled in the last 6 months?
    a. If yes, what reasons were given to you?
    b. Did you submit the old ones? How did it happen? Were you told new ones would be issued?
    c. Has it got re-issued?
    d. How did it get re-issued?
    e. What did you do to get food during the time your card was cancelled?
10. Are there any benefits of a Smart Ration Card?
    a. If so, what according to you are the benefits of the Smart Ration Card?
    b. What do you see as advantages of the smart card (*to check awareness of portability, of the fact that the ration received is automatically recorded, etc.*)
11. Have you ever faced a problem with the card not working?
    a. If yes, did you get the ration?
    b. How?/What did you do?
12. Have you ever faced a problem when the PoS device at the FPS hasn't worked?
    a. If yes, did you get the ration?
    b. What happens when PoS isn't working?
13. Did you ever lose your card?
    a. If yes, when?
    b. What did you do?
14. Have you ever lodged a complaint? Details (*awareness of the toll free number, have you ever used it?*)

Portability:

15. Can you buy in any shop other than the one you are assigned to?
(If NO skip to Q20)
    a. If YES: Do you do so?
    b. How frequently/many times do you go to another FPS?
    c. When was the last you used this facility?
    d. Where did you go?

Name of other FPS	
Name of owner(s):	
Code:	Place:

    e. Why?

16. Do you go to the same FPS each time, when you don't go to your own ration shop?
    a. If yes, why?
    b. If NO:

Name of other FPS 1	
Name of owner(s):	
Code	Place
Why1	

Name of other FPS 2	
Name of owner(s):	
Code	Place
Why 2	

Name of other FPS 3	
Name of owner(s):	
Code	Place
Why 3	

Name of other FPS 4	
Name of owner(s):	
Code	Place
Why 4	

For our reference:			
a. Closer to home	b. Availability of ration	c. Better service	d. Mode of transportation
e. My relative/friend brings ration for me	f. Less waiting time	g. Efficient technology	h. Availability of 'other services and behaviour of FPS owner'

17. What card do you use to avail benefits of portability/at your FPS?

Type of card	**At parent FPS**	**At other FPS**
Ration Card (Paper)		
Smart Ration Card		
RSBY card		
Aadhaar card		
One Time Password (OTP)		
Any other:		

18. Difference in behaviour in FPS Salesperson in parent and other FPS? How so?
19. Is there a difference in the quality of commodities between your parent shop and other shops where you might have bought commodities?
    a. Sometimes/always?
    b. Details for different commodities
    c. Are you able to do keep a check on the quality of commodities in all FPS/ration shops you procure your commodities from?
20. Do you know of anyone who has used a card elsewhere? What have you heard about that case?
21. Does anyone prevent you from going to another FPS?
22. Do you think that the shop owner gives you accurate weights of the commodities? If not what can you do?
23. Have you ever been denied your entitlement at any FPS?
    a. When?
24. Have you ever lodged a complaint? How? (Check for toll free no. awareness) What happened? Have you kept any proof? Can we see it?
25. Do you or any member of your family migrate for work?
    a. Where? How long? Who all?
    b. How/from where do you procure your entitlement when you migrate?
    c. What happens when only 1 member of the family migrates?
26. How do you think the system can be improved? What is needed to make getting ration easier?

References

Bertot, J.C.; Jaeger, P.T. and Grimes, J.M. (2012) 'Promoting Transparency and Accountability through ICTs, Social Media, and Collaborative E-government', *Transforming Government: People, Process and Policy* 6.1: 78–91, http://dx.doi.org/10.1108/17506161211214831 (accessed 9 February 2015)

Bhatnagar, S.C. and Singh, N. (2009) 'Results from a Study of Impact of E-Government Projects in India', paper presented at the International Conference on Information and Communication Technologies and Development (ICTD), Doha, 17–19 April 2009

Bovens, M. and Zouridis, S. (2002) 'From Street Level to System-level Bureaucracies: How Information and Communication Technology is Transforming Administrative Discretion and Constitutional Control', *Public Administration Review* 62.2: 174–84

Brito, J. (2008) 'Hack, Mash and Peer: Crowdsourcing Government Transparency', *The Columbia Science and Technology Law Review* 119.9: 119–57

Chand, V. (2006) 'Simplifying Transactions' in *Reforming Public Services in India: Drawing Lessons From Success*, Washington DC: World Bank: 15–27

Drèze, J. and Khera, R. (2013) *Rural Poverty and the Public Distribution System*, Working Paper 235, Delhi: Centre for Development Economics, Delhi School of Economics

Drèze, J. and Khera, R. (2010) 'The BPL Census and a Possible Alternative', *Economic and Political Weekly* 45.9: 54–63

Dunleavy, P.; Margetts, H.; Bastow, S. and Tinkler, J. (2005) 'New Public Management is Dead: Long Live Digital Era Governance', *Journal of Public Administration Research and Theory* 16: 467–94

Government of Chhattisgarh (2014) *CORE PDS Portal*, http://khadya.cg.nic.in/pdsonline/corepds/ (accessed 19 February 2015)

Government of India (2010) *Envisioning a Role for Aadhaar in the Public Distribution System,* New Delhi: Unique Identification Authority of India Planning Commission, Government of India, http://uidai.gov.in/images/resource/Circulated_Aadhaar_PDS_Note.pdf (accessed 13 January 2015)

Government of India, Planning Commission, Unique Identification Authority of India (2010) *Envisioning a Role for Aadhaar in the Public Distribution System*, New Delhi: Government of India

Greeley, M.; Lucas, H. and Chai, J. (2013a) *Real Time Monitoring for the Most Vulnerable,* Synthesis Report, London: UNICEF/Brighton: IDS

Greeley, M.; Lucas, H.; Chai, J. and Cummins, M. (2013b) 'Real Time Monitoring for the Most Vulnerable: Investing in Common Guidance for Equity and Quality', *IDS Bulletin* 44.2: 1–14

Gupta, R. (2014) ‘Chhattisgarh’s Food ATMs: Portable Benefits Minus Biometrics’, *India Together*, http://indiatogether.org/core-pds-smart-system-in-raipur-chhattisgarh-food-security-portability-government (accessed 13 January 2015)

Harris, R. and Rajora, R. (2006) *Empowering the Poor: Information and Communications Technology for Governance and Poverty Reduction,* UNDP-APDIP ICT4D Series, Bangkok: United Nations Development Fund Asia-Pacific Development Information Programme

Heeks, R. (2003) *Most E-Government-for-Development Projects Fail, How can Risks be Reduced?*, Government Working Paper Series, Manchester: Institute of Development Policy and Management, University of Manchester

Hogge, B. (2010) *Open Data Study*, London: Transparency and Accountability Initiative

Khera, R. (2011) ‘Trends in the Diversion of Grain from the Public Distribution System’, *Economic and Political Weekly* 46.2: 106–14

Krishna, S. and Walsham, G. (2005) ‘Implementing Public Information Systems in Developing Countries: Learning from a Success Story’, *Information Technology for Development* 11.2: 123–40

Lucas, H.; Greeley, M. and Roelen, K. (2013) ‘Real Time Monitoring for the Most Vulnerable: Concepts and Methods’, *IDS Bulletin* 44.2: 15–30

Madon, S. (2009) *E-Governance for Development: A Focus on Rural India*, London: Palgrave Macmillan

Masiero, S. (2015) ‘Redesigning the Indian Food Security System through E-Governance: The Case of Kerala’, *World Development* 67: 126–37

Masud, M.O. (2002) *Coproducing Citizen Security: The Citizen-Police Liaison Committee in Karachi,* IDS Working Paper 172, Brighton: IDS

Mooij, J. (1998) ‘Food Policy and Politics: The Political Economy of the Public Distribution System in India’, *The Journal of Peasant Studies* 252: 77–101

PRAJA (2000) *Citizen Satisfaction Survey 2000*, Executive Summary, Mumbai: PRAJA

Programme Evaluation Organisation (2005) *Performance Evaluation of Targeted Public Distribution System (TPDS)*, PEO Report 189, New Delhi: Programme Evaluation Organisation, Planning Commission, Government of India, http://planningcommission.gov.in/reports/peoreport/peo/peo_tpdsmarch05.pdf (accessed 13 January 2015)

Pueyo, A. (2013) *Real Time Monitoring Technologies for Pro-Poor Access to Electricity*, IDS Evidence Report 12, Brighton: IDS

Right to Food Campaign (2013) ‘Evaluating CORE PDS in Raipur City of Chhattisgarh State’, mimeo, New Delhi: Right to Food Campaign

Sen, A. and Himanshu (2011) ‘Why not a Universal Food Security Legislation’, *Economic and Political Weekly* 66.12: 38–47

Sheel, V. (2013) ‘Executing Food Security: Experiences from the Grassroots’, *The Discussant, Journal of the Centre for Reforms, Development and Justice* 1.4: 54–62

Shim, D.C. and Eom, T.H. (2008) ‘E-Government and Anti-corruption: Empirical Analysis of International Data’, *International Journal of Public Administration* 31: 298–316

Times of India (2010) ‘Janagraha to Clean up Poll Roll’, *Times of India*, 24 July

Vaidya, A.S. and Somasekhar, A.K. (2014) *CORE PDS: Empowering with Portability*, Hyderabad: National Institute for Smart Government (NISG), http://nisg.org/files/documents/UP1401111489.pdf (accessed 20 December 2014)

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