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Functioning of Direct Benefit Transfer in Fertiliser at Retail Point in Gujarat State

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All India Study Coordinated by
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Foreword

India is one of the major producers as well as consumers of chemical fertilizers. The Green revolution technology comprised of high yielding variety seeds, fertilizer and irrigation adopted during mid-sixties has brought country out of chronic food shortage stage to food grains surplus country. The usage of chemical fertilizers with quality seeds and irrigation helped to increase food grains production in the country by almost five and half times during last seven decades' period and achieving the self-sufficiency. Fertilizers also play a major role in the advanced short duration crop production. In view of diminishing land for cultivation and in order to maintain the self-sufficiency of food grain production in years to come, availability of fertilizer at reasonable prices in quality time is very necessary.

Over the years, intensity of fertilizer consumption has increased significantly, i.e. from 5.09 kg/ha in 1966-67 to 137.4 kg/ha in 2018-19 having huge variations across the States. Gujarat has reported the per hectare consumption of fertilizer (136.01 kg/ha) higher than national average (128.5 kg/ha) and the highest in Western Zone of India during TE 2017-18. Though fertilizer consumption has reported significant increase, but many reports have highlighted its uneven, untimely and faulty distribution which had become prone to 'leakages' as well as pro-rich large farmer group. It was estimated that about two third of total fertilizers produced in the country does not reaches the intended beneficiaries viz., small and marginal farmers. Besides, some reports have highlighted industry use of fertilizer. In order to tackle these issues, Government of India had taken various initiatives including technological interventions such as Fertilizer Management System in 2007, Neem Coated of Urea in 2008, Mobile Fertilizer Monitoring System in 2012 and Integrated Fertilizer Monitoring System in 2016 which has helped to increase transparency in the fertilizer distribution system and its management. While these initiatives could not fully curb the leakage, excess use as well as misuse of fertilizer. As subsidy on fertilizer is the second largest subsidy after food subsidy provided the by the government, therefore, Government of India decided to bring fertilizer subsidy under the Direct Benefit Transfer (DBT) system w.e.f., 1st October 2016 in 17 districts under which government remits a subsidy amount to fertilizer companies after fertilizer retailers have sold fertilizer to farmers through Point of Sale (PoS) machines through biometric authentication. Any farmer can purchase any required quantity of subsidized fertilizer regardless of the land size availed with him at subsidized rate. The Pan India rollout of DBT was completed by March 2018. It was therefore important to find out the degree of variation among various sources of data at the retailer level. With this view, the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India entrusted our Centre a study on 'Functioning of Direct Benefit Transfer in Fertiliser at Retail Point in Gujarat State'. Agricultural Development and Rural

Transformation Centre, Institute for Social and Economic Change, Bangalore, Karnataka has coordinated this all India study. The ultimate objective of the study was to see how much reliance can be placed on the PoS data for the purpose of policy planning and movement/supply of fertilizers in the Gujarat and what corrective action need to be undertaken to reconcile data across various data sources.

The study is based on secondary and primary level data. For primary data, two districts, viz. Anand and Botad were selected covering different agro climatic zones with one district covering irrigated and the other one covering rain-fed/ dry land area. The total sample for Gujarat state was 60 retailers, 100 top twenty buyers, 50 most frequent buyers and 100 random walk buyers selected from the same villages where from top and frequent buyers are selected. The study results indicate that existing scheme of DBT in fertilizers is very good. While major problems in functioning of DBT at retailer level reported were poor internet network connectivity, frequent server down, failure of Aadhaar authentication of farmers, frequently session log out after some time, battery getting down in short time, battery do not get charge during the operational/working time/way, updated version of PoS is not user friendly, roll of print out is not easily available in the market, poor service issues, ink of the print out receipt is not long durable. Most of the farmers are found illiterate or with very low level education and they do not understand the receipt of sales transaction which is in English language. During the field visit, it was observed that despite of these challenges, the new system has increased the overall accountability of stakeholders, including wholesalers and retailers, besides enhancing the transparency with improved tracking of physical movement of fertilizer in the district or state. During the conversation with the retailers, they revealed that the instead of PoS machine, the laptops and computer systems is very user friendly and can be used at high speed broadband service for fertilizer sales in desktop version. The desktop software is more robust and secure than PoS machine. As many as retailers sell manually in initially and adjust immediately in peak season while another adjust it later on or in evening. Retailers are having lack of knowledge about the computer system, even lack of training facilities of the same and therefore training should be arranged frequently for issues raised

I am thankful to authors and their research team for putting in a lot of efforts to complete this excellent piece of work. I also thank the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India for the unstinted cooperation and support. I hope this report will be useful for those who are interested in understanding the DBT in fertilizer uses in agriculture.

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The study would not have reached to this stage without the active co-operation of the respondent from selected district /villages in Gujarat and stakeholders who provided all the required data for the study without any hesitation and expectation. We thank each one of them for their invaluable support.

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List of Abbreviations

ADRTC	-	Agricultural Development and Rural Transformation Centre
AeFDS	-	Aadhaar-enabled Fertilizer Distribution system
AERC	-	Agro Economic Research Centre
APS	-	Ammonium Phosphate Sulphate
ARCOGUL	-	Anand regional co-operative growers union limited
AS	-	Ammonium Sulphate
Av.	-	Average
DAC		Department of Agriculture & Cooperation
DAP	-	Di-Ammonium Phosphate
DBT	-	Direct Benefit Transfer
DBT-F	-	Direct Benefit Transfer in Fertilizer
DOA	-	Directorate of Agriculture
DOF	-	Department of Fertilizers
ECA	-	Essential Commodities Act
FAI	-	Fertilizer Association of India
FB	-	Frequent Buyers
FCO	-	Fertilizer Control Order
FMS	-	Fertilizer Management System
FY	-	Financial Year
GCA	-	Gross cropped Area
GDP	-	Gross Domestic Product
GOG	-	Government of Gujarat
GOI	-	Government of India
GRM	-	Grievance Redress Mechanism
Ha./ha	-	Hectare
HYVs	-	High Yielding Varieties
iFMS	-	Integrated Fertilizer Monitoring System
INR	-	Indian Rupee

ISEC	-	Institute for Social and Economic Change
K	-	Potassium
KCC	-	Kisan Credit Card
LFS	-	Lead Fertilizer Supplier
LMT	-	Lakh Metric Tones
MCO	-	Movement Control Order
MDA	-	Market Development Assistance
mFMS	-	Mobile Fertilizer Management System
MOP	-	Murate of Potash
MRP	-	Maximum Retail Price
MT	-	Metric tonne
N	-	Nitrogen
NBS	-	Nutrient-based Subsidy Scheme
No..Nos	-	Number
NPK	-	Nitrogen Phosphate Potash
OBC	-	Other Backward Class
P	-	Phosphorous
PACS	-	Primary Agricultural Credit Society
PAN	-	Presence Across Nation
PoS	-	Point of Sale
Qty.	-	Quantity
RE	-	Revised Estimate
RPS	-	Retention Price Scheme
RW	-	Random walk
SSP	-	Single Super Phosphate
SSP (P)	-	Single Super Phosphate (Powder)
SSP(G)	-	Single Super Phosphate (Granular)
TB	-	Top Buyers
UK	-	United Kingdom
USD	-	United States dollar
UT	-	Union Territory

Executive Summary

Functioning of Direct Benefit Transfer in Fertiliser at Retail Point in Gujarat State

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1. Backdrop

India is one of the major producers as well as consumers of chemical fertilisers in the World. The N & P (P_2O_5) fertilizers production in India was reported to be 18.16 million tonnes that accounts for 10.35 per cent of the World's N & P (P_2O_5) fertilizers production in 2017 and rank second position. The total fertiliser product consumption in India was reported to be 26.59 million tonnes in 2017-18 which accounted for 13.80 per cent of total fertiliser consumption in the World and rank at second position. However, as compared to the most of the countries in the World, average intensity of fertilizer use in India remains much lower which is highly skewed, with wide inter-regional, inter-state, and inter-district variations. In India, the most commonly accepted NPK ratio is reported to be 4:2:1, while it was estimated 6.6:2.6:1.0 in 2018-19.

Fertilisers have been considered as an essential input to Indian agriculture for increasing agricultural production so as to meet the food grains requirements of growing population of the country. A very close association is observed between growth in use of fertilisers and crop production and productivity in almost all the states of the country. The Green revolution technology adopted during mid-sixties comprised of high yielding variety seeds (HYVs), fertilizer and irrigation has brought country out of chronic food shortage stage to food grains surplus country. With the advent of fertiliser responsive crop varieties, total consumption of fertilisers have increased from about 1.1 million tonnes in 1966-67 to 27.23 million tonnes in 2018-19. It was estimated that urea accounts for 82 per cent of total nitrogen consumption and di-ammonium phosphate accounted for 61 per cent of phosphate consumption in 2018-19. The intensity of use of fertilisers in India has increased from 6.99 kg per ha of gross cropped area in 1966-67 to 137.40 kg per ha during 2018-19. However, the level of consumption of fertilisers was highly varied within as well as between the States, i.e. from 223.6 kg/ha in Punjab to 53.4 kg/ha in Rajasthan to 25 kg/ha in Tripura during TE 2018-19. The variability in consumption of fertilisers can be attributed to different cultivation methods, type of crops and subsidy on fertilisers. Further, the consumption of fertilisers has also varied across farm size groups with the highest amount of consumption recorded among group of small farmers. Besides, there are concerns about the indiscriminate use of chemical fertilisers by the farmers with a view to increase the crop yield. This has led to deterioration of soil structure, wastage of nutrients, destruction of soil micro-organisms and scorching of plants at the extreme cases.

Though fertilizer consumption has reported significant increase, but many reports have highlighted its uneven, untimely and faulty distribution which had become prone to 'leakages' as well as pro-rich large farmer group. It was estimated that about two third of total fertilizers produced in the country does

not reaches the intended beneficiaries viz., small and marginal farmers. Besides, some reports have highlighted industry use of fertilizer. Fertilizer subsidies in India currently account for the second-largest government transfer, with estimated outlays of over 700 billion rupees (USD 10 billion) projected for the 2018-19 fiscal year. Because of the vast size of fertilizer subsidies and the subsequent market distortions they introduce, India's fertilizer subsidies have been the subject of much scrutiny for some time. Among other effects, these subsidies introduce arbitrage opportunities whereby subsidized fertilizer supplies from India can be smuggled across porous borders into Nepal and Bangladesh and sold in so-called 'grey markets.' In order to tackle these issues, GOI had taken various initiatives including technological interventions such as Fertilizer Management System in 2007, Neem Coated of Urea in 2008, Mobile Fertilizer Monitoring System in 2012 and Integrated Fertilizer Monitoring System in 2016 which has helped to increase transparency in the fertilizer distribution system and its management. While these initiatives could not fully curb the leakage, excess use as well as misuse of fertilizer.

As subsidy on fertilizer is the second largest subsidy after food subsidy provided the by the government, GOI has decided to bring fertilizer subsidy under the Direct Benefit Transfer (DBT) system w.e.f., 1st October 2016 in 17 pilot districts under which government remits a subsidy amount to fertilizer companies after fertilizer retailers have sold fertilizer to farmers through Point of Sale (PoS) machines through biometric authentication. Any farmer can purchase any required quantity of subsidized fertilizer regardless of the land size availed with him at subsidized rate. The different states were put on Go—Live mode w.e.f 01.09.2017 and Pan India rollout of DBT was completed by March 2018. The implementation of the DBT in Fertilizer Scheme required deployment of PoS devices at every retailer shop and training of retailers for operating PoS device. Across the country, Lead Fertilizer Supplier have conducted 10878 training sessions. So far 2.26 Lakh PoS devices have been deployed across all States. A total of 1182.04 Lakh Metric Tons Fertilizers have been sold through PoS devices under DBT Scheme till December 2019. Approximately, 2.39 lakh retailers were sensitized during the introductory training sessions conducted by lead fertilizer suppliers (LFS). The DBT system entails 100 per cent payment of subsidy to the fertilizer manufacturing companies on the basis of actual sales by the retailer to the beneficiary. NITI Aayog has conducted four extensive evaluations through an independent agency M/s Microsave in the DBT pilot and received positive feedback after which the deployment of PoS devices was extended to all the States/UTs across the country.

Based on circumstantial evidences, it has been found that the information regarding opening stock, daily/weekly/monthly sales, closing stocks of fertilizers at retail points do not match from various sources, i.e., PoS, physical sale/stock register maintained by the retailer. Further, the daily/weekly/monthly sales as per the physical bill book maintained by retailer do not match with each other. For example, stocks of fertilizers on a particular date at a retail point as shown in the PoS generated records and the physical registers/books of the retailer do not reconcile. Since the release or the entitlement to subsidy is established through sales recorded in the PoS machine, it is critical that the system of operation of PoS at the retail point is strictly adhered to. Therefore, it is needed to verify such information at the first hand. Additionally, it is essential to check not only at the retail point, but also it is desirable to cross check with the farmers about their purchase of fertilizers; the identification source used by

them; their ease of doing business with this new PoS system; and seek their opinion about the functioning of the PoS system. Therefore, present study was undertaken to find out the degree of variation among various sources of data at the retailer level in Gujarat state.

The study is based on both primary and secondary level data. The secondary data required for the study were compiled from published sources. The primary data for the study were collected by interviewing personally the retailers and fertiliser buyers from two selected districts by recall method. The quantitative/qualitative data were collected in a structured questionnaire; keeping in view the objectives of the study. As per the methodology provided by the coordinator, two districts were selected covering different agro climatic zones with one district covering irrigated area and the other one covering rain-fed/dry land area. Accordingly, Anand (irrigated area) and Botad (rainfed/dry land area) district were selected. From each selected district, a total number of 30 retailers were selected for the purpose of investigation which have the representation of private retailers, company owned shops and cooperative societies. In addition, from each selected district, a list of top 20 buyers and frequent 10 buyers were obtained for the last six months (i.e., from January 2019 to June 2019). Thus, from this list of 120 top-twenty buyers and 60 frequent buyers, a total number of 50 top-twenty buyers and 25 frequent buyers/farmers (as generated from IFMS) were selected randomly for detailed investigation and verification for operational holdings, crops sown etc. Further, 50 farmers from each district were selected as random walk for further purchase verification through PoS. Thus, the aggregate sample for Gujarat state was 60 retailers, 100 top-twenty buyers, 50 most frequent buyers and 100 random walk buyers selected from the same villages where from top and frequent buyers were selected. The data were collected for the agricultural year 2018-19.

2. Fertiliser Consumption in Gujarat

Gujarat is not only the fastest growing states of India but also one of those states where economy has always performed better than the national average. Agriculture and allied sector plays major role in the growth of State economy as activities of agriculture and allied sectors are the primary source of occupation for the majority of the rural people in the State. Gujarat has been consistently clocking impressive agricultural growth rates. This has been possible because the government has focused on improving not only irrigation, quality of seeds and power but also subsidiary sectors like animal husbandry. Gujarat has seen intensification in agricultural practices during the last two decades with increase in the consumption of chemical fertilisers. The major highlights of fertiliser use in Gujarat are as follows:

- Total fertiliser consumption in Gujarat has increased from 17.2 thousand tonnes in TE 1962-63 to 538.5 thousand tonnes in TE 12002-03 and then to 1681.5 thousand tonnes in TE 2018-19. Gujarat has reported the per hectare consumption of fertilizer (133.7 kg/ha) close to national average of 134.18 kg/ha in TE 2018-19, which was the highest in across the states in Western Zone of India.
- During the period from 1960-61 to 2018-19, total fertiliser consumption in Gujarat has increased at the rate of 7.32 per cent per annum. Among the nutrients, rate of growth was highest in case of K (8.4 per cent p.a.) followed by use of N (7.3 per cent p.a.) and P (6.7 per cent p.a.). Increase in

consumption of fertiliser has also increased the intensity of fertiliser use over the period of time. The per hectare use of total fertiliser has increased from 1.7 kg/ha in TE 1962-63 to 76.9 kg/ha in TE 2002-03 and 133.7 kg/ha in TE 2018-19.

- The consumption ratio of N& P to K in Gujarat was estimated to be very wrost during TE 1962-63 (25.9:12.7:1), which has lower done and balanced as 13.6:6.9:1 in TE 1972-73 and got closer to stipulated one (4:2:1) in TE 1982-83, i.e 6.2:3.1:1. While then after again, ratio of fertliers nutrients have got in favor of N till date and it was estimated as 9.5:2.9:1 in TE 2019-20.
- Across the districts, the highest quantity of fertiliser use is reported in Banaskantha district followed by Rajkot, Surat, Surendranagar, Kheda, Ahmedabad, Anand, Sabarkantha, Kutch and Bhavnagar. These top ten selected districts together accounted for 52 per cent of total fertiliser consumption in the State during 2018-19.
- Out to total fertiliser use across the districts of Gujarat, 52 per cent was used in Kharif season and rest was used in Rabi season.
- Most of the districts in Saurashtra region (viz. Amreli, Bhavnagar, Botad, Devbhoomi Dwarka, Jamnagar) and tribal district of Dang have reported around three fourth of total fertiliser use in kharif season. While use of fertiliser was higher in Rabi season than kharif season in the districts of Ahmedabad, Anand, Vadodara, Mehsana, Banaskantha and Sabarkantha.
- The consumption of N&P ratio to K use was estimated to be the highest and extra orbitant towards N in Dahod district (317.7:38.8:1), followed by Patan (55.4:13.5:1) and the lowest was in Surat (2.9:1.1:1). Except Surat and Vasari districts, all other district has higher use of N as compared to stipulated one (4:2:1). While out of total 33, 19 districts have higher use of N as compared to State average (9.6:2.9:1).
- The intensity of use of fertiliser across districts of Gujarat was found the highest in Surat district (332 kg/ha) and the lowest was in Dang district (16 kg/ha). Other top fertiliser user districts having higher use of fertiliser that State average were Navsari, Anand, Gandhinagar, Vadodara, Sabarkantha, Chhota Udepur, Panchmahal, Kheda, Mahisagar, Rajkot, Banaskantha, Narmada, Arvalli, Morbi, Tapi and Bharuch.

3. Functioning of DBT in Fertiliser at Retailers' End

- Out of the selected retailers, 31.6 per cent were private retailers, 23.3 per cent were company owned depot/retailers and remaining 45 per cent were cooperatives-PACS.
- All the retailers have the PoS Machine for entry of purchase and sell of the fertilizers at their outlets. Majority of the retailers (98.3 per cent) have the 'Oasis company' machine for the purchase sale entry operation while very few have Analogic company machine. All the retailers had gone through the training about the operation of the PoS machine.
- In majority of the cases, retailer along with his helper had participated in training of PoS machine (as in some cases, more than one training was attended from each retail shop).

- Around 95 per cent of total retailers had started raising invoices w.e.f February, 2018. All the retailers have emphasized on the Aadhaar based authentication via PoS machines.
- All the retailers have faced problems in handling the PoS machine. Around 90 per cent of total retailers had faced some issues in PoS machine related to software and authentication issues, while one third of total retailers have faced hardware issues and around 38 per cent retailers have faced stock issues. Network problem was the another biggest issue faced by almost 82 per cent retailers at the aggregate.
- Among the software issues, 98.1 per cent retailers have faced the problem of frequent logout/Session expired/took more time for up-dation issues in new version while rest of them had experienced non-acceptance of finger print of retailer as well as of farmer.
- In case of hardware issues, about two third of retailers have faced issues related print issue/non-availability of print roll/print ink fade away while rest have faced problem of early drain-out of battery /more time for charging/Screen not display properly.
- All the retailers have reported problem related to figure print authentication while 52 per cent of retailers have reported problem of authentication of farmer's thumb.
- Retailers have also faced the issues related to the slowdown of server, late receiving of dispatch ID acknowledgement, slow processing of updating PoS new version, updating the present stock, Aadhaar authentication, and small screen size on the PoS.
- In the context of the stock related issues, it arises during the peak season period when there was heavy rush of farmers for fertilizer purchase and thus it was difficult to match the stock at that time. Besides, farmers had demanded fertilizers on the credit basis for which no credit bill can be generated and thus matching the stock was very difficult.
- One of the pertinent problem reported by retailers was that after receiving the stock from the fertilizer company, they need to update the stock in the stock invoice to generate online receipt records. However, updating of stock is not possible until the company stock number is entered into the PoS. But, fertilizer companies have not been updating the Demand Draft number for the stock provided and thus it was always difficult for the retailer to sell the same stock through PoS until that entry was made. This was one of the biggest issues faced by retailers for not updating PoS at the time of current fertilizer sale.
- The issues faced by the retailers were reported to State DBT coordinator, fertilizer company representatives and department officials. All the issues were raised by the retailers were rectified by the Fertilizer company representatives and POS company representatives. Majority of the retailers have reported that issues were addressed immediately and services offered by the POS staff was reported satisfactory.
- Majority of retailers have used multiple sources of stock records wherein manual book keeping and computer system /PoS for record keeping of fertilizers are major one. While few of them had computer operated management system in Talley or such softwares. The management of stock and sale information through multiple system of book keeping/computer

operated systems/POS by retailers have increased their workload enormously. Many retailers have been maintaining two systems (the first was a PoS to record sale transactions and the second was system generated as well as /or manual record). Retailers have reported that increase in workload consumed their productive time and they felt burden of record keeping.

- The receipts generated through the PoS devices get fade away very early and thus it was very difficult to maintain record for long time. Retailers have suggested that the government should link the PoS application with the tally/any such system software at their end.
- More than half of the retailers have reported that updation of the stock was delayed by more than a day. Most of the retailers faced issues of stock mismatched of the PoS and physical stock received which had happened because of the gaps in the back-end stock updation process. Even though the physical stock reached to the retail point but same was not reflected in their PoS machine. Retailers could not sell the stock unless it was updated in the PoS. Thus, as per practice adopted, retailer sold their old stock manually and after that same was adjusted in the new stock. Retailers have reported that due to slower internet network connectivity at village level, they couldn't perform updation of PoS on daily basis.
- The major three reasons reported by the retailers for the mismatch for the POS stock with physical stock were heavy rush of farmers during the seasons/hurriedness of the farmers/it is time consuming process (by 40 per cent of retailers), followed by authentication were not proper due to muddy hand (by 29 per cent of retailers) and farmer did not bring Aadhaar card always (by 26 per cent retailers).
- More than half of the retailers had purchased fertilizers directly from fertiliser company followed by one fifth of total retailers had purchased from Wholesaler, while more than 28 per cent of retailers had purchased fertiliser from both the sources, i.e wholesalers as well as Companies.
- More than half of the retailers have reported the raising of invoices in POS on the daily basis. While rest of them had generated invoices in PoS once in a week basis due to various reasons such as difficulty in authentication of purchases (34.52 per cent), followed by difficulty in multiple records keeping (28.57 per cent), farmers did not bring Aadhaar card at the time of purchasing fertilizers (19.1 per cent). The transaction receipts getting fade away within a month that is way there were not able to use that receipt after a month and therefore they had avoided raising invoices in POS.
- The retailers also reported that network connectivity problem was another hurdle along with technical problem. Besides, short battery life was also a major issue. The majority of retailers faced problem in managing transactions during peak agriculture season.
- None of the retailer had reported that PoS required too many documents for the selling of fertilizers as only Aadhaar card was required for the authentication.
- Almost two third of retailers have reported that problem of authentication by thumb impression (due to muddy hand & fate line disappeared due to heavy work done by hand on the farm) and linking of Aadhaar card at the time of sale was the major issue. While almost one third of the total retailers have

reported that farmers did not keep Aadhaar card with them while purchasing the fertilisers.

- More than half of the total retailers have reported that they have checked details on land holding and cropping pattern status while selling fertilizer in large quantity to buyers. Almost half of the retailers agreed for the implications of obtaining the declaration from farmer regarding operational holding at the time of PoS.
- The details on stock reports as per PoS devices, physical stock and manual records at the time of visit to retailers indicate that in case of the all types of the retailers, mis-match between stock as per PoS and physical verification, as well as manual records was observed. There was a difference in closing stock as per PoS and physical verification as well as manual record maintained. In case of private retailers, the highest difference in closing stock as per PoS and physical verification was observed in case of entry of Urea (452 Qtls.) while difference in stock as per PoS and Manual record was the highest in case of SSP fertilizers (438 Qtls.) with Private retailers. In case of Company owned depot as well as PACS, same situation was found wherein the highest difference in stock as per PoS and physical verification, as well as manual records was found in case of Urea and DAP, respectively. In fact, difference was more than 10000 quintals in case of PACS data entry, i.e POS stock, physical verification and as per manual record. At overall level, the highest mismatch across various types of fertiliser was estimated in case of DAP.
- There are various reasons behind the stock mismatches between PoS and physical as well as manual records, such as stocks are not getting updated on a real time basis; there are irrational changes and numerous glitches in the PoS machine/software; sale of fertilizers by the retailers without PoS machines; poor internet connectivity in rural areas; problem of authentication of Aadhaar number of the farmers; poor maintenance of PoS machines; farmer did not possess Aadhaar card at the time of purchasing of fertilizers (farmers generally directly come from the farm); auto driver purchases fertilizer on behalf of the farmers and the auto driver uses his own Aadhaar number to authenticate the transaction. Some time, transactions are made by representatives of farmers as relative or friend who happens to visit the town for his work (buys fertilizer/seeds on behalf of the farmer). During the peak season, if retailers are not able to cater to the large number of farmers coming to shop, his sales may decrease because of limitations of the PoS machine (therefore they switch to manual transactions which are later 'adjusted) and the horridness of the purchasers. Therefore, the issue of mismatch of physical stock with PoS stock continues to persist.
- The difference of sales as per PoS and manual record was the highest in case of data entry of Urea fertilizers for all three types of selected retailers. Thus, at overall level, sale of urea fertilisers was the highest and also the highest difference of sales as per PoS and manual record was observed.
- The details about training on application of PoS devices at the selected districts of Gujarat state indicate that all the retailers were sensitized during the introductory training sessions conducted by LFS. During the field it is observed that average duration of training 1-2 days. A dedicated 15-member Multi-lingual HelpDesks were set up to provide quick response to the queries of wide range of stakeholders across the country as a preparatory to DBT implementation.

- On the supply side of AeFDS (Aadhaar enabled Fertilizer Distribution System), retailers stated that PoS doesn't require too many documents neither create hassles in selling fertilizers. More than two third of the retailers have expressed the problems of linking Aadhaar with sale, while more than half of the retailers have opined about checking land holding or cropping pattern of the purchaser. Administrative compliance implication was opined to be needed by more than half of the retailers.
- The retailers have given suggestions to improve the DBT system as follows:
    - The measurement of quantity should be in terms of per bag in the PoS instead of per tonne or per quintal that is easily understood both by retailers as well as farmers.
    - Desktop version / Computer system instead of PoS machine is preferable and moresuitable.
    - Software and service issues should be addressed immediately.
    - Provide improved version and best service system set-up. Poor network issues need solution.
    - Frequent trainings, user friendly version and prompt services at the doorstep of retailerswill help the system work more efficiently.
    - Acknowledgement receipt if given at the time of delivery it will enable provision of prompt services.
    - Frequent rebooting of PoS delays the service and need a permanent solution.
    - Improve infrastructure facilities and provide service centres at village level.

4. Functioning of DBT in fertilizer at Farmers' Level

- The average age of selected respondent was 44.2 years in which random walk respondents were older (49.3 years) than frequent buyers (41.6 years) and top 20 buyers (40.5 years). Thus, top 20 buyers were from the younger generation in the agriculture.
- All the sample respondents were male which indicate dominance of male culture in Indian society.
- The average level of education of all the respondents was estimated to be around 9 years only. The Average year of schooling of top 20 buyers and frequent buyers was around 9 years while same was 8.4 years for random walk buyers. As it was expected that younger generation of top 20 buyers may be educated till graduation, same was not found at ground level.
- The average family size of sample households was estimated to be 6.6 persons at overall level, which was relatively small in case of top 20 and random walk group respondent than frequent buyers group which had family size of 7 persons.
- Majority of buyers belongs to General category (60.8 per cent) followed by 34.4 per cent from Other Backward Classes social group while rest of them belongs to SC and ST categories.
- Agriculture was the main occupation of the selected 83 per cent of respondents while 10.8 per cent respondents were salaried persons. The

subsidiary occupation of the selected respondents was reported to be self-employed in household industry followed by agriculture labour and activities related agriculture and allied sectors.

- The total farming experience of the all types of buyers was estimated to be about 22 years, in which random walk respondents were more experienced (28.33 years) followed by top 20 buyers (15.56 years) and the lowest experienced was reported by frequent buyers (15.06 years).
- On an average, owned area of the sampled household was estimated to be 9.30 acres, in which top 20 buyers had the highest size of owned area (12.24 acres) and the lowest was with frequent buyers (5.46 acres). On aggregate net operated area was slightly higher (13.1 acres) than the owned area indicating net lease-in exceeding the net lease-out area by the selected households. Almost 97 per cent area reported was irrigated. Cropping intensity was around 138 per cent at overall level, which was highest in case of frequent buyers and the lowest was in case of random walk buyers.
- The average annual income from agriculture of selected buyers was highest in case of top twenty buyers (Rs. 400530/-) and the lowest was for random walk buyers (Rs. 194180/-). At overall level, average income from agriculture was reported to be Rs. 277922 followed by income from non-agriculture sources (Rs, 100318) and the lowest was from allied activities (Rs. 16060/-).
- Cotton was the main crop being grown by the selected households (39.10 percent) followed by paddy (17.65 per cent), Tobacco (13.10 per cent) and Wheat (10.33 per cent). These four crops together accounted for 80 per cent of gross cropped area of the selected household. Thus, at overall level, hardly 38 per cent area was under food grain crops, 3 per cent was under oilseed crops, 52 percent was under cash crops (Cotton and Tobacco) and rest was under horticultural and perennial crops. Same kind of trend was observed in all three categories of respondents.
- Among the all categories of the buyers, the highest percent of buyers (40.8 per cent) purchased fertilizers from cooperative societies may be due to availability of PACS at village level and easy access for respective buyers. About 19 per cent of households had purchased fertilisers from private dealers followed by 3.2 percent respondents from company owned shops. The 37.2 per cent of buyers had purchased fertilisers from all these three sources.
- At overall level, almost three fourth of respondents had purchased fertilisers themselves while very meagre share of respondents had send someone to purchase the same for them. One fourth of respondents have used both the options, i.e self-purchase or through someone. Almost same trend was observed in case of use of purchased fertilizer. More than two third of respondents had purchased fertilisers for their own use, while almost 5 per cent have purchased it for neighbours' use. Some buyers have reported that they had purchased fertilizers for others and they had charged around Rs. 37 per quintal extra and across the groups, the lowest extra charges were in case of random walk buyers and the highest was in case of top 20 buyers. None of them had purchased fertilisers from others.
- Almost 93 percent buyers have reported that they had received receipt for their purchase. However, around 80 per cent of them had received manual hand written receipt. Hardly 6.03 per cent of buyers have reported receipt of

POS generated receipt which is main aim of the whole DBT in fertiliser scheme.

- More than 98 per cent of all categories of buyers have reported that price/sale amount mentioned had matched with the payment made by them, and around 45 per cent have understood that how much subsidy is provided on purchase.
- About 96 percent of respondents have reported that price as well as sale amount mentioned matches with the payment made by them. However, only 45 percent were aware about how much subsidy is provided on purchase made by them. It is clearly indicating that sensitization among the farmers is needed towards what proportion subsidy could make available to farmers towards the purchasing of fertilizers.
- Almost 96 per cent of buyers have reported that retailers have insisted on Aadhaar card or Voter ID submission for the sale of fertilisers. Most of the farmers did not carry Aadhaar Card when they visit retailers to buy fertiliser. Therefore, there is a need for carrying out a communication campaign to increase farmers' awareness so that they bring their Aadhaar to buy fertiliser.
- Almost 56 per cent of respondents have reported that they had some problem in producing Aadhaar/Voter ID while purchasing fertilisers as they could not carry same at the time of purchase of fertilisers.
- While 48 per cent of respondents were aware about the fact that DBT in fertiliser and sale of fertiliser through POS is mandatory.
- Around 42 per cent of respondents had insisted for the receipt of transaction through POS but due to either no identity was provided or failure of authentication through Aadhaar as it was mandatory or could not authenticate or both were the major reasons behind the same.
- Almost 94 per cent of respondents reported that they purchased fertilisers as and when required while remaining purchased sometime in advance or sometime instant. Thus, purchase of fertiliser by the farmers was as per requirement on time and majority of them did not make any advance purchase and stock of fertilisers.
- About 94 percent of buyers had purchased fertilisers recently through POS device at the retail point. Across the buyers, percentage of buyers was highest in case of group of top twenty and frequent buyers (96 per cent) while same was 91 per cent in case of random walk buyers.
- Around 98 per cent of total fertilisers purchased by top 20 and frequent buyers was through POS. As it was expected, random walk buyers' had partially purchased fertilizers through PoS machine. All of those who had purchased fertiliser have reported that POS device was in operation at the shop.
- The fertiliser purchase data of by top 20 buyers and frequent buyers was for last two years but in case of random walk buyers, it was for the current year. None of the buyers have carried forward stock from previous year.
- When respondents were asked about their opinion on acceptability for compulsory declaration regarding operational holdings and sale of fertilizer as per farming requirement at the time of PoS, around 39 per cent of total respondents have agreed for same and around 36 per cent were opined that it is workable proposition and it is possible to fix the requirement looking at

size of operational holdings, cropping pattern and soil test report. While they also reported that all the farmers could not understand the soil health card report and the recommendations given on the same.

- The selected buyers were asked to give their suggestions to make fertiliser use equal to the desired level. More than half of the buyers have suggested that there is a need to create awareness among the farmers, while about 32 per cent of buyers suggested need to create awareness about organic farming and 12 per cent suggested that fertilisers should be provided to farmer as per demand and requirement of soil.
- There were many reasons expressed by the surveyed farmers as it is not workable preposition for operational holdings declaration and sale of fertilizers as per farming requirements at the time of buying fertilizer through PoS. Mainly the crux of their opinion against fixing up such a requirement was in many cases almost one third of total buyers were not willing to reveal details of land holdings in order to buy fertilisers followed by around 32 per cent of buyers were not be the actual cultivators as many of respondents were either purely tenants or owner cum tenants. Therefore, farmers are not sure whether they would be cultivating the same land during the next year or in some cases even next season. Therefore, fixing up requirement may not be feasible on long term basis. In addition, there are some cases of multiple or joint ownership of land as well as disputed ownership which may create problem in provision of documentation for such fixation of requirement. Many farmers do not have ownership proof of their land which could beadditional problem.
- The farmers' insight on why it is not possible to fix the requirement of fertilizers looking at size of operational holdings, cropping pattern and soil test report. Like to the previous question a large number of respondents were of the opinion that cropping pattern changes or weather condition changes may obstruct fixing up such a requirement. However, a significant number of respondents (44 per cent) pointed out that either they do not have any soil health card made available to them or even if they do have a soil health card, they do not rely on soil health card results. Therefore, fixing up requirement based on soil health card may not work. Another significant numbers (almost one fourth) pointed out that they would rather like to continue their traditional pattern of fertilizer usage. Farmers also pointed out that it won't be a workable proposition as every year/season farmers tend to change crops or its varieties as per weather condition.
- The information relating to fertilizer purchases by respondents for the reference year 2018-19, i.e., for the season of kharif and rabi and summer 2019 2018 (July 2018 to June 2019) indicate that various variants/types of fertilizers had purchased by the selected buyers during the reference year. The highest quantity of fertilizers purchased during the reference year/month was ASP and Urea and out of total transactions, more than 90 percent (except random walk buyers) was done through PoS machine.
- Almost all types of fertilizers were purchased through PoS machine by top twenty buyers and frequent buyers but in the case of random walk buyers, unavailability of Aadhaar card with them at the time of purchasing restricted entry through POS.
- The use of different variants of fertilizers by the selected farmers for the crops grown during the reference year of 2018-19 indicate that Cotton,

tobacco, paddy and wheat were the major crops grown by the selected farmers. It was observed that the increase in consumption of urea and decrease in consumption of other fertilizers due to price differential. Both prices and subsidies of fertilizers are important determinants of consumption level per hectare. It is observed that there are marked crop wise variations in the consumption of fertilizers. As expected, among these variants, the most intensive use was that of urea in almost all crops grown by the selected farmers. It is visible from figure that intensive use of urea was followed by DAP, MOP and SSP in the descending order.

- More than 98 per cent farmers didn't attend any training organized by any government officials or fertilizer companies. Out of total trained farmers, 60 percent had attended training of 2-7 days' duration while rests were trained for 1-2 days. Agriculture department officials had conducted all trainings during 2017 and 2018.
- Major problems faced by buyers during the fertilizer purchasing through POS device were biometric authentication related issues like failure of authentication, lower Aadhaar authentication strike rate, network related issues, poor farmers' awareness. This would need to be addressed on priority, if necessary, by applying proper policy. Almost, half of the buyers in all the categories, revealed that the mandatory authentication through Aadhaar in purchase of fertilizers create hassles in buying fertilizers during the peak season. While Aadhaar is the preferred form of identification of buyers, other forms of identification may also be used. The major suggestions for improvements in present fertilizer delivery system were that there is a need to create awareness amongst the farmers and proper implementation of the scheme and existing Scheme of DBT in Fertilizers is very good.
- Interestingly, despite of these challenges and constraints faced by the buyers, farmers (and buyers) prefer the DBT system.

5. Conclusions and Policy Implications

On the basis of above discussion, conclusions and policy implications are drawn and presented below:

- All the retailers have faced problems in handling the PoS machine. Around 90 per cent of total retailers had faced some issues in PoS machine related to software and authentication issues, while one third of total retailers have faced hardware issues and around 38 per cent retailers have faced stock issues. Therefore, there is topmost need to address the operational problems in the PoS machine. Retailers are complained that the screen on the device is too small. They find it difficult to make entries into the PoS while carrying out transactions, receiving/updating stocks, etc. As suggested by the retailers, PoS should be made compatible with the desktop or laptop maintained by the retailers/wholesalers.
- Though all the retailers have undergone training on use of POS, but in most of the cases, retailers were not technically very well versed about the PoS Operated sale in Fertilizers management. Either they are too old or very less technologically sound in most of the cases of cooperative society secretary or others.
- Poor Network connectivity was the biggest issue faced by almost 82 per cent retailers at the aggregate level. This problem becomes acute during the peak season when there are long queues of buyers. Therefore, there is

a need to provide them speedy internet connection facility or any other suitable system can be provided.

- Retailers have also reported problem of frequent server down, failure server down, failure of Aadhaar authentication of farmers, frequently session log out after some time, short battery charge status, battery do not get charge during the operational/working time/way, updated version of PoS are not user friendly, roll of print out is not easily available in the market, ink of the print out receipt are not long durable. Sale receipt and reports are printed on thermal paper that does not last long. Ink on thermal paper fades over a period of time. These problems need to be addressed through appropriate actions by the Department of Fertilizers.
- The devices from Analogics are of very poor quality. Among other issues, they suffer from short battery life, the devices may shutdown anytime.
- One of the pertinent problem reported by retailers was that after receiving the stock from the fertilizer company, they need to update the stock in the stock invoice to generate online receipt records. However, updating of stock is not possible until the company stock number is entered into the PoS. But, fertilizer companies have not been updating the Demand Draft number for the stock provided and thus it was always difficult for the retailer to sell the same stock through PoS until that entry was made. This was one of the biggest issues faced by retailers for not updating PoS at the time of current fertilizer sale. Therefore, there should be automatic updation to be done by Company once the delivery of the stock is dispatched which can be confirmed by the retailers on receipt of same.
- There was a huge difference in closing stock as per PoS and physical verification as well as manual record maintained. As the subsidy is attached with real time PoS transactions, it is beyond understanding who bears the brunt in case there is difference between fertilizer issued by fertilizer companies to retailers and the amount displayed in the PoS sale at retailers' end. Thus, there is a need of appropriate step at each stakeholder level to rectify the same.
- In term of farmers, it was observed that most of the top 20 buyer and frequent were retailers itself and some of them were auto/tempo drivers, only few were actual farmers. The entire system of top and frequent buyers need streamlining and a proper punishment system need to be put in place on the retailers if they generate any fake identity of top and frequent buyers.
- Most of the farmers were with very low level education and they could not understand the receipt of sales transaction which is in English language. The POS device should also have option of local/State language. Also the measurement of quantity should be in terms of per bag in the PoS instead of per tonne or per quintal that is easily understood both by retailers as well as farmers.
- More than 98 per cent farmers didn't attend any training organized by any government officials or fertilizer companies while 48 per cent of respondents were aware about the fact that DBT in fertilizer and sale of fertilizer through POS is mandatory. As suggested by the more than half of the buyers, there is a need to create awareness among the farmers. There is need to organize village training camps on the same line as that of retailers training camps have been organized by fertilizer companies.

- Farmers have reported that availability of fertilizers on the basis of operational holding, cropping pattern and soil health card is not favorable for farmers. As like Anand district has number of NRI who have leased out their land to laborer/tenant and tenet is unable to produce the land record or other document behalf of land lords. Besides, the reasons towards non-workable preposition for operational holdings declaration and sale of fertilizers as per farming requirements at the time of buying fertilizer through PoS includes mentioned by buyers were buyers were not willing to reveal details of land holdings in order to buy fertilizers; buyers were not be the actual cultivators as many of respondents were either purely tenants or owner cum tenants (therefore, farmers are not sure whether they would be cultivating the same land during the next year or in some cases even next season. Therefore, fixing up requirement may not be feasible on long term basis); In addition, there are some cases of multiple or joint ownership of land as well as disputed ownership which may create problem in provision of documentation for such fixation of requirement; many farmers do not have ownership proof of their land which could be additional problem. On the question of soil test report, a significant number of respondents pointed out that either they do not have any soil health card made available to them or even if they do have a soil health card, they do not rely on soil health card results. Therefore, fixing up requirement based on soil health card may not work. Therefore, robust methodology need to be develop to deliver the fertilizers as per crop requirements.
- Majority of the buyers have disagreed to full payment towards purchase of fertilizer and later subsidy amount deposition in bank by the government. Farmers' have pointed out that most of farmers are not economically sound to pay first and wait for subsidy for month or more. They cannot pay full amount initially as most of the time either they are in crunch of working capital to or they buy it on credit basis. Besides, tenant will not get benefit of subsidy was it will go of land holder's account. It would be acceptable to all farmers if the implementation of direct transfer of subsidy is done in such a way that the fertilizer subsidy amount is transferred to the farmer's account at the time of entry of purchase details in the PoS system through Aadhar linked bank account. As soon as the purchase details are entered in the PoS, subsidy transfer takes place simultaneously so that farmer has to pay only the balance amount to the retailer as he is paying at present. Such a system will save all hassles for the fertilizer companies as well as retailers and farmers.
- Despite of the challenges, the new system has increased the overall accountability of stakeholders, including wholesalers and retailers, besides enhancing the transparency with improved tracking of physical movement of fertilizer in the district or state.

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