Pilot Study

Assessment of Direct Benefit Transfer in Fertiliser

April, 2018

NITI Aayog
(National Institution for Transforming India),
Government of India

MicroSave
Market-led solutions for financial services

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About *MicroSave*

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Our vision is to live in a world where everyone has access to high-quality, affordable, market-led financial services and support. For 20 years, we have worked with our clients as a locally based, international consulting firm. We have guided policy and facilitated partnerships to develop enabling ecosystems.

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List of Acronyms

ADRTC	Agricultural Development and Rural Transformation Centre
ATM	Automated Teller Machine
BAPU	Biometrically Authenticated Physical Uptake
BHIM	Bharat Interface for Money
BPL	Below Poverty Line
DBT	Direct Benefit Transfer
DBT-F	Direct Benefit Transfer in Fertiliser
DD	Demand Draft
DoF	Department of Fertilisers
EPIC	Electoral Photo Identity Card
ERP	Enterprise Resource Planning
FCO	Fertiliser Control Order
FMS	Fertiliser Management System
GoI	Government of India
GPRS	General Packet Radio Service
GRM	Grievance Redress Mechanism
GST	Goods and Services Tax
iFMS	Integrated Fertiliser Management System
INR	Indian Rupees
IT	Information Technology
KCC	Kisan Credit Card
Kg	Kilogram
LFS	Lead Fertiliser Supplier
MCO	Movement Control Order
MDR	Merchant Discount Rate
mFMS	Mobile Fertiliser Management System
MMT	Million Metric Ton
MT	Metric Ton
MRP	Maximum Retail Price
NBS	Nutrient Based Subsidy
NCU	Neem-coated Urea
NPK	Nitrogen, Phosphorous, and Potassium
PACS	Primary Agriculture Credit Society
PoS Device	Point of Sale Device (It is an electronic device used to process sale transaction)
PPS	Probability Proportional to Size
RO	Release Order
RPS	Retention Price Scheme
SHC	Soil Health Card
TAT	Turnaround Time
USD	United States Dollar
Wi-Fi	Wireless Fidelity

1. Executive Summary

India is the world's second-largest consumer of fertiliser.[1] The Government of India (GoI) had introduced the Fertiliser Control Order (FCO)[2] in 1957 to regulate the sale, price, and quality of fertilisers and passed the Movement Control Order (MCO)[3] in 1973 to regulate the distribution of fertiliser. The government did not provide subsidies to farmers for the purchase of fertiliser until 1977.

After 1977, the GoI introduced a range of fertiliser subsidies to ensure price stability and efficient distribution to farmers. However, the fertiliser distribution became prone to 'leakages' as 65% of the fertiliser produced does not reach the intended beneficiaries, that is, small and marginal farmers.[4] Initiatives such as technological intervention through the Fertiliser Management System (FMS) in 2007,[5] and neem coating of urea[6] in 2008 have resulted in increased transparency in the fertiliser distribution system.

In the Union Budget 2016–17, the Indian government proposed to bring fertiliser subsidy under the Direct Benefit Transfer (DBT) system. DBT in fertiliser (DBT-F) is a modified subsidy payment system, under which the government remits the subsidy to fertiliser companies only after fertiliser retailers have sold fertiliser to farmers through successful *Aadhaar*[7]-based authentication.[8] Under the DBT-F system, farmers may purchase any quantity of subsidised fertiliser regardless of the land size they possess or cultivate.

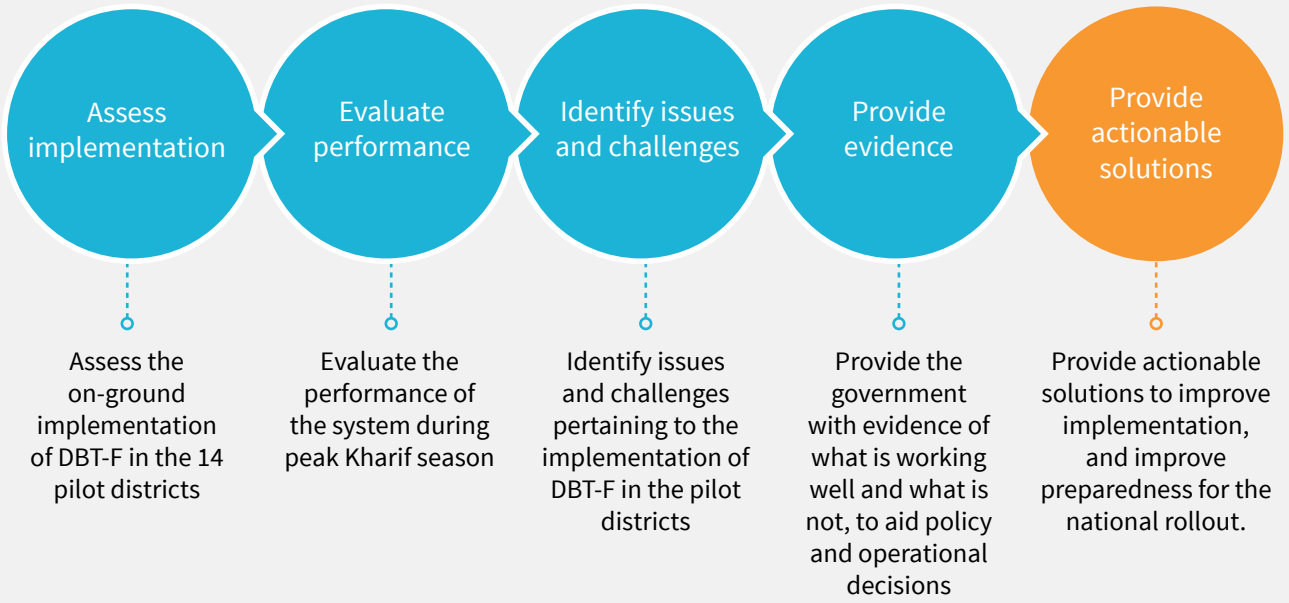
The government announced pilots for DBT-F in 16 districts[9] across India before pan India rollout. The government ended up launching the pilots in 14 districts[10] out of the proposed 16. Currently, a pan-India rollout is underway. The government first launched a pre-pilot in Krishna and West Godavari districts of Andhra Pradesh in September, 2016 to test the concept. Later, the government scaled it up to 12 districts between January and March, 2017. Acting on the request of the National Institute for Transforming India (NITI) Aayog[11] and Department of Fertilisers (DoF)[12], *MicroSave* conducted evaluations of the pilot districts over three rounds.[13]

1. http://www.iasri.res.in/agridata/15data/chapter8/db2015tb8_3.pdf
2. http://www.faidelhi.org/fertiliser-control-order.htm
3. http://indianfertilizer.com/frontend/statistics/sectionView?section=statistics&page=TFCO-1958/TF-274.htm
4. http://indiabudget.nic.in/budget2016-2017/es2015-16/echapvol1-09.pdf
5. http://fert.nic.in/page/publication-reports
6. http://pib.nic.in/newsite/PrintRelease.aspx?relid=159903
7. *Aadhaar* is India's national identity number based on biometrics, https://uidai.gov.in/
8. *Aadhaar* authentication here means that the retailer asks farmers for their *Aadhaar* number and enters the *Aadhaar* details in the PoS device in the presence of the farmers, and then asks farmers to apply their fingerprint for biometric authentication.
9. The 16 districts were Una (Himachal Pradesh), Kishanganj (Bihar), Hoshangabad (Madhya Pradesh), Karnal and Kurukshetra (Haryana), Kannur (Kerala), Nasik and Raigarh (Maharashtra), Tumkur (Karnataka), Rangareddy (Telangana), Krishna and West Godavari (Andhra Pradesh, Maldah and South 24 Parganas (West Bengal), Narmada (Gujarat), and Pali (Rajasthan).
10. The 14 districts are – Una (Himachal Pradesh), Kishanganj (Bihar), Hoshangabad (Madhya Pradesh), Karnal and Kurukshetra (Haryana), Thrissur (Kerala), Nasik and Raigarh (Maharashtra), Tumkur (Karnataka), Rangareddy (Telangana), Krishna and West Godavari (Andhra Pradesh, Narmada (Gujarat), and Pali (Rajasthan).
11. http://niti.gov.in/
12. http://fert.nic.in/
13. The findings across three rounds are not strictly speaking comparable. Readers should be aware of this while reviewing the conclusions/ comparisons in this report. The inter-round comparisons made are indicative.

Evaluation	Study Duration	Number of Districts Assessed (Live Districts)	Farmer Sample	Retailer Sample
Round I	September 2016	Two	650	36
Round II	January 2017	Six including the two districts from Round I	1,734	200
Round III	July – September 2017	Fourteen including the six districts from Round II	5,659	427
Note: The findings across the three rounds are not comparable, strictly speaking. Readers should be aware of this while reviewing the conclusions/comparisons in this report. The inter-round comparisons made are indicative.				

This report details the findings from the evaluation conducted in Round III.

Figure 1: The key objectives of the evaluation conducted in Round III



MicroSave conducted quantitative research with 427 retailers and 5,659 farmers.[14] We conducted qualitative in-depth interviews with 138 retailers and 185 farmers in 14 pilot districts across 11 states. Furthermore, in order to gain a holistic view, we also conducted intensive qualitative interviews with other stakeholders including district government officials (District Agriculture Officers and Block Agriculture Officers), fertiliser company representatives (Lead Fertiliser Supplier (LFS)[15] and others), and district consultants.[16]

This report provides details on the findings from the evaluation conducted in Round III for both fertiliser retailers and farmers on training and awareness, transaction status and experience, compliance with processes, grievance redress mechanism (GRM), and response to DBT-F and the cashless payment system. The report also provides recommendations to aid policy-level decision making, improve implementation, and improve preparedness for the national rollout. The report concludes with district-wise insights from the qualitative and quantitative research.

14. Farmers also include non-farmer buyers, such as individuals buying on behalf of farmers.
15. The government has entrusted the responsibility of movement of fertiliser within a district to one fertiliser manufacturer, that is, LFS. One district only has one LFS.
16. The government has hired one personnel per district to implement the DBT-F at the district level.

1.1. Key Findings

- Incidences of adjusted transactions[17] have increased to 21% as compared to 10% observed in Round II.[18] Fertiliser retailers adjust transactions due to unavailability of *Aadhaar*[19] with farmers at the time of fertiliser purchase and *Aadhaar* authentication failure. Additionally, retailers do not ask farmers their *Aadhaar* numbers and sell to them on a manual basis without *Aadhaar* authentication. Later, retailers adjust these transactions. The retailers adjust transactions to minimise transaction time and manage high customer footfall. Retailers were not inclined to use more than the one PoS device to manage high farmer footfall during peak season, as this would necessitate a larger workforce. Moreover, it was easy for them to adjust transactions to manage the higher customer footfall.

- The average transaction time[20] through PoS is five minutes. The duration has not changed from the Round II evaluation.

- Transaction experience has improved for farmers, as successful *Aadhaar* authentication in the first attempt has increased to 62% as compared to 35% in Round II.[21] Overall, successful *Aadhaar* authentication in three attempts has increased to 97% as compared to 93% and 41% in Round II and Round I, respectively.

- 98% of the farmers (out of those who received transaction receipts) were charged the same amount as shown on the transaction receipt.

- 41% of retailers update the fertiliser stock in PoS devices immediately after receiving the acknowledgement ID. The remaining 59% of retailers take at least one day or more to update the stock. Ideally, retailers should not sell fertiliser without updating the stock in the PoS devices. However, pressure from the farmers and fear of losing business compel retailers to sell stock manually without *Aadhaar* authentication. Once the stock is reflected in the retailers' PoS devices, they adjust these transactions.

- Training and awareness efforts for retailers have been laudable. Of the total retailers surveyed, 93% (396) had received training. Out of these retailers, 90% (356) retailers found the training useful to understand functionalities and features of the PoS devices. Only 23% (98) retailers referred to the online training material, such as videos and MS PowerPoint presentations available on the Mobile Fertiliser Management System (mFMS) website.[22] The remaining retailers did not use the online material or were not aware of them. Those who referred to the online training material found them to be comprehensible.

- Communication to farmers for awareness creation about the requirement to use *Aadhaar* to for fertiliser purchases needs improvement. Of the farmers, 66% received the information that *Aadhaar* is required to buy fertiliser only after they had arrived at the retailer-outlet. According to the farmers, they did not receive the information from any credible source, such government or Panchayat officials.

17. "Adjusted Transaction" means that retailers use their own or someone else's *Aadhaar* number instead of the farmer's to authenticate and register sales, either during the sale or later. Such 'adjusted transactions' may also take the form of retailer registering all sales for the day using a few *Aadhaar* numbers.
18. The data sets are not statistically comparable over the three rounds. However, we have compared the data sets to provide a trend over the two rounds of evaluation.
19. Farmers do not carry *Aadhaar* when they visit retailers to buy fertiliser.
20. Transaction time – once the retailer begins to input the farmer's *Aadhaar* number into the PoS device until the receipt is printed by the PoS.
21. Data is provided for the farmers whose *Aadhaar* authentication was successful and does not include the data from farmers whose *Aadhaar* authentication failed or those who bought fertiliser manually.
22. The objective of the mFMS is to monitor the movement of the fertiliser from the manufacturer to warehouse to wholesalers and from wholesalers to retailers. The proposed system helps in monitoring the movement of fertiliser's consignments and its stock position at various warehouses, wholesalers, and retailers. The system also acts as a tool for government bodies to track and ensure the timely distribution of fertilisers to the farmers" http://mfms.nic.in/

- DBT-F has the following impact:
    a. Low retailer commission on fertiliser sales, especially urea and additional hassles due to the introduction of PoS based sales and Goods and Services Tax (GST) may result in retailer attrition in near future.
    b. Anecdotal evidence suggests that cross-border sales have reduced after introduction of DBT-F.
    c. Inactive retailers and retailers with low sales volume did not opt for a PoS-based fertiliser distribution system. The low margin in fertiliser sales and the possibility of hassles due to the introduction of a PoS system compelled the retailers to opt out of the PoS-based system.
- The existing informal Grievance Redress Mechanism (GRM), such as utilising a WhatsApp group and email has lost its relevance in Round III as compared to Round II. Satisfaction levels with the existing informal GRM have reduced to 79% in Round III from 91% in Round II. This informal GRM will not be effective when the government rolls out the DBT-F at the national level. The recently launched toll-free number also lacks features of an ideal GRM – including regional dialects and a system to track complains resolution.
- 54% of the retailers and 59% of the farmers preferred the DBT-F over the manual system of fertiliser distribution.
- 40% of the retailers and 32% of the farmers said that they would prefer cashless transactions for fertiliser sales and purchases, respectively.
- Awareness of soil health cards (SHC) among farmers is poor as only 30% of the farmers reported being aware of SHCs. Only a minuscule proportion of farmers either have an SHC (8.6%) or follow (6.2%) the recommendations provided on the SHC.

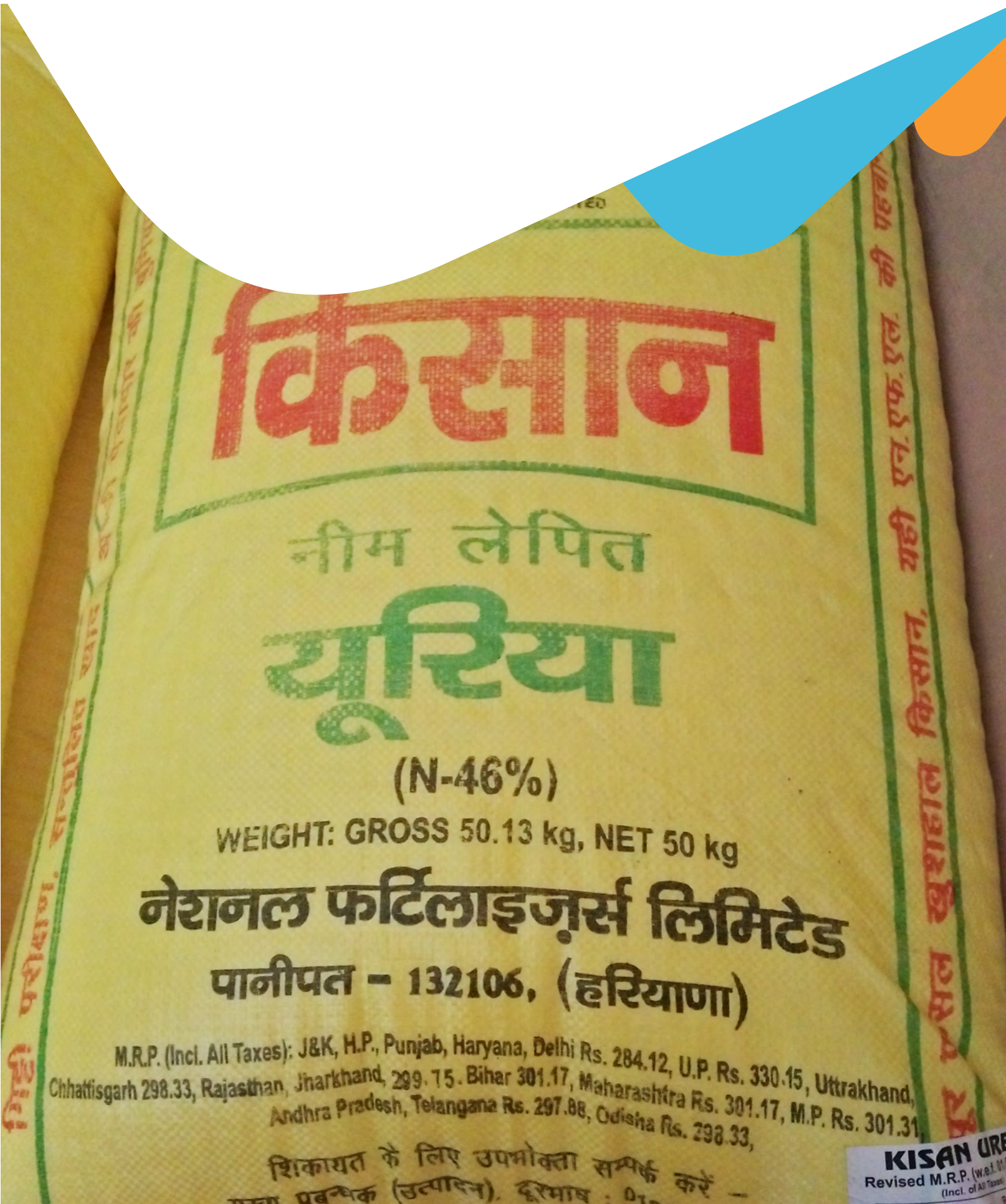
1.2. Key Recommendations

Policy Recommendations	
Issues	**Recommendations**
Possible retailer attrition in future due to unattractive fertiliser sale commissions and additional operational hassles (PoS-related issues, increased record keeping associated with Goods and Services Tax (GST), etc.) post-DBT	1. Increase the commission, especially on the sale of urea, which constitutes a significant portion of retailers' annual sales. The government has plans to double the retailer commission.[23] 2. Proactively consider issuing licenses to new retailers
A recently launched toll-free number lacks features of an ideal GRM, including regional dialects and a system to track the resolution of complaints.	1. Allow conversations in regional languages 2. Include features to allow generation of complaint ID, tracking the status of grievance resolution through the complaint ID, a defined turnaround time (TAT) for grievance resolution, and resolution acknowledgement for the complainants
Retailers encounter issues such as small screen size on PoS devices, shortened battery life, and lack of available maintenance and repair services.	1. Develop mFMS as a device-agnostic application 2. Allow retailers the choice to use laptops, desktops, tablets, and smartphones to run the mFMS application

Key Operational Recommendations	
Issues	**Recommendations**
In the national rollout phase, the government has appointed a contact person only at the state level. The State Coordinators will not be able to manage the programme effectively at such large scale.	1. Appoint Block Agriculture Officers as the main contact point for retailers 2. Use the extension services of the District Agriculture Office as well
Many retailers maintain two systems – the first is a PoS to record sale transactions and the second is Enterprise Resource Planning (ERP) for manufacturers. This increases their workload.	1. Allow linkage of mFMS with manufacturer ERPs or tally
The PoS devices do not provide transaction receipts with GST. Retailers, for their taxation and bookkeeping purposes, calculate the GST on every transaction manually.	1. Enable GST calculation in the PoS application
Due to delays in updating stock by fertiliser companies in the mFMS system, there is a delay in the update of retailers' PoS systems. However, pressure from the farmers and fear of losing business compels retailers to sell the stock manually	1. Enable IT infrastructure at rake points and warehouses for updating stock immediately 2. Dispatch ID as notification should also appear on the PoS device

23. http://indianexpress.com/article/business/ahead-of-dbt-roll-out-next-january-centre-plans-to-double-dealers-commission-on-urea-4832126/

2. Background - Evolution of Fertiliser Subsidy Reforms in India



Fertiliser subsidy is the second largest subsidy, after food that the Government of India provides. It has a budget of INR 70,000 crore (USD 10.77 billion)[24] in FY 2017–18.[25] This is a significant policy shift from the period before 1977 when the government did not provide subsidies to farmers for fertiliser purchases.[26] Due to the dependence of India's rural economy on fertilisers, the Government of India regulated the sale, price, and quality of fertilisers through a Fertiliser Control Order (FCO)[27] in 1957, and then controlled fertiliser distribution through the Movement Control Order (MCO)[28] in 1973.

The Green Revolution in India further underscored the importance of fertiliser as an essential commodity as the new variety seeds were responsive to higher doses of fertiliser. This led to an increased demand for fertiliser in the country. It was critical that sufficient fertiliser reaches farmers on time at a reasonable price.

Moreover, the oil shocks of the 1970s created uncertainty about fertiliser pricing. The increase in crude oil prices led to an increase in the price of petroleum naphtha, a key fertiliser feedstock.[29] The increase in the prices of the fertiliser feedstock resulted in increases in fertiliser price.

In the wake of the oil price instability and increased fertiliser prices, the Indian government set up the *Marathe Committee*[30] in 1976. This committee would study the basis of existing pricing policy and recommend a pricing policy that would ensure price certainty for fertiliser. Based on the recommendations of the committee, the Indian government introduced the Retention Price Scheme (RPS) in 1977.[31] This was the first major policy reform in the fertiliser industry. The government also introduced incremental reforms in the later years to overcome the shortcomings of the preceding reform.

The following table provides a brief summary of major reforms in the fertiliser industry.

Scheme Name	Description	Impact
Retention Price Scheme (RPS), (1977)	• The government fixed the fertiliser price and made it uniform across the country • The government paid the difference between the retention price and the MRP to the manufacturers	• A significant increase in fertiliser production and consumption (see Annexure II) • A significant increase in government's subsidy bill (see Annexure II)
Decontrolling fertiliser, (1991)	• To reduce the subsidy burden, the government decontrolled all fertilisers except urea (that is, only urea production was subsidised under RPS) • The government sold non-urea fertilisers at non-subsidised prices	• Urea price became lower than other fertilisers • Increase in consumption of urea and decrease in consumption of other fertilisers due to price differential (see Annexure II) • Imbalance/ disproportionate use of fertilisers, that is, use of urea in higher proportion compared to other fertilisers

24. USD 1 = INR 65
25. http://indiabudget.nic.in/
26. http://fert.nic.in/page/fertilizer-policy
27. http://www.faidelhi.org/fertiliser-control-order.htm
28. http://indianfertilizer.com/frontend/statistics/sectionView?section=statistics&page=TFCO-1958/TF-274.htm
29. Petroleum naphtha is an intermediate hydrocarbon liquid stream derived from the refining of crude oil
30. http://www.faidelhi.org/reports.htm
31. http://fert.nic.in/page/fertilizer-policy

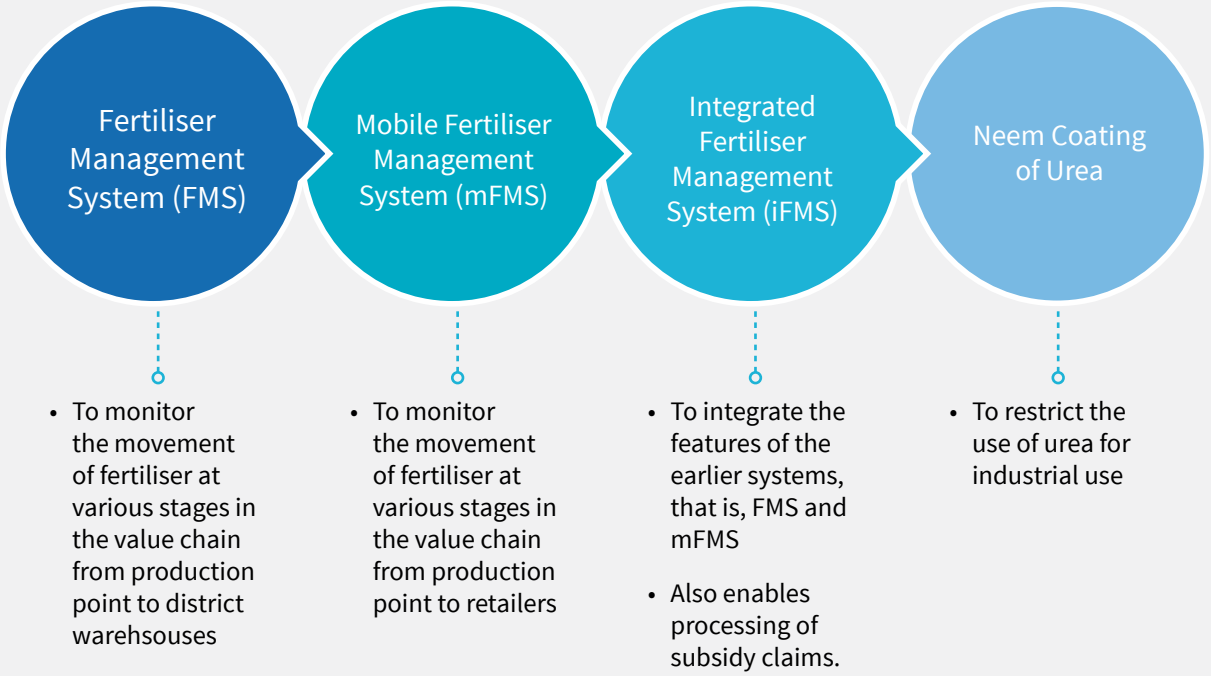
Concession Scheme for Other Fertilisers, (1992)	• To encourage a balanced or proportionate use of fertilisers and enhance the ability of farmers to purchase affordable fertilisers other than urea, the government introduced a specific concession scheme for non-urea fertilisers • The difference between the cost of sales and maximum retails price (MRP) formed the concession rates.	• Increase in fertiliser consumption and consequently agriculture production in the country during two decades that is, from 1991 to 2000 (see Annexure II) • However, the marginal response of agriculture productivity to additional fertiliser usage decreased during the last few years of this period. • A significant increase in subsidy burden of the government (see Annexure II)
Nutrient-based Subsidy Scheme (NBS), (2010)	• To overcome the drawbacks of the concession scheme, the government introduced NBS for non-urea fertilisers. • The government decides per kg subsidy rates (converted to per metric tonne (MT)) on non-urea fertilisers. Based on the percentage of nutrient(s) in each grade of fertiliser, manufacturers avail a subsidy from the government • Urea remained subsidised under RPS	• Urea price became lower than other fertilisers • Increase in consumption of urea and decrease in consumption of other fertilisers due to price differential (see Annexure II) • Imbalanced or disproportionate use of fertilisers – that is, use of urea in higher proportion compared to other fertilisers • The marginal response of agricultural productivity to additional fertiliser usage decreased

The majority of the fertiliser reforms in the country have been focused on non-urea fertiliser. The government still controls the maximum retail price (MRP) of urea. The major reason to control the MRP of urea has been to save farmers from the financial burden that they may face if asked to pay the price in a decontrolled environment. For instance, the MRP of subsidised urea ranges between INR 295 (USD 4.54) and INR 326 (USD 5) per bag whereas non-subsidised urea costs approximately INR 1,171 (USD 18) per bag. Currently, a small farmer with one hectare of land who cultivates paddy and applies seven bags of subsidised urea needs INR 2,282 (USD 35). However, in a decontrolled environment, the farmer would need INR 8,197 (USD 126) for the same quantity of urea, that is, four times the amount farmer pays at present.

However, the large price difference between the subsidised and non-subsidised urea serves as an incentive to divert the subsidised urea to industrial use[32] and across the border to Nepal and Bangladesh.[33] According to the economic survey 2015-16, 65% of the fertiliser produced does not reach the intended beneficiaries, that is, small and marginal farmers.[34] To overcome the challenges in fertiliser distribution, the government introduced two additional measures. These were the fertiliser management system to digitise the distribution value chain and a system of coating urea with extract of neem (a bitter product of the *Azadirachta indica* tree) to restrict its use for industrial purposes.

32. Urea is used as an ingredient in the chemical, medical and explosives industries industry, automobile systems, laboratories, flavour enhancing additives in cigarettes, and others.
33. A 50kg bag of urea costs around Tk 800 (INR 685) in Bangladesh and NPR 996 (INR 622) in Nepal
34. http://indiabudget.nic.in/budget2016-2017/es2015-16/echapvol1-09.pdf

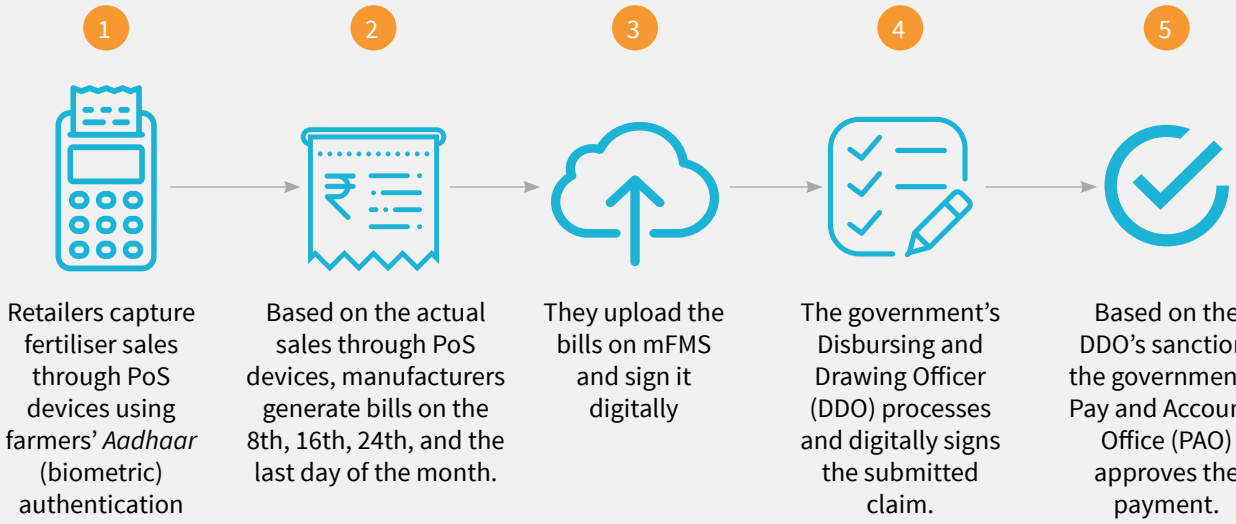
Figure 2: Fertiliser Management System and Neem-coated Urea



3. Project Background

In the Union Budget 2016–17, the Indian government proposed to bring the fertiliser subsidy under the Direct Benefit Transfer (DBT) programme. Under DBT, the government releases 100% subsidy on various grades of fertiliser-to-fertiliser manufacturers. This is based on actual sales made by the retailers to the beneficiaries through PoS devices. Retailers authorise the sales through successful *Aadhaar*[35]-based authentication of the farmers on PoS devices. Retailers can also use *Aadhaar* enrolment ID along with Kisan Credit Card (KCC) or Electoral Photo ID Card (EPIC) to authorise sales if the farmer does not have *Aadhaar*. However, the government has provided this facility primarily for the states with low *Aadhaar* penetration, such as Assam, Meghalaya, Nagaland, Jammu and Kashmir, Arunachal Pradesh, Mizoram, and Manipur.[36]

Figure 3: Subsidy Payment Process DBT-F



The government launched the DBT-F programme with the following objectives: (Figure 4)

1. To build an efficient and replicable fertiliser subsidy distribution model
2. To study fertiliser consumption at the farmer-level and bring in rationalisation via SHC recommendation
3. To identify the actual beneficiaries of fertiliser subsidies
4. To digitalise the sale of fertiliser through POS
5. To track and mitigate over-use of fertiliser based on sales data
6. To rationalise the subsidy payments to the manufacturers and thereby reduce the fertiliser subsidy burden on the exchequer
7. To understand land-holding details, cropping, and cultivation patterns for better planning of fertiliser demand estimations

35. *Aadhaar* is India's national identity number based on biometrics, https://uidai.gov.in/
36. https://uidai.gov.in/enrolment-update/ecosystem-partnemrs/state-wise-aadhaar-saturation.html

The government announced pilots for DBT-F in 16 districts[37] across India before the pan-India rollout. However, the government launched the pilots only in 14 districts[38] out of the proposed 16. Currently, the pan-India rollout is underway. The government launched these pilots in two phases.

1. **Pre-pilot Phase:** The government in the pre-pilot phase announced DBT-F pilot for fertiliser distribution in Krishna and West Godavari districts of Andhra Pradesh. The government launched the pre-pilot phase in September, 2016.
2. **Pilot Phase:** In the pilot phase, the government expanded DBT-F to 12 more districts between January and March, 2017.

At the request of the National Institute for Transforming India (NITI) Aayog[39] and Department of Fertilisers (DoF),[40] *MicroSave* conducted evaluations of the pre-pilot and pilot districts over three rounds.

Evaluation	Study Duration	Number of Districts Assessed (Live Districts)	Farmer Sample	Retailer Sample
Round I	September 2016	Two, that is, Krishna and West Godavari (Andhra Pradesh)	650	36
Round II	January 2017	Six, including the two districts from Round I, that is, Una (Himachal Pradesh), Hoshangabad (Madhya Pradesh), Rangareddy (Telangana), Krishna and West Godavari (Andhra Pradesh), and Pali (Rajasthan).	1,734	200
Round III	July – September 2017	Fourteen, including the six districts from Round II, that is, Una (Himachal Pradesh), Kishanganj (Bihar), Hoshangabad (Madhya Pradesh), Karnal and Kurukshetra (Haryana), Thrissur (Kerala), Nasik and Raigarh (Maharashtra), Tumkur (Karnataka), Rangareddy (Telangana), Krishna and West Godavari (Andhra Pradesh), Narmada (Gujarat), and Pali (Rajasthan)	5,659	427
Note: The findings across three rounds are not comparable, strictly speaking. Readers should be aware of this while reviewing the conclusions or comparisons in this report. The inter-round comparisons made are indicative.				

The key objectives of the evaluation were to:

1. Highlight the on-ground implementation DBT-F in the 14 pilot districts;
2. Evaluate the performance of the system during peak Kharif season;
3. Identify the issues and challenges pertaining to the implementation of DBT-F in the pilot districts;
4. Provide the government with evidence of what is working well and what is not, to aid decision-making at the policy-level;
5. Provide actionable solutions to improve implementation and improve preparedness for the national rollout.

37. 16 districts were Una (Himachal Pradesh), Kishanganj (Bihar), Hoshangabad (Madhya Pradesh), Karnal and Kurukshetra (Haryana), Kannur (Kerala), Nasik and Raigarh (Maharashtra), Tumkur (Karnataka), Rangareddy (Telangana), Krishna and West Godavari (Andhra Pradesh, Maldah and South 24 Parganas (West Bengal), Narmada (Gujarat), and Pali (Rajasthan).
38. 14 districts are – Una (Himachal Pradesh), Kishanganj (Bihar), Hoshangabad (Madhya Pradesh), Karnal and Kurukshetra (Haryana), Thrissur (Kerala), Nasik and Raigarh (Maharashtra), Tumkur (Karnataka), Rangareddy (Telangana), Krishna and West Godavari (Andhra Pradesh, Narmada (Gujarat), and Pali (Rajasthan).
39. http://niti.gov.in/
40. http://fert.nic.in/

3.1. Round I Evaluation

In the pre-pilot phase of DBT-F in Krishna and West Godavari districts, the government-integrated farmers' land records, Soil Health Card (SHC)[41] information, and *Aadhaar* database. The integrated database was used to identify and distribute fertiliser to farmers using *Aadhaar*-based biometric authentication using a PoS device. The PoS device, provided to the fertiliser retailers, fetched land record details and corresponding SHC information using the farmers' *Aadhaar* numbers. The government had seeded both the land records and SHC with *Aadhaar*. Although the recommended fertiliser quantity based on SHC information and land holding was on display on the PoS device, the farmers were free to buy whatever quantity they desired. Additionally, the government designed the pre-pilot phase on a 'no denial policy' where retailers were not permitted to deny the sale of fertiliser to farmers in case they failed to produce their *Aadhaar* card or in the case of *Aadhaar* authentication failure.

MicroSave's evaluation of the pre-pilot phase identified a number of challenges. These included issues like inadequate training of field functionaries, high transaction time, delayed deployment of PoS devices, technology and connectivity issues that led to *Aadhaar* authentication failure, and challenges surrounding database integration (*Aadhaar*, land records, and SHC). *MicroSave* recommended the following measures:

- Delinking of SHC and land record data to save on transaction time and decrease authentication failure;
- Using only *Aadhaar* database for authentication in the initial phase;
- Integrating exception management practices in the system to address exceptions;
- Increasing retailer margin to increase the business viability and improve participation;
- Carrying out a communication campaign to increase farmers' awareness so that they bring their *Aadhaar* to buy fertiliser

In the pilot phase, the government incorporated *MicroSave's* policy and operational-level recommendations. One of the significant modifications in the DBT-F pilot phase in the 14 districts was to delink the SHC database and land record database. This was for two reasons. Firstly, the integration of three databases had increased the transaction time substantially. The transaction time increased from approximately a minute to 10 minutes under the manual transaction process. Secondly, at the time of writing, SHC and land records are not yet seeded with *Aadhaar* numbers across India; hence, it was not possible to roll out this model across India. In the subsequent pilot phase in the 14 districts, the government used only the *Aadhaar* database to authenticate fertiliser purchase transactions.

3.2. Round II Evaluation[42]

MicroSave conducted an evaluation of the six pilot districts that were live[43] in January 2017. The key findings from the evaluation were:

1. On the supply side, the groundwork to implement DBT-F across six districts was commendable. Almost all the retailers (97%) had received training and operational support. The grievance resolution (through

41. Macro- and micro-nutrients needed by the soil are identified and translated into specific, measured quantities of fertilisers – http://www.soilhealth.dac.gov.in/
42. One can access the full report for Round II from the following link: http://www.microsave.net/resource/assessment_of_aefds_aadhaar_enabled_fertilizer_distribution_system_pilot
43. Live districts are those districts where the government is paying subsidies to the fertiliser manufacturers on actual sales realised through PoS devices

informal methods such as WhatsApp groups) was quick and responsive. However, the national rollout of DBT-F required a robust formal GRM to track and analyse operational and technical issues.

2. On the demand-side, farmer awareness about the new fertiliser distribution system, process, and requirements was low. Of the farmers, 88% were unaware of the requirement to produce *Aadhaar* at the retailer-outlet to buy fertiliser. They were also confused about the amount of subsidy mentioned on the receipt.
3. Approximately 10% of the total transactions were adjusted transactions. This means that instead of the farmer who bought the fertiliser, someone else performed the authentication using their *Aadhaar* either during the sale or later for reconciliation.
4. The average transaction time had significantly improved to five minutes from 10.5 minutes in the initial pre-pilot phase.
5. Fertiliser retailers were worried that transactions authenticated through PoS devices may not be feasible during upcoming peak Kharif season due to high transaction time.

MicroSave recommended the following measures:

- An 'early check out' system, where farmers can pre-authenticate themselves at designated points of authentication a few days before they purchase fertiliser to manage sales during the peak agriculture season;
- A centralised GRM to allow tracking and analysis of issues and a structured approach to resolve the issues;
- A strong focus on communication strategy in vernacular language to increase awareness among the beneficiaries.

3.3. Round III Evaluation

MicroSave conducted the evaluation of 14 live districts between July and September, 2017. This report provides details on the ground-level realities of DBT-F implementation and suggests actionable solutions for further improvement of the DBT-F system.

4. Methodology

MicroSave adopted a mixed-methods study design for the evaluation. This comprised a qualitative and quantitative component. *MicroSave* interacted extensively with both farmers and fertiliser retailers to understand the DBT-F implementation process and the issues that the government faced. In addition to this, we conducted in-depth interviews with other stakeholders. These included district government officials – District Agriculture Officer and Block Agriculture Officer, fertiliser company representatives – LFS[44] and other representatives, and District Consultants[45] responsible for implementation of DBT-F at the district-level.

MicroSave conducted quantitative research with 427 retailers and 5,659 farmers (see figure 5).[46] In addition, *MicroSave* conducted qualitative in-depth interviews with 138 retailers and 185 farmers.

The quantitative component followed a cross-sectional design coupled with multistage stratified random sampling. Based on retailers in four different strata, we conducted the first stage sampling. The second stage of the sampling had a systematic random component to cover farmers.

4.1. Retailer and Farmer Sampling

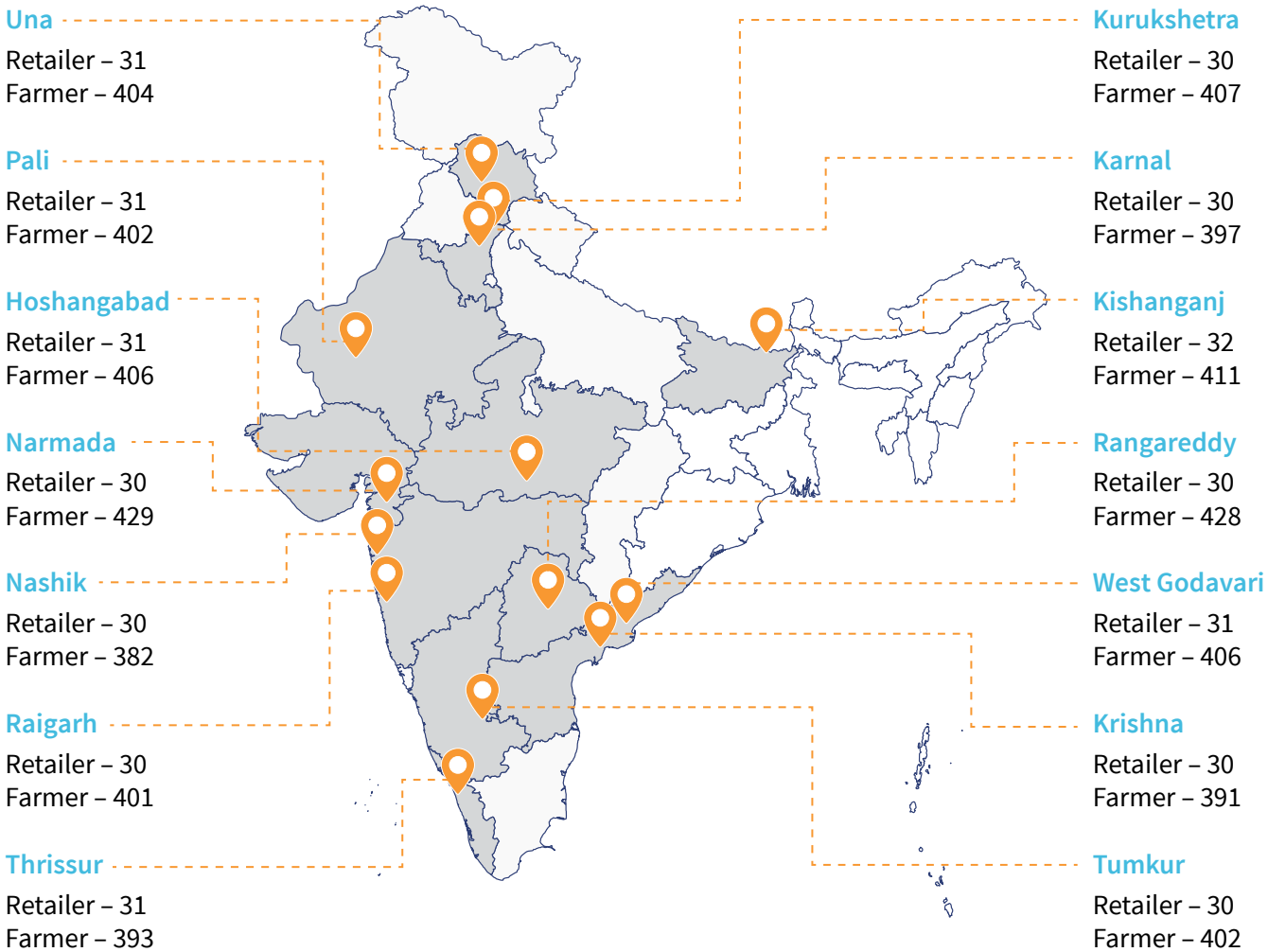
To finalise the quantitative sample of farmers and retailers we used following steps:

1. For retailer sampling, *MicroSave* extracted the retailer details for the 14 live districts from the mFMS website.[47]
2. We followed a clustered sampling approach[48], with each district considered as a separate cluster. We decided to cover 30 retailers in each district (cluster) and covered all the districts (clusters).
3. Based on the number of cumulative transactions, each district (cluster) was divided into four strata:
    I. Up to 20 transactions
    II. 21-50 transactions
    III. 51-100 transactions
    IV. More than 100 transactions
4. We followed probability proportional to size (PPS) sampling to determine the number of retailers under each stratum.[49] Retailers from each stratum were selected considering it as a discrete sample frame, following a random start and selecting each sample (retailer) with a sample interval.
5. For farmer sampling, we estimated the sample size for the farmers at the level of each district, keeping in mind the design and the requirements of the research study. This yielded estimates with a 95% significance level and 5% margin of error. The sample size of farmers at the district level was 400 (384 but rounded up for logistical reasons).

44. The government has entrusted the responsibility of movement of fertiliser within a district to one fertiliser manufacturer, that is, LFS. One district only has one LFS.
45. The government has hired one personnel per district to implement the DBT-F at district level.
46. Map – not to scale
47. GoI introduced the mFMS to monitor the movement of fertiliser at various stages in the value chain – http://mfms.nic.in/
48. With cluster sampling, the researcher divides the population into separate groups, called clusters. Then, the researcher selects a simple random sample of clusters from the population. The researcher conducts his analysis using data from the sampled clusters. http://stattrek.com/statistics/dictionary.aspx?definition=Cluster_sampling
49. Probability proportion to size is a sampling procedure under which the probability of a unit being selected is proportional to the size of the ultimate unit. This gives larger clusters a greater probability of selection and smaller clusters a lower probability. http://www.who.int/tb/advisory_bodies/impact_measurement_taskforce/meetings/prevalence_survey/psws_probability_prop_size_bierrenbach.pdf

6. Then, we calculated the median of 'number of transactions by retailer' in each of the four strata in each district. Thereafter we took the median value of medians in those strata across districts after considering the median values of each stratum from each district as a discrete sampling frame. We considered median values instead of mean or average values due to high levels of variation in the number of transactions at the retailer-outlet level.
7. We considered this median value as the farmer sample size for one stratum across all districts.
8. Subsequently, we arrived at the farmer sample per retailer by dividing the sample size (median value) by the retailer sample size in each stratum.
9. Farmers were randomly selected from the sampled retailer locations to for interviews. We selected farmers coming to the retailer location randomly interviewed them after they had completed the transaction. During the transaction time, we recorded observations regarding the conduct of transaction. For this purpose, a field enumerator stationed at the retailer location for one day interviewed the farmers. We selected the farmers following a sample interval, based on average footfall at the sampled retailer outlet as reported by the retailer at the time of discussion.

Figure 5: Quantitative Sample of Farmers and Retailers[50]



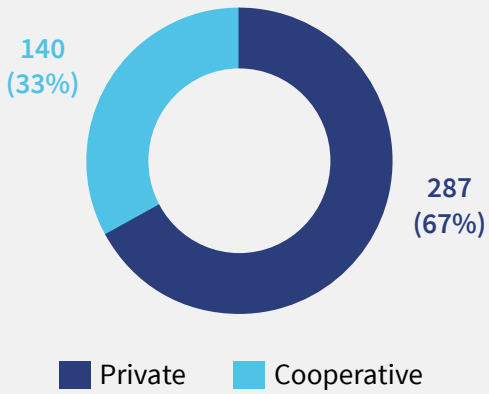
50. Map – not to scale

5. Respondent Profile

5.1. Retailer Profile

- Of the 427 retailers surveyed, 67% were private retailers and the remaining 33% were cooperatives. These cooperatives were also involved in additional activities, such as farm produce sale, agriculture input procurement, agriculture credit, and other banking services.
- On an average, retailers sold fertiliser worth INR 10.2 million (USD 0.16 million) during the last year. Out of these, 78% of sales were in cash.
- On an average, fertiliser outlets remain open for nine hours per day.

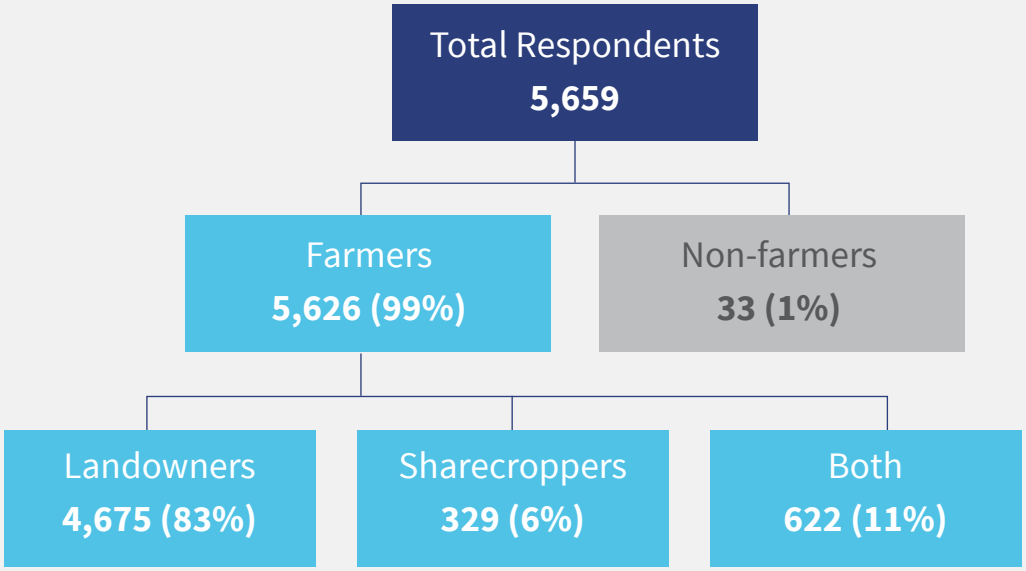
Figure 6: Retailer Profile (n=427)



5.2. Farmer Profile

- Out of a total of 5,659 respondents, 99% (5,626) were farmers. The remaining 1% constituted non-farmers who purchased fertiliser on behalf of other farmer relatives or friends
- Out of the 5,626 farmers, 83% are landowners and 6% are sharecroppers.[51] The remaining 11% of the farmers are both sharecroppers and landowners.
- Average land size of all the farmers surveyed is 4.54 acres (1.84 hectares).
- The farmers bought an average of 32 urea bags during the past year

Figure 7: Farmer Profile (n=5,659)



51. A Landowner is a person who owns land, whereas a sharecropper is a tenant farmer, who cultivates land rented from its owner. Typically, a sharecropper pays the landowner with a part of the harvest or money.

6. Key Findings

6.1 Transaction Status and Experience

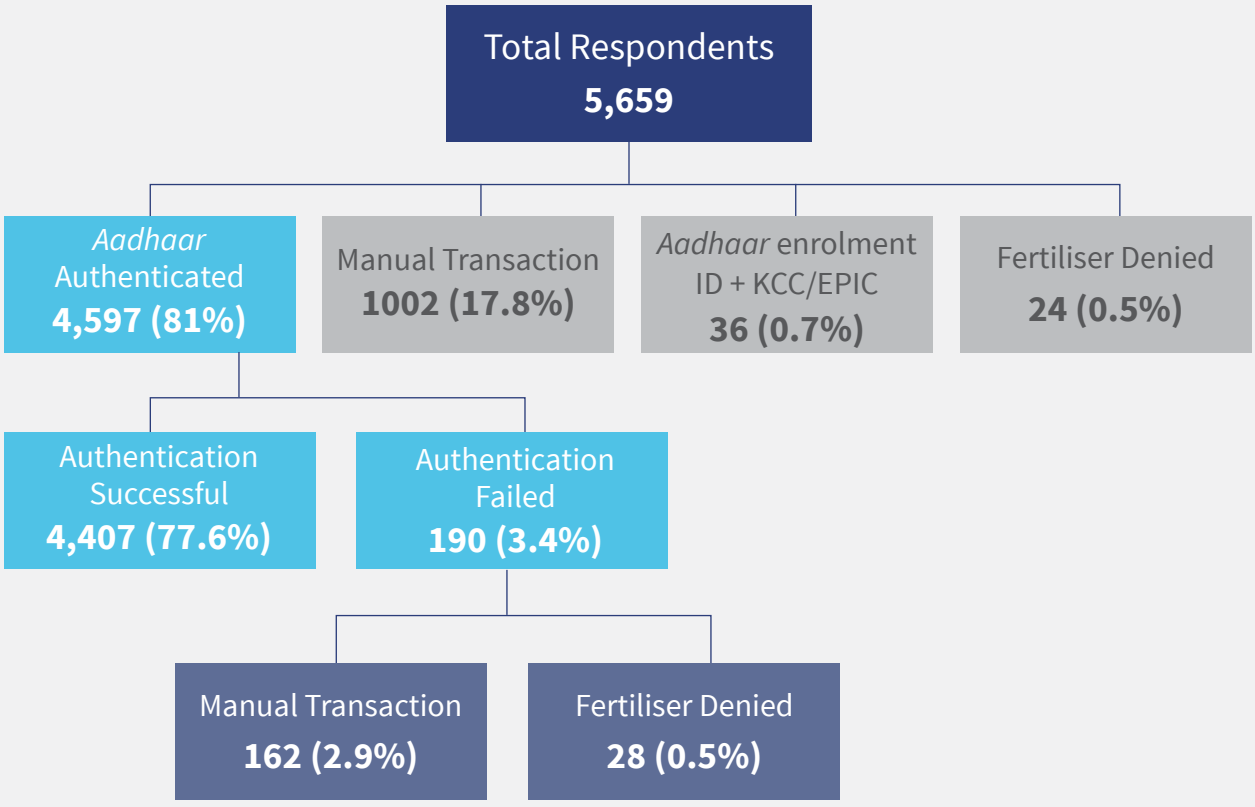
6.1.1. Incidences of 'adjusted' transaction are high

- Incidences of manual sale without *Aadhaar* and adjusted transactions[52] are high at 21% compared to 10% observed in Round II. The retailers adjust transactions due to *Aadhaar* unavailability with farmers at the time of fertiliser purchase and *Aadhaar* authentication failure. We also observed that the retailers do not ask farmers to provide their *Aadhaar* for purchasing fertiliser and simply sells them the fertilizer manually – adjusting these transactions later. The retailers sell manually and adjust transactions to minimise the transaction time and manage sales during peak sales times.

- Of the total farmers surveyed (5,659) used *Aadhaar* to initiate the fertiliser purchase transaction at the fertiliser dealer shop. Out of the 4,597 farmers, *Aadhaar* authentication was successful in 4,407 cases (77.60% of total farmers) and failed in 190 (3.40% of total farmers) cases. Out of the 190 authentication failed cases, 162 (2.90%) received fertiliser manually i.e., the retailers sold the fertiliser to the farmers without *Aadhaar* authentication and later conducted the transactions using someone else's *Aadhaar* (adjusted transactions). Retailers denied fertiliser to the remaining 28 (0.50% of total farmers) farmers (See figure 8).

- Thrissur district of Kerala is an outlier. Of the 393 farmers, 89% (351) did not buy fertiliser through *Aadhaar* even once. Therefore, of the 1,002 manual transactions, 351 are from Thrissur. If we remove the sample of Thrissur from the total sample, the percent of adjusted transactions decreases to 15%.

Figure 8: Transaction Status



52. "Adjusted Transaction" means that retailers would use their own or someone else's *Aadhaar* number instead of the farmer's to authenticate and register sales, either during the sale or later. Such 'adjusted transactions' may also imply situations whereby a retailer registers all sales for the day using only a few *Aadhaar* numbers.

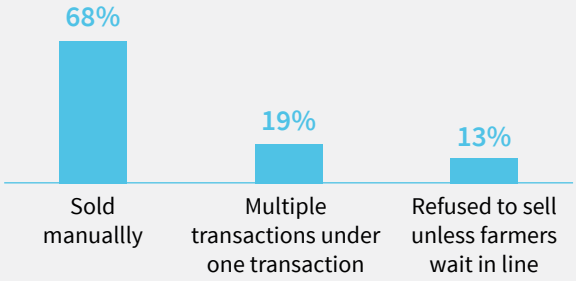
6.1.2. Retailers manage peak season sales by adjusting transactions

> *"Bheed me manual de dete hain, baad me adjust kar dete hain"*
>
> (I sell manually if the shop is crowded and adjust transactions later)
>
> -Retailer, Raigarh

- In the Round II evaluation report, we had raised the concern that retailers are worried about the inability of the PoS system to manage peak sales in the upcoming Kharif season. Retailers were concerned that during the peak agriculture period they would be able to handle around 120 transactions in a day using PoS when the footfall could range between 300-500 customers per day.[53] They hinted that in such situations, they would resort to higher adjusted transactions to handle the peak load. In the recent evaluation findings, these concerns stand vindicated as the number of adjusted transactions has increased from 10% to 21% in Round II.

- Of the retailers surveyed, 44% (189) complained of difficulty in serving customers during peak season as an average of 65 customers remain present together at any given time on a single day. However, they managed sales by selling manually to farmers and adjusting later (68%), adjusting multiple transactions under one transaction at the time of sales (19%), and refusing to sell unless the farmers waited in the queue for their turn (13%). Hence, the majority of retailers who faced difficulty in managing sales during peak agriculture season resorted to adjusting transactions.

Figure 9: Ways to Manage Sales during Peak Season (n=189)

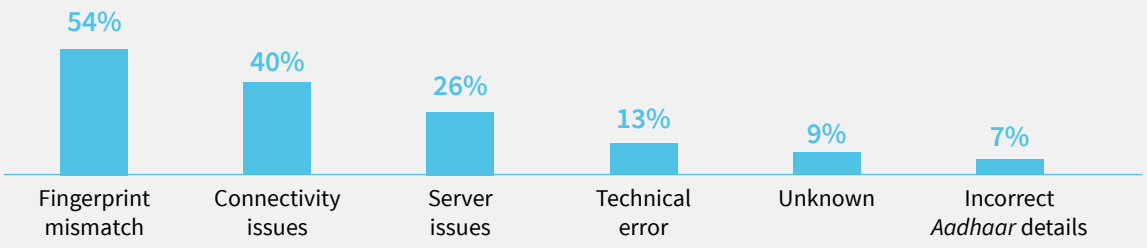


- Retailers, on average, use only one PoS device at the outlet[54]. They did not show a desire to use more than one PoS device to manage sales during the peak season, as it would require additional manpower and increase their costs. However, some of the cooperatives that had more than one sales point in their area of operation did use more than one PoS device. These cooperatives use one PoS device at each of their sales points.

6.1.3. Transaction experience of retailers

- Retailers primarily face issues with *Aadhaar* authentication failure. According to the retailers, *Aadhaar* authentication fails due to fingerprint mismatch (54%), connectivity issues (40%), server-related issues (26%) technical errors (13%), unknown errors (9%), and incorrect *Aadhaar* details entered (7%) (See figure 10).[55]

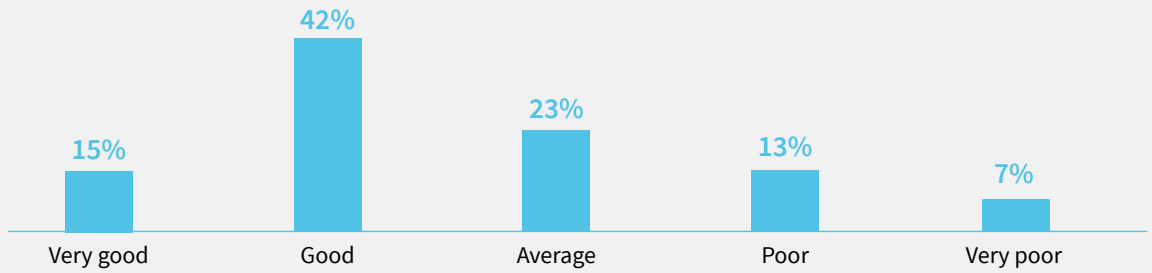
Figure 10: Reasons for *Aadhaar* Authentication Failure (n=427)



53. See page 18 of the report – https://bit.ly/2uGZMT7
54. http://164.100.128.10/mfmsReports/displayDBTReport and http://mfms.nic.in/dbt/POS_DEVICE_ERROR_LIST.pdf
55. Answers to the question are based on multiple responses. Hence, the sum of individual percentages may exceed 100.

- 57% of the retailers surveyed believed that the network strength on the PoS is very good to good, that is, they rarely face connectivity issues. The remaining 43% face connectivity issues intermittently to regularly, which affect the PoS transactions (see figure 11).
- On average, retailers took two *Aadhaar* authentication attempts to login into the PoS device.

Figure 11: Network Strength (n=427)



6.1.4. Transaction experience for farmers has improved

- The transaction experience has improved for farmers as successful *Aadhaar* authentication in the first attempt has increased to 62% in Round III as compared to 35% in Round II (see figure 12).
- Overall, successful *Aadhaar* authentication during the first three attempts has increased to 97% in Round III from 93% in Round II, and 41% in Round I (see figure 13). Successful *Aadhaar* authentication during the first three attempts has increased to 98% in Round III for the six districts that we assessed in Round II.[56]

Figure 12: Attempts for Successful *Aadhaar* Authentication

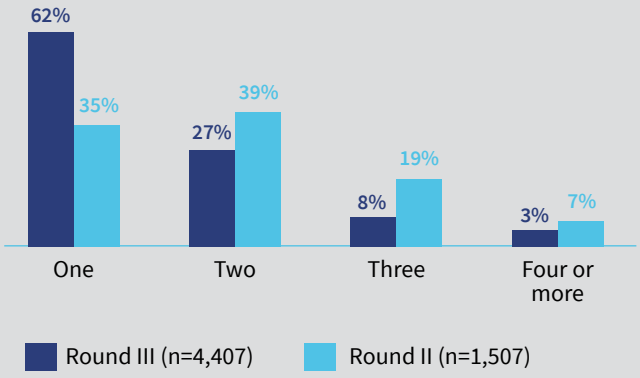
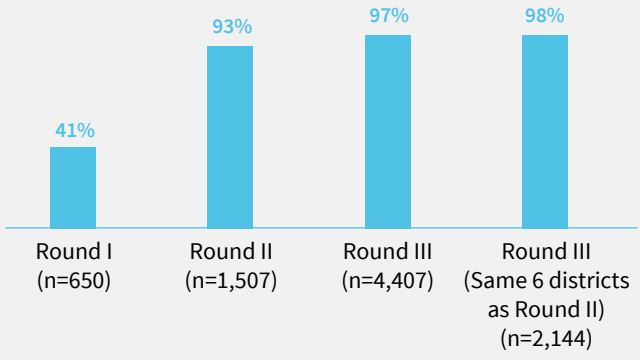


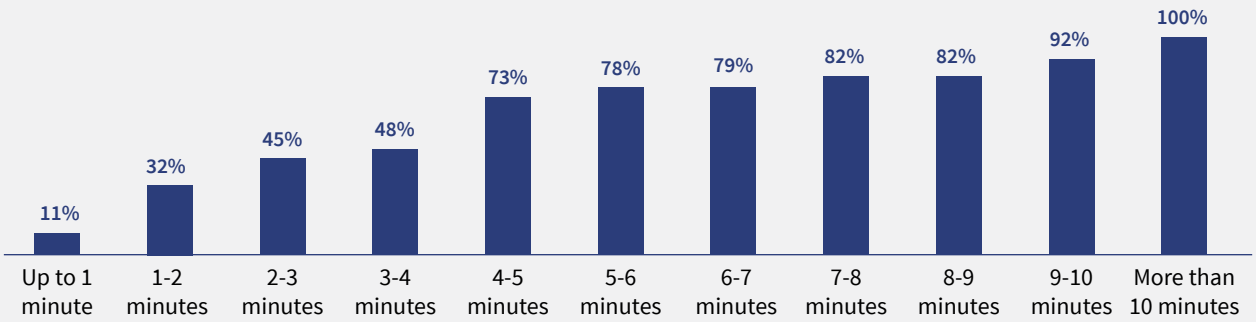
Figure 13: Successful *Aadhaar* Authentication in First Three Attempts



- Of the farmers, 73% complete the sale transaction within five minutes (see figure 14). Only 8% of the farmers complete the sale transaction in more than 10 minutes due to *Aadhaar* authentication failure or network connectivity issues.

56. n=Farmers who received fertiliser through *Aadhaar* authentication (Round I, n=650; Round II, n=1,507; Round III, n=4,407)

Figure 14: Transaction Completion Time for Farmers (Cumulative Frequency, n=4,407)



- Of the 5,191 farmers who purchased fertiliser, 85% (4,398) received transaction receipts. Of those who receive transaction receipts, 98% (4,308) were charged the same amount as mentioned on the transaction receipt.
- However, in Kishanganj district of Bihar, farmers pay an average price of INR 398 (USD 6.12) for one bag of urea, which is higher than the actual MRP, that is, INR 295 (USD 4.54). This is due to urea being diverted from Kishanganj to Bangladesh and Nepal where it is sold at INR 700–800 (USD 10.77–12.31) per bag.
- Farmers instinctively use the right-hand thumb in the first attempt for *Aadhaar* authentication (73%) followed by left thumb (11%), right index finger (9%), right middle finger (3%), and left index finger (2%) (See figure 15).

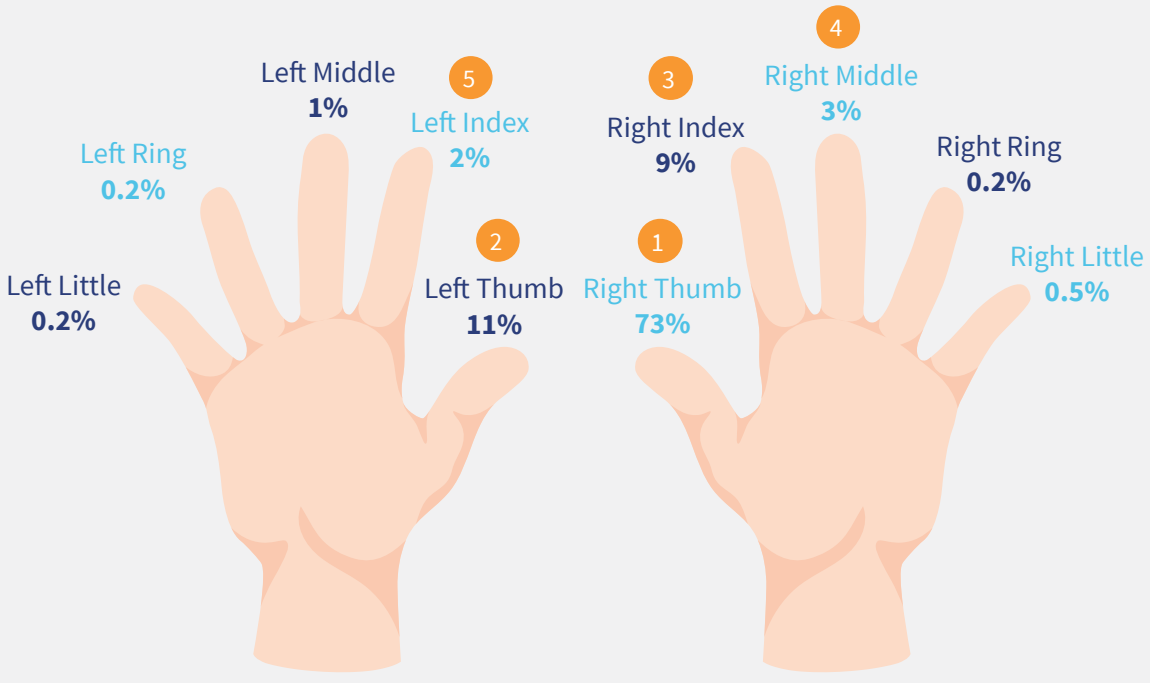


Figure 15: Fingers Used for First Attempt in Authentication

6.2 Compliance

6.2.1. Release Order (RO) Module

Delay in updating the records of stock on the PoS devices through the Release Order (RO) module creates a barrier in the sale of fertiliser through PoS devices. This also compels retailers to sell fertiliser manually without *Aadhaar* authentication and adjust transactions later.

What is RO Module?

The government has developed an RO module[57] to enable online tracking of stock in real-time. The module enables manufacturers, rake point managers, warehouse managers, wholesalers, and retailers to update and track the movement of fertiliser from one stakeholder to another. Fertiliser moves in different ways from the manufacturers to the retailers (see figure 16). When one stakeholder (manufacturer, rake-point, warehouse, or wholesaler) dispatches (dispatcher) fertiliser to the next stakeholder in the value chain, the dispatched updates the same quantity of fertiliser in the RO module and dispatches a challan copy (printed copy) along with the physical stock. The printed challan copy contains the dispatch ID. The stakeholder who receives the physical stock and challan copy acknowledges receipt of the fertiliser in the RO module through the dispatch ID. This updates the stock at the receiver's end in mFMS or PoS devices. Each stakeholder adopts this process to dispatch and receive the fertiliser until the retailers receive the fertiliser.

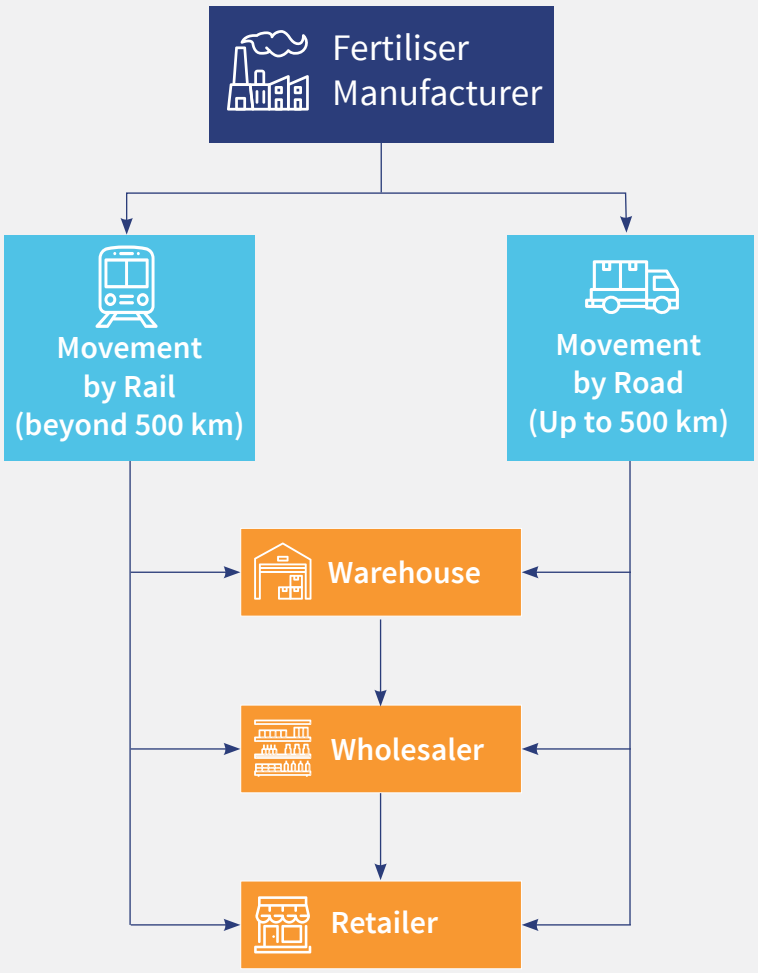


Figure 16: Fertiliser Movement from Manufacturer to Retailer

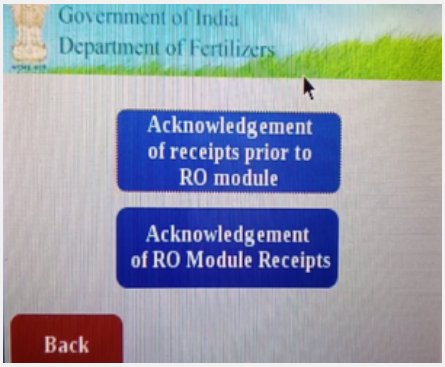
The government has also enabled the latest mFMS version 2.4 with the RO module for PoS devices. The retailers can acknowledge the receipt of fertiliser in their PoS devices (version 2.4). Prior to the RO module, retailers acknowledged the receipt of fertiliser through the 'Receipt Acknowledgement' menu option in PoS version 2.3. This was a two-step process: firstly, the user had to click on the 'Receipt Acknowledgement' option in the User Menu. Secondly, the user had to enter the fertiliser quantity received and click on 'Submit'. This would update the stock in the PoS devices for retailers to start the sale of fertiliser through the PoS (see figure 17).

57. http://mfms.nic.in/

Figure 17: Receipt Acknowledgement in mFMS Version 2.3 in PoS

After the introduction of RO module in mFMS version 2.4, the 'Receipt Acknowledgement' menu option in the User Menu displays two sub-options (see figure 18):

Figure 18: Receipt Acknowledgement Menu Options in Version 2.4



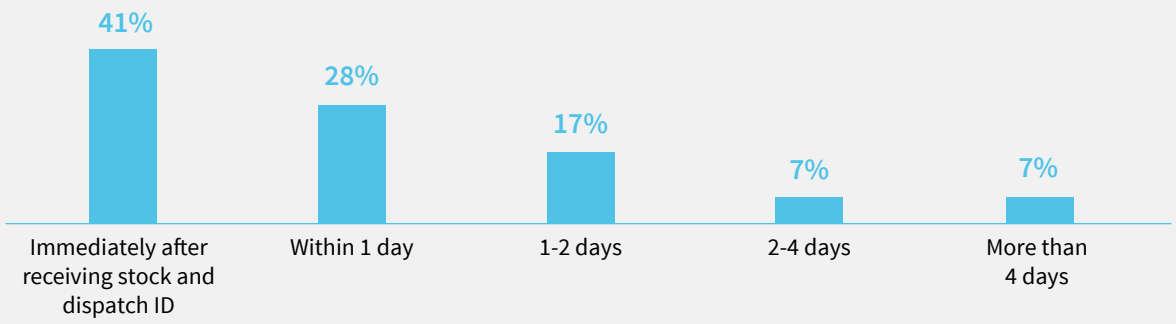
1. The purpose of 'Acknowledgment of Receipt Prior to RO Module' is to acknowledge all the dispatches entered through the mFMS portal by manufacturers, rake point managers, or wholesalers in PoS devices before the launch of RO module. The acknowledgement process is similar to the acknowledgement process in the mFMS version 2.3 (see figure 17).
2. The purpose of 'Acknowledgment of RO Module Receipts' is to acknowledge all the dispatches by manufacturers, rake point managers, or wholesalers. In this process, the dispatchers should send an RO module challan copy (printed copy) along with the physical stock to the retailers. Receipt acknowledgement through the RO module is a three-step process: Firstly, the user clicks on 'Acknowledgement of RO Modules Receipts', then, they enter the dispatch ID and click on 'Fetch', which provides the detail of fertiliser sent by the dispatcher. Finally, they click on 'Submit' if the fertiliser received through the RO module matches the physical stock received. This updates the stock in the PoS devices (see figure 19).

Figure 19: Acknowledgement of Fertiliser Receipt in RO Module

6.2.2 Delays in updating the RO Module also delays receipt acknowledgement and compels retailers to adjust transactions

- Only 41% of the retailers surveyed acknowledge the dispatch ID (fertiliser receipt) immediately after receiving the physical stock and dispatch ID in RO module to update stock. The remaining retailers take one day or more to acknowledge the dispatch ID (see figure 20).[58]

Figure 20: Dispatch ID Acknowledgement in RO Module (n=427)



Dispatch ID (fertiliser receipt) acknowledgement is delayed due to following reasons:

1. Dispatchers often do not update stock in the RO module at the point of dispatch (rake-points, warehouses, and/or wholesaler). Hence, no dispatch ID is generated and the retailer receives physical stock without dispatch ID. Therefore, immediate acknowledgement of fertiliser receipt in PoS is not possible.

2. In some cases, dispatchers update the stock in the RO module but do not print the challan from the system. Instead, they send a handmade challan without the dispatch ID (see figure 21). The retailer then reaches out to the dispatcher over phone or WhatsApp to get the dispatch ID after they receive the physical stock, which sometimes leads to delays.

Figure 21: Handmade Challan (Without Dispatch ID)

3. Rake points and warehouses do not have adequate IT infrastructure, such as computer and Internet connectivity to update the RO module. Hence, rake point managers have no option but to dispatch the physical stock and update the RO module later when they come back to the office.

4. A lack of training and awareness about the RO module among dispatchers and retailers also delays generation and acknowledgement of dispatch ID, respectively.

> *"Acknowledgment teen din baad aata hai, usse pehle machine me nai dikhta, teen din me to gadi bech dete hain"*
>
> (I receive acknowledgement after a delay of up to three days. I sell the fertiliser by the time I receive the acknowledgement)
>
> -Retailer, Raigarh

58. Answers to the question are based on multiple responses. Hence, sum of individual percentages may exceed 100.

Ideally, retailers should not sell fertiliser without updating the stock in PoS devices. However, pressure from farmers and fear of losing business, compel retailers to sell fertiliser manually without *Aadhaar* authentication. Later, retailers adjust these transactions using someone else's *Aadhaar* after receiving the dispatch ID.

- Of the retailers surveyed, 49% said that the stock does not update immediately after acknowledgement of the fertiliser receipt in the PoS devices. In these cases, the retailers sell fertiliser manually without *Aadhaar* authentication and adjust the transactions later.

6.2.3. Other Compliance Observations

- Of the retailers, 84% said that the stock updated correctly after every sales transaction.
- Of the retailers surveyed, 74% (316) had updated their PoS with the latest mFMS version 2.4. 19% (79) were unaware if they had updated their PoS devices to version 2.4. Only 7% (32) retailers had not updated their PoS devices with the latest version.
- Of the retailers who updated their PoS devices, 56% either did it themselves or took help from District Consultants (32%), other government officials (8%), or other individuals (4%) (See figure 22). Retailers preferred to use General Packet Radio Service (GPRS) (63%) and Wireless Fidelity (Wi-Fi) (29%) connectivity to update to version 2.4 (see figure 23).

Figure 22: Individual Who Updated PoS Software (n=316)

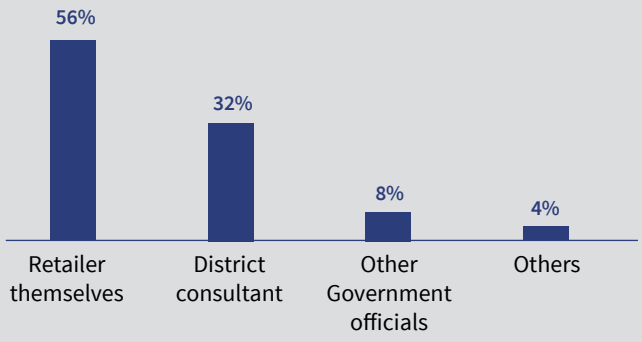
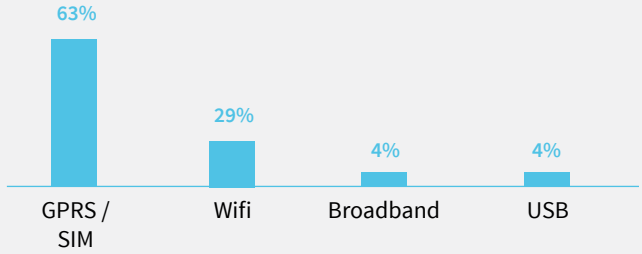


Figure 23: Connectivity Used to Update PoS Software (n=316)

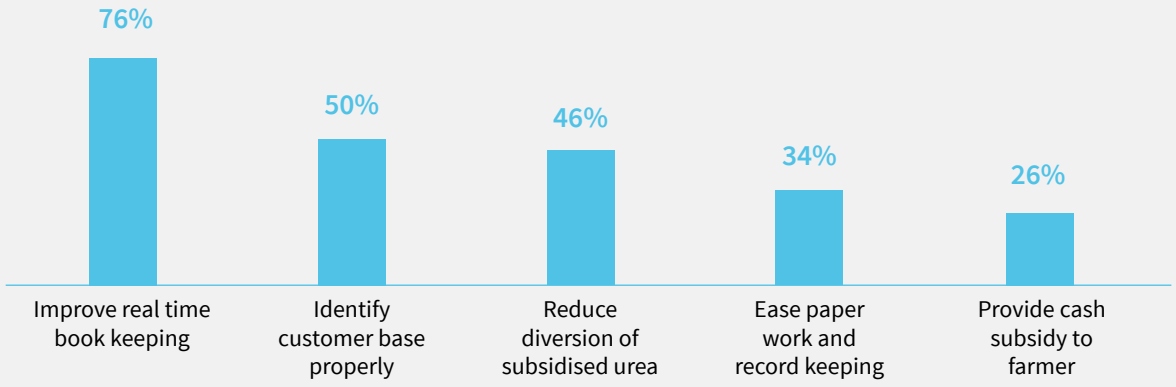


6.3. Training and Awareness

6.3.1. Retailer training and awareness efforts are laudable

- Retailer training and awareness efforts that the Ministry of Chemicals and Fertilisers undertook are laudable as these efforts have helped retailers understand the functionalities of PoS devices and efficiently conduct transactions through the devices.
- Of the total retailers surveyed, 93% (396) have received training on functionalities and operations of the PoS device from either district agricultural officials, fertiliser company officials, or district consultants. On average, the retailers received two training sessions. Of these retailers, 90% (356) found these training sessions to be useful.
- Of the total retailers surveyed, 58% (248) were aware that KCC or EPIC can also be used to authenticate farmer transaction on PoS devices.
- Only 23% (98) retailers referred to the online training material, such as videos and MS PowerPoint presentations available on the mFMS website[59]. The remaining retailers did not use the online material or were not aware of them. The retailers who referred to the online training material found them to be comprehensive.
- Retailers were aware that the objectives of DBT have been to improve real-time record-keeping (76%), identify the customer base properly (50%), reduce the diversion of subsidised urea (46%), and ease the processes of paperwork and bookkeeping (34%)[60]. However, some retailers also believed that eventually, the government would transfer cash subsidies directly to the farmers' accounts. (See figure 24).

Figure 24: Reasons for Introduction of DBT in Fertiliser (n=427)

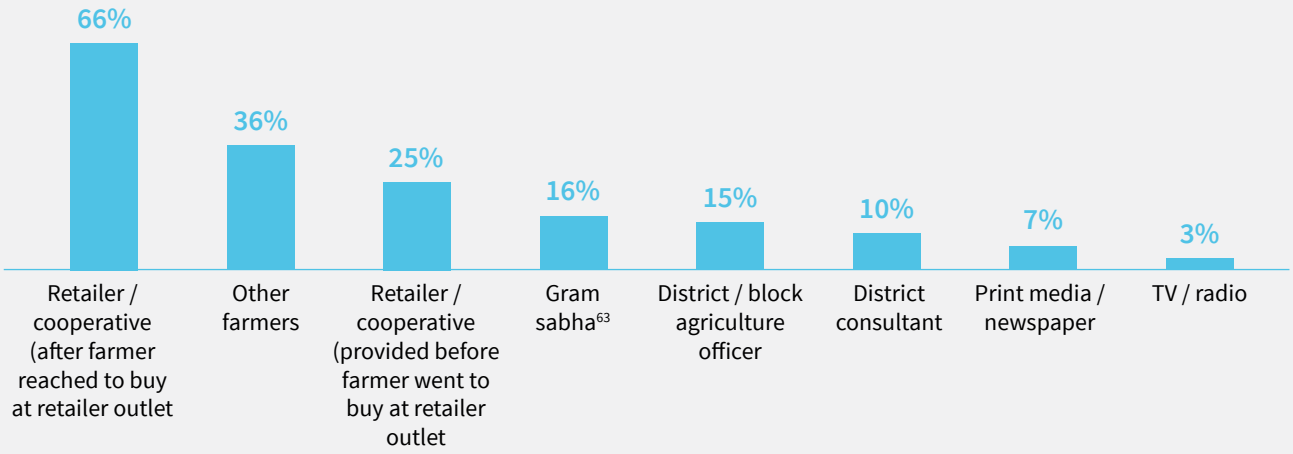


59. http://mfms.nic.in/
60. Answers to the question are based on multiple responses. Hence, sum of individual percentages may exceed 100.

6.3.2. Communication efforts to create awareness among farmers needs

- Of the farmers, 66% received the information that '*Aadhaar* is mandatory to buy fertiliser' only after they had arrived at the fertiliser retailer outlet.
- The major sources of information for farmers about the new system of fertiliser delivery under DBT-F were retailers and fellow farmers (see figure 25).[61]

Figure 25: Source of Information for Farmers (n=5,243)[62]



- Farmers believed that the communication efforts of the government had been inadequate. According to farmers, they did not receive information from any credible sources, such as government or Panchayat officials. This has also led to the following rumours among the farmers about the programme:

  1. The government would initiate cash transfers in fertiliser, that is, the farmers will have to buy fertiliser at a non-subsidised rate from the market. The government will transfer the subsidy amount into their bank accounts.
  2. The government would gauge the land they possess and cancel their Below Poverty Line (BPL) status if the land size exceeds a certain limit.
  3. The government planned to estimate the land of farmers to either tax them or seize their land beyond a certain limit.

- Of the farmers, 32% (1,671) were aware that the government provides subsidised urea bags in the market. The remaining 43% were unaware of the fact that the urea bag that they purchase is subsidised by the government, and 25% of farmers did not know that the government provides a subsidy for fertiliser.

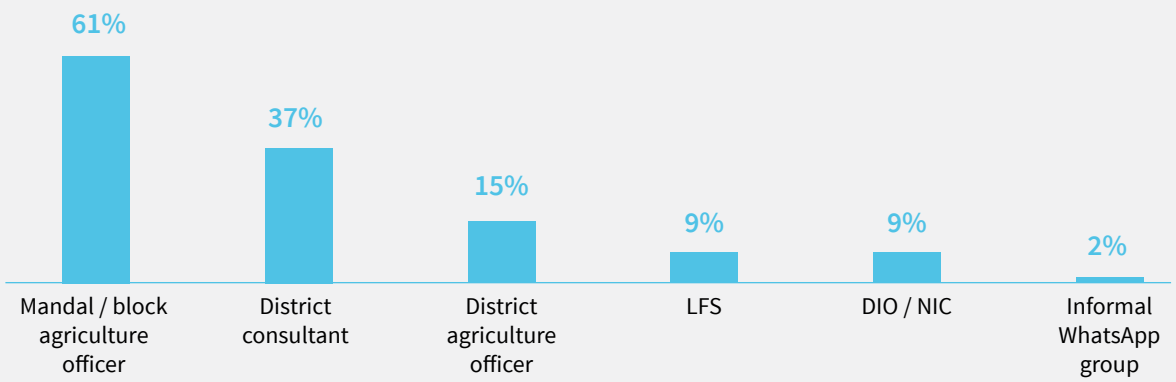
61. Answers to the question are based on multiple responses. Hence, sum of individual percentages may exceed 100.
62. Answers to the question are based on multiple responses. Hence, sum of individual percentages may exceed 100.
63. Gram Sabha - means a body consisting of all persons whose names are included in the electoral rolls for the Panchayat at the village level

6.4. Grievance Redress Mechanism (GRM)

The existing informal grievance redressal mechanisms, such as WhatsApp groups, phone, and email are not sufficient to support a pan-India rollout of DBT-F. These modes had served their purpose well when the scale of the project was limited (as shown in Round II). The recently launched 'toll-free number' also lacks features of an ideal GRM.

Retailers register their complaints mostly with Block Agriculture Officers (61%) and District Consultants (37%) (See figure 26).[64] In turn, the Block Agriculture Officers and District Consultants contact the concerned officials in the department through email or a WhatsApp group. Although 79% of the retailers are satisfied with the existing GRM, an informal GRM, such as a WhatsApp group or emails will likely not be effective when the government rolls out the DBT-F at the national level.

Figure 26: GRM Source for Retailers (n=427)



Previously, one District Consultant was deployed in each pilot district to manage the DBT-F programme. Now, the burden on District Consultants has increased as the government has given them more responsibilities to oversee additional districts as it expanded the DBT system in new districts. Due to the increased workload, District Consultants will not be able to manage the programmes in additional districts as effectively as they did when they oversaw just one district. This shortage of manpower would adversely affect the GRM in the new districts.

The government has launched a 'toll-free number – 1800115501' for retailers to register their grievances. However, it has the following limitations:

1. The number allows conversation only in Hindi and English. Retailers, especially from the southern states, would find registering grievances difficult in Hindi and English.
2. It lacks the features of an ideal GRM, which includes a complaint tracking system, defined turnaround-times (TATs), etc.

64. Answers to the question are based on multiple responses. Hence, sum of individual percentages may exceed 100.

6.5. Majority of Farmers and Retailers Prefer DBT-F

- Of the retailers surveyed (n=427), 54% preferred the DBT-F (PoS-based fertiliser distribution system) to the previous manual one, while 44% preferred the manual system. Only 2% of retailers are indifferent to both the systems (see figure 27).
- Of the farmers surveyed (n=5,243), 59% preferred the DBT-F (PoS-based fertiliser distribution system). Only 30% of farmers preferred the manual system of fertiliser distribution. The remaining farmers are either indifferent to both the systems (4%) or do not understand the difference between the two systems (7%) (See figure 28). See figure 29 for reasons farmers prefer DBT-F versus the manual system of fertiliser distribution.

Figure 27: Retailers' Preference for Fertiliser Distribution Systems (n=427)

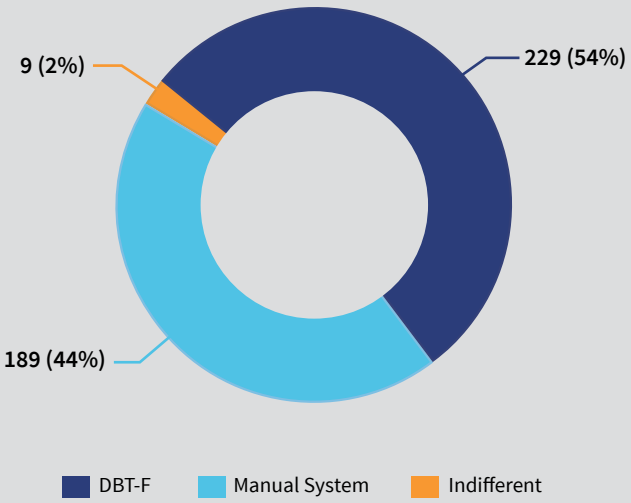


Figure 28: Farmers' Preference for Fertiliser Distribution Systems (n=5,243)

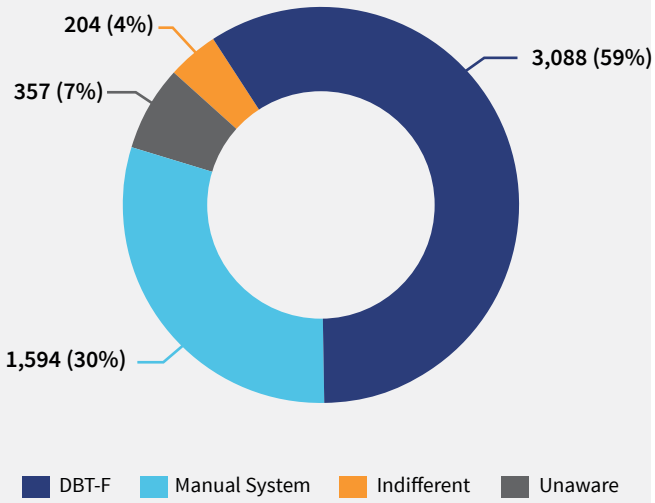


Figure 29: Reasons for Preference for Fertiliser Distribution Systems[65]

	Retailer	Farmer
Reasons of Preference for DBT-F	**n=229** • Improves real-time record-keeping (92%) • Identifies farmers properly (50%) • Reduces diversion of urea (40%) • Eases paperwork and record-keeping (44%)	**n=3,088** • Tracks actual farmers (72%) • Reduces black market and diversion (64%) • Availability of fertiliser has improved (25%) • Overcharging has decreased (21%) • Aware of the quantity and price of fertiliser purchased (17%)
Reasons of Preference for Manual System	**n=189** • Less transaction time (79%) • No documents required (44%) • No connectivity issues (56%)	**n=1,594** • The fingerprint does not work (79%) • Connectivity or server issues (77%) • Increased transaction time (62%) • Increased waiting time (55%) • Do not like to carry *Aadhaar* all the time (32%)

65. Answers to the question are based on multiple responses. Hence, sum of individual percentages may exceed 100.

6.6. Mixed Response from Farmers and Retailers on Cashless Payment

6.6.1 Half of the Retailers Prefer Cashless Sales

- Of the retailers surveyed (n=427), 49% (210) would prefer cashless transactions. These retailers cited benefits, such as reduced cost of handling cash (67%), reduced risk of handling cash (58%), the convenience of carrying out transactions (54%), and easier record-keeping (47%) due to cashless transactions.[66]
- Of retailers, 51% would prefer cash payments for fertiliser sales. These retailers cited farmers' inability to pay in cashless mode (81%), connectivity issues (41%), lack of enabling infrastructure at the outlet (24%), and Merchant Discount Rate (MDR) charges (18%) as the major hindrance for cashless payments.

6.6.2. One-Third of the Farmers Prefer Cashless Payments

- Of the farmers who bought fertiliser (n=5,191), 92% (4,767) paid in cash for their most recent transaction.
- However, 32% (1,685) of the farmers surveyed (5,243) said that in the future, they would prefer to buy fertiliser using a cashless payment. Of these farmers, 75% stated that they would prefer cheque or Demand Draft (DD) as a payment instrument, while 32% would prefer debit cards.[67]
- Of the farmers, 68% (3,558) said that they would not prefer a cashless mode to buy fertiliser. A major reason for this was the ease of use with cash (93%). Other reasons cited for the low preference of cashless modes were low availability and accessibility of enabling infrastructure such as Automated Teller Machines (ATMs), smartphones, etc.
- Of the total retailers surveyed, 58% (248) were aware that KCC or EPIC can also be used to authenticate farmer transaction on PoS devices.

Cashless Payments in Krishna District through BHIM *Aadhaar* Pay*

In March 2017, authorities in Krishna district introduced BHIM-*Aadhaar* Pay in partnership with IDFC bank at all the fertiliser retailers. They wanted to provide an end-to-end solution to the farmers so that farmers could purchase fertiliser through *Aadhaar*-based authentication in PoS devices and also pay for the fertiliser through BHIM-*Aadhaar* Pay again using *Aadhaar* authentication.

The Primary Agriculture Credit Society (PACS) at Thotlavalluru Mandal, had more than 2,500 farmers as members from six villages. The society had conducted transactions of more than INR 70,000 (USD 1,077) in value terms using BHIM *Aadhaar* pay. The society conducted an average of five to six transactions per day. The PACS secretary was expecting the transactions to increase tenfold in the days to come.

We identified the following enablers for this:

1. IDFC imparted training to the fertiliser retailers;
2. District authorities organised awareness camps to make farmers aware about the product;
3. IDFC bank provided branding and awareness collateral to the fertiliser retailers;
4. Agriculture officers were appointed as points of contact for grievances.

66. Answers to the question are based on multiple responses. Hence, sum of individual percentages may exceed 100.
67. Answers to the question are based on multiple responses. Hence, sum of individual percentages may exceed 100.

However, the following barriers hampered their efforts:

1. Multiple authentication attempts were required due to slow Internet connectivity resulting in session time-outs;
2. Authentication failed as farmers often damage their fingerprint impression during farm activities;
3. In the case of multiple *Aadhaar*-seeded accounts, farmers were unaware of which account had been linked for receiving payment.

*It is a United Payment Interface (UPI) -based service to enable money transfer using only a mobile number. It is an instant payments application meant for sending money as well as for requesting payments. BHIM-*Aadhaar* Pay, the merchant interface of the BHIM app, paves the way for digital payments using biometric data – fingerprints or iris scanners – on a trader's device which could even be a smartphone with a biometric reader. – https://www.npci.org.in/product-overview/upi-product-overview

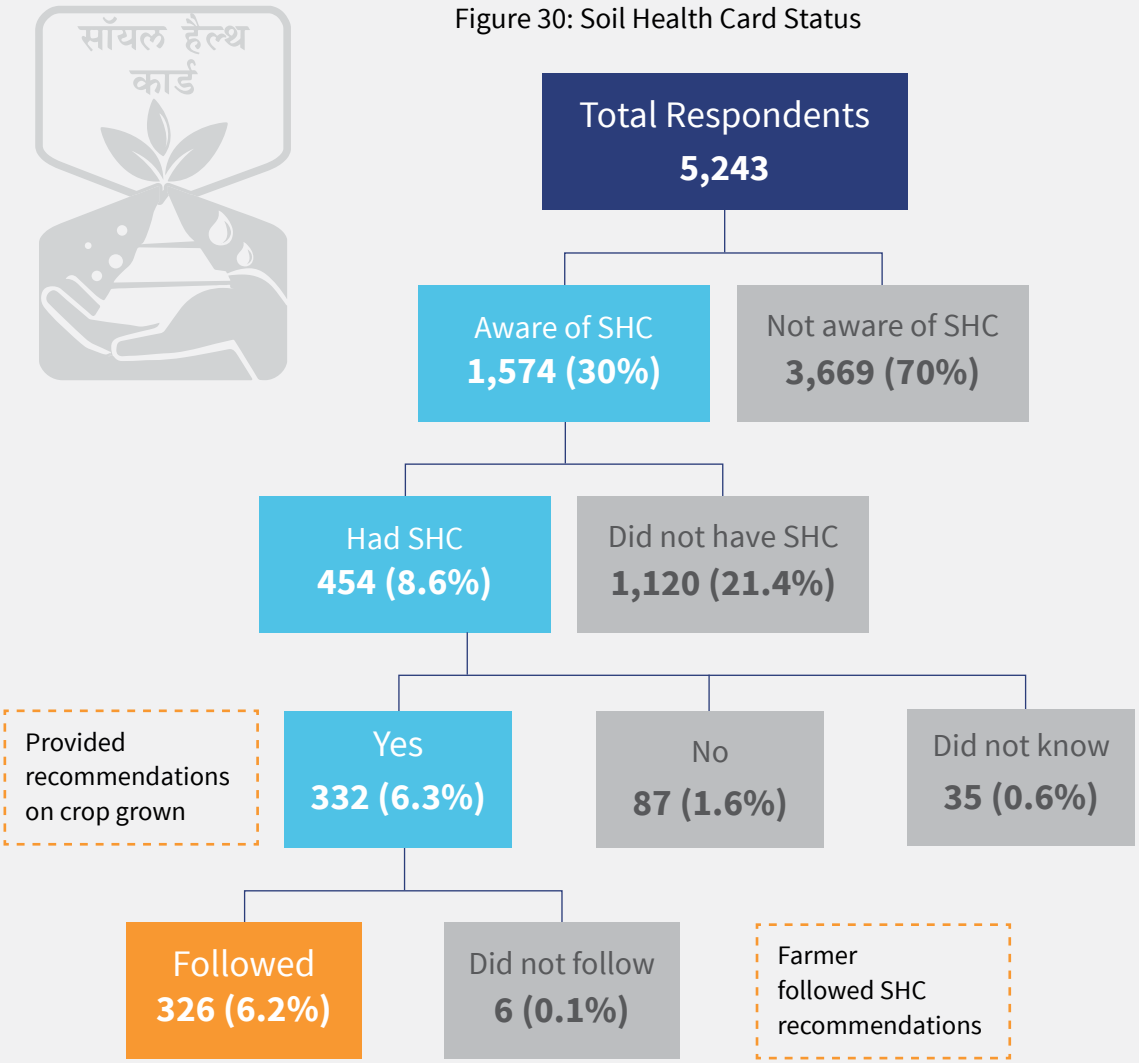
6.7. Soil Health Card (SHC) Status

In November 2016, *MicroSave* conducted a behavioural study on SHC for the Government of Andhra Pradesh to understand the triggers and barriers to the use of SHC and identify the most effective communication channels for farmers.[68] Based on this, we decided to gather basic information about the use of SHC in the 14 pilot districts.

- Awareness of SHC among farmers remains poor. An abysmally low number of farmers either have an SHC or follow the recommendations provided on the SHC.
- Only 30% (1,574) of the farmers surveyed (5,243) were aware of the SHC. The remaining 70% (2,669) of farmers were unaware of the SHC.
- Of the farmers who were aware of the SHC (1,574), only 454 (8.6% of total respondents) had received the SHC. The remaining 1,120 (21.4% of total respondents) had not received the SHC. On probing, many farmers informed us that they had received the SHC, but they were not aware of its purpose and use, as this was not explained when they received it from the government officials. The government should therefore, focus on creating awareness about the role of SHCs.
- Of the farmers who received the SHC (454), only 332 (6.3% of total respondents) said that the SHC provides recommendations on the crop they cultivate.
- However, among the farmers for whom the SHC provided information on the crops they cultivated (332), almost everyone 326 (6.2% of total respondents) followed the recommendations. A few (six farmers) who did not follow the recommendations stated that they did not want to risk their farm crop productivity. They believed more in their experience in using fertiliser over the years.

68. http://www.microsave.net/files/pdf/IFN_140_Is_Soil_Health_Card_the_Magic_Pill_for_Agricultural_Woes.pdf

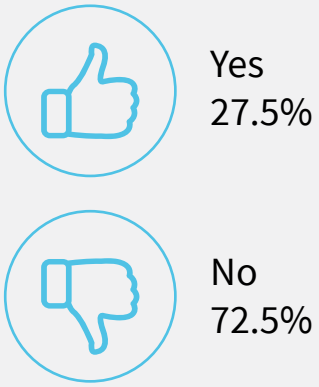
Figure 30: Soil Health Card Status



7. Shifting to Direct Cash Transfer is Distant Possibility

Only 27.5% (1442) of farmers said that they would prefer direct cash transfer in fertiliser subsidy. This means that they would prefer to pay the market price (decontrolled market) to buy fertiliser and receive cash in their bank accounts in lieu of the subsidy. The remaining 72.5% farmers said that they would not prefer direct cash transfer in fertiliser subsidy and would like to buy fertiliser at a subsidised price. The major concern raised by the farmers was the financial burden of arranging large lump sums of money to purchase non-subsidised bags of urea upfront.

Figure 31: Farmers Willing to Receive Direct Cash Transfers



For instance, the MRP of subsidised urea ranges between INR 295 (USD 4.54) and INR 326 (USD 5) per bag whereas the non-subsidised urea costs approximately INR 1,171 (USD 18) per bag. Currently, a small farmer with one hectare of land who cultivates paddy and applies seven bags of subsidised urea needs INR 2,282 (USD 35). However, in a decontrolled environment, the farmer would have to pay INR 8,197 (USD 126) for the same quantity of urea, that is, four times the money the farmer pays at present. Additionally, the amount required to purchase other fertilisers (phosphorous, potassium-based, and NPK complexes) will further increase their financial burden. This may push farmers to borrow more. The situation would be worse for farmers who borrow from informal sources at high interest rates.

8. DBT Impact

8.1. Unattractive retailer commissions and hassles related to PoS and GST may lead to retailer attrition

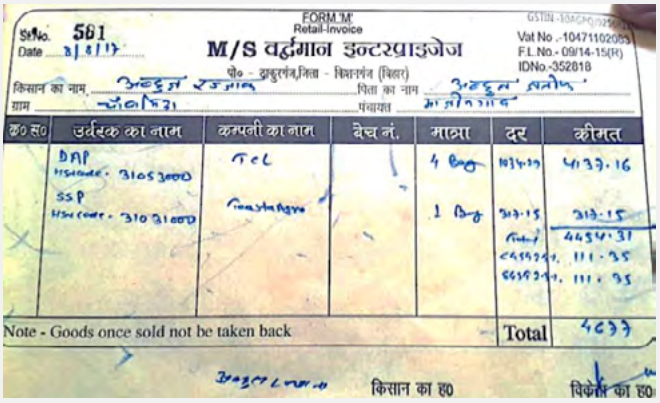
Unattractive retailer margins along with additional hassles related to GST/ PoS may lead to retailer attrition in the future. The government provides a gross margin of INR 9 (USD 0.14) and INR 10 (USD 0.15) per bag of urea to private retailers and cooperatives, respectively. However, depending upon the arrangement with the wholesalers, loading and offloading charges squeeze the margin in the range of INR 0 – INR 9 (USD 0 – USD 0.14). Moreover, the introduction of mFMS and DBT-F has reduced avenues for earning through manipulating the system or overcharging farmers.

> *"We don't want to become bankrupt by selling urea. We get profits from other products such as pesticides"*
> -Retailer, Thrissur

Additionally, the introduction of the PoS has added hassles for the retailers. These include increased transaction time as compared to manual transactions, increased waiting time for farmers, authentication failure, and connectivity issues.

The Goods and Services Tax (GST), which came into effect in July, 2017, has also created hassles for retailers. For instance, PoS devices do not provide transaction receipts with the GST on it. The transaction receipts have only the MRPs of fertiliser. Retailers, for their taxation and bookkeeping purposes, have to calculate the GST on each transaction manually (see figure 32). This costs retailers their time and adds to the recordkeeping burden. Hence, the retailers are feeling disgruntled with the system.

Figure 32: Manual GST Calculation

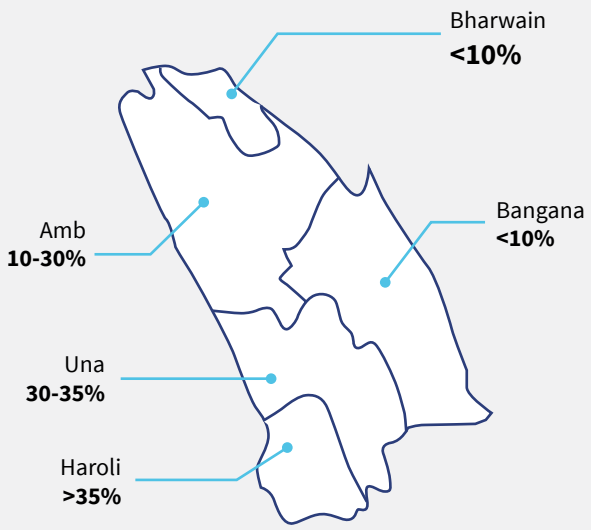


These issues including unattractive retailer margins and additional hassles related to PoS and GST introduction may lead to retailer attrition in the near future. We may see more retailers leaving the system following the national rollout.

Based on the data of total retailer attrition in Una district, the block-wise percent of attrition is presented in the figure 33.

The government has planned to double the retailer or cooperative commission from INR 9 (USD 0.14) / INR 10 (USD 0.15) per urea bag to INR 20 (USD 0.30) per urea bag for both private retailers and cooperatives.

Figure 33: Block-wise Retailer Attrition in Una District



Sale of Loose Fertiliser

Although loose sale of fertiliser is prohibited, retailers continue to sell loose fertiliser in an unauthorised manner at INR 8 (USD 0.12) per kg. However, ideally the price should be INR 6 (USD 0.09) per kg as the maximum retail price (MRP) for a 50 kg bag is INR 295 (USD 4.54). Therefore, through such unauthorised sales, they earn INR 400 (USD 6.15) from one bag of urea instead of the stipulated INR 295 (USD 4.54).

8.2. DBT-F may reduce cross-border sales (across the states and country)

Anecdotal evidence suggests that cross-border sales across states and country have decreased after introduction of DBT-F. Such sales occur, for instance, from Kishanganj to Nepal and Bangladesh, and from Karnal district of Haryana to Uttar Pradesh (see box for case study).

Cross-border Sales from Karnal, Haryana to Saharanpur, Uttar Pradesh

Harpreet Singh Saini is a private retailer in Karnal. He understands the advantages and disadvantages of the DBT-F. According to him, diversion of urea for industrial purposes has decreased due to neem coating. He also believes that initiatives such as DBT-F will enable further improvement in the fertiliser distribution system, especially diversion across the state border to adjoining districts of Saharanpur in Uttar Pradesh.

The difference in MRP of urea between the states is the major reason for such diversion. This difference currently stands at INR 31 (USD 0.48) per bag of urea at the time of writing. The MRP of urea in Haryana is INR 295 (USD 4.54) per bag whereas in Uttar Pradesh it is INR 326 (USD 5.02). According to Saini, the diversion occurs in two ways. First, farmers from Uttar Pradesh come to buy fertiliser and the retailers sell urea at an MRP higher than in Haryana but lower than the MRP in Uttar Pradesh. Second, wholesalers and retailers divert urea to Uttar Pradesh in tandem.

Prior to the introduction of PoS devices, retailers used to divert urea trucks to Uttar Pradesh. However, after the introduction of PoS, the retailers have been cautious while selling fertiliser to farmers from Uttar Pradesh or diverting urea to Uttar Pradesh. The retailers fear that the government can track the transactions. He adds that the farmers from Uttar Pradesh still come to buy fertiliser. In such cases, some of the retailers try not to sell fertiliser. But sometimes farmers from Uttar Pradesh come along with their relatives or friends from Haryana. The retailers cannot deny fertiliser to their relatives or friends if they bring their *Aadhaar*. The retailers also say that they have not received any official communication which prohibits fertiliser sales to farmers from other states. Hence, if the farmers from Uttar Pradesh come to buy fertiliser with their *Aadhaar* cards, or along with their farmer friends from Haryana, the retailers sell the fertiliser.

He suggests that the PoS should provide a pop-up message when someone from other state uses their *Aadhaar*.

8.3. Inactive retailers and retailers with low sales volumes did not opt for the PoS-based system

Some retailers opted out of using the PoS-based system for the following reasons:

1. The low margin in urea sales and increased hassles due to the introduction of PoS forced the retailers to opt out of the PoS-based fertiliser distribution system.
2. Selling fertiliser was only a small part of their business. They mainly sold pesticides and seeds, which provides a greater margin than fertiliser sales. Moreover, they did not want to face hassles related to the PoS introduction. Hence, they did not opt for the PoS-based fertiliser distribution system.
3. Retailers sold fertiliser during a limited time of the year, mainly during peak season. Fertiliser or agriculture input sales were their secondary or tertiary business activity. They did not opt for a PoS-based fertiliser distribution system that would have cost them their time.

Of the retailers, 47 in Raigarh, 80 in Tumkur, 29 in Narmada, and 10 in Kishanganj opted out of using the PoS-based fertiliser distribution system for the reasons above. Additionally, after the introduction of PoS devices, the government has identified and cancelled 45 mFMS IDs in Pali district. These retailers had more than one mFMS ID registered.

After mFMS, the existence of a dummy wholesaler came to light in the neighboring block. Imagine, a wholesaler was purchasing large quantities of fertiliser, but a shop did not even exist in the given address". "

-Retailer, Kishanganj

9. Other Operation and PoS issues also hamper the Implementation

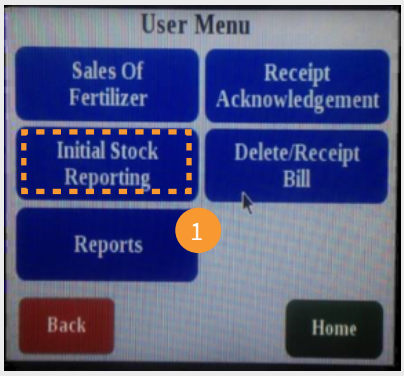
9.1. Doubling of Stock in PoS

Stock duplication occurs for two reasons. One, while updating a new fertiliser product, a retailer may update the same stock twice in the PoS device – once as initial stock and again as new stock. Second, retailers may receive the same stock twice in two different acknowledgement menu options and update the stock twice. Details behind stock duplication are explained in more detail below:

As it concerns the first reason, retailers need to update the initial stock before the 'Go Live' date in the 'Initial Stock Reporting' option in the User Menu. Retailers should update the same quantity of fertiliser available as physical stock in the PoS devices. Retailers should update the initial stock as zero for all the fertiliser not available in the retail outlets at the time of 'Go Live'.

This is a three-step process – (i) Click on the 'Initial Stock Reporting' option in the User Menu, (ii) again click on the 'Initial Stock Reporting' on the next page, and (iii) enter the initial stock as available in the outlet and click on 'Submit' (see figure 34). Initial stock reporting is a one-time activity to be completed at the time of 'Go Live'. Once saved, one cannot make any changes to this menu option.

Step 1: Click on 'Initial Stock Reporting' in User Menu



Step 2: Click on 'Initial Stock Reporting'

Step 3: Enter the fertiliser quantity and click 'Submit'

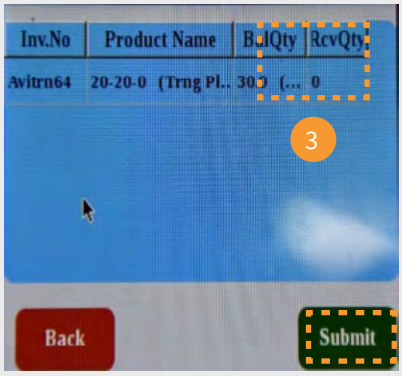


Figure 34: Initial Stock Reporting Process

In certain cases, where retailers did not update the initial stock as zero at the time of 'Go Live' and want to update stock of new fertiliser through the 'Add Stock for More Products' option after the 'Go Live' date, the PoS shows an error – 'opening balance not declared'. In these cases, the retailers should first add the stock and update it as zero through the 'Add Stock for More Products' option (see the second image in figure 34).

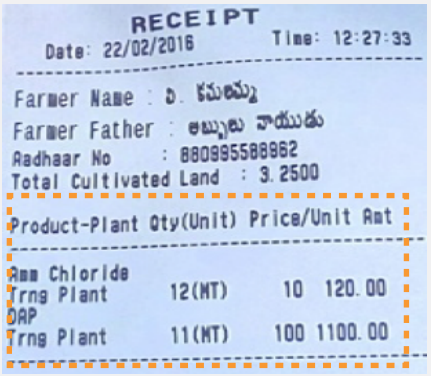
However, due to low awareness about the RO module, the retailers update this as the physical stock received instead of zero. They also acknowledge the receipt of the same quantity of fertiliser through the 'Acknowledgement of RO Modules Receipts' option in 'Receipt Acknowledgement' in the 'User Menu' (see figure 17). Thus, the stock is duplicated in the PoS.

Second, sometimes retailers receive the same stock twice, once through the RO module and again through the module prior to the RO module. During the initial phase of the RO module, the government had been using both modules simultaneously. Retailers acknowledge the receipt of fertiliser through dispatch ID in the RO module – and also add the same quantity of fertiliser in the PoS devices through the module utilised prior to the introduction of the RO module. Hence, the stock is duplicated.

9.2. Unreadable Transaction Receipt

- The PoS devices print the transaction receipts in English, and in many cases, farmers do not understand its content, while some of the farmers can only decipher the numeric, that is, price and quantity mentioned.
- The font size of the text on the receipts is small and not easily readable.
- Text that should fit on one line across the width of the receipt does not fit properly. It continues to the second line, which makes it difficult to comprehend (see figure 35).

Figure 35: Transaction Receipt – Sample



9.3. Difference between PoS and Server Time

PoS time does not sync automatically with the server time. Time has to be set on the PoS through 'Admin Menu'. The mFMS server remains unavailable every day between 1:30 A.M. and 3:00 A.M. due to server maintenance activity. If the PoS time is 10 hours ahead of the server time then it will not work between 11:30 A.M. and 1:00 P.M. (PoS time) because this corresponds to the server maintenance time. Some such cases were reported from the field.

9.4. Limited Reports Printed through PoS

- The PoS devices generate stock reports only for the previous month. Moreover, the ink on the transaction receipts fades within a month or so. Therefore, the retailers cannot use these receipts for bookkeeping.
- The PoS devices print the last 10 transactions only while printing duplicate bills for one invoice (farmer transaction). This functionality does not serve any purpose if the duplicate bills have more than 10 transactions. However, the chances of having more than 10 transactions in a single invoice are rare.

9.5. Retailers with the Same Name

In the RO module, wholesalers select only the 'fertiliser retailer name' to dispatch fertiliser. The module does not allow wholesalers to select or to check the retailer ID (see figure 36). In some cases where there is more than one retailer with the same name, wholesalers often select and dispatch fertiliser to the other (unintended) retailer with the same name through mFMS. The retailer receives the stock in the PoS but does not receive the physical stock against it.

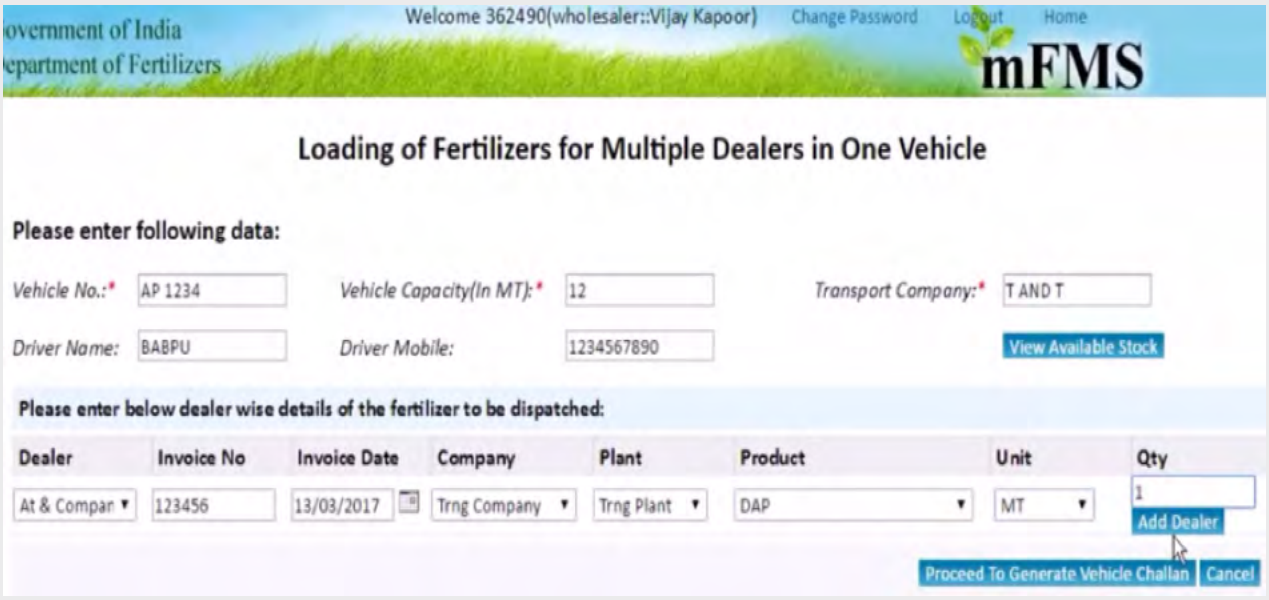


Figure 36: RO Module Interface for Wholesalers to Dispatch Fertiliser to Retailers

Since the updates in the RO module are delayed and the dispatcher may not send the printed copy of challan (with dispatch ID) timely, the retailer does not wait for the dispatch ID to update the stock in the PoS. The retailer begins selling the fertiliser manually without *Aadhaar* authentication. This leads to an increased number of adjusted transactions.

9.6. Authentication Failure

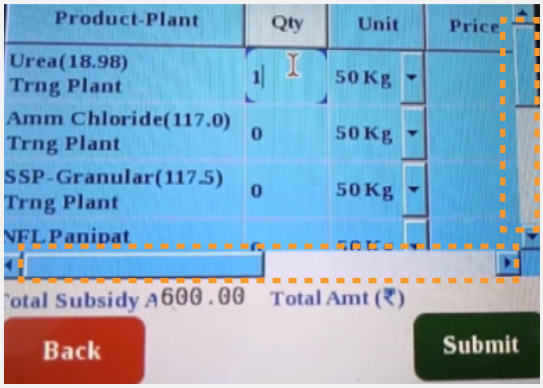
Authentication failure and authentication in more than one attempt increases the transaction time. To avoid the hassles associated with increased transaction time, retailers adjust transactions. Additionally, the government has not implemented an exception management practice in place for instances when an authentication failure occurs. Sometimes, this leads to denial of sales to farmers. However, the government has introduced the DBT-F with a 'no denial policy'.

9.7. Hardware Issues

Retailers face the following issues with the PoS hardware:

- The size of the screen on the PoS device is too small. Retailers have to scroll left, right, up, and down to enter the sales data while selling fertiliser through the PoS devices (see figure 37). This increases the chance of retailers entering an incorrect quantity or price against the fertiliser selected. Of the retailers surveyed, 15% complained of this issue.

Figure 37: PoS Interface for Fertiliser



- Of the retailers surveyed, 8% complained of shortening battery life. 53% of these retailers are from the additional eight districts that went live after December 2016. Hence, in a period of eight to nine months (at the time of survey) this issue has arisen.
- Maintenance and repair services are not easily available at the district level. The vendors do not have representatives in every district.
- In Kishanganj, the district administration had replaced 50 PoS devices (at the time of research). This was hampering daily operations of retailers. Retailers were compelled to adjust transactions when the PoS device did not work. Issues related to PoS device would increase as the PoS life increases.

10. Recommendations

10.1. Policy Recommendations

10.1.1. Increase retailer commission

Retailers earn a net commission in the range of INR 0 – INR 9 (USD 0 – USD 0.14) per bag of urea. This low and unattractive margin coupled with the additional hassles associated with the introduction of the PoS and GST may lead to retailer attrition. Some evidence of this attrition is already available in the pilot districts. The government should increase the retailer commission, especially in urea, as it constitutes a significant portion of their fertiliser sales. This would serve as an incentive for retailers to continue their operations. The government has already planned to double the retailer or cooperative commission from INR 9 (USD 0.14) / INR 10 (USD 0.15) per urea bag to INR 20 (USD 0.30) per urea bag for both private retailers and cooperatives. However, the impact of the increased commission on dealer's attrition would be visible only after the implementation.

10.1.2. Plan to issue fertiliser licenses to new retailers

Many inactive and low volume retailers did not opt for PoS-based fertiliser distribution system for various reasons, as explained above. More retailers may leave the system when the government rolls out the programme at the national level. This will create white spaces in the market that can have an adverse impact on the fertiliser supply in these areas. The government should proactively consider issuing licenses to new retailers to ensure the availability of fertiliser retailers and fertiliser supply.

10.1.3. Include features of an ideal GRM

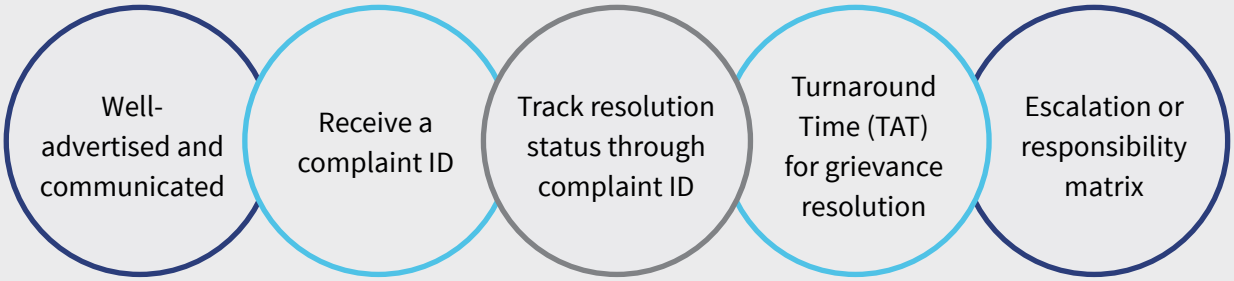
The government has launched a 'toll-free number – 1800115501' for retailers to register their grievances. However, it has following limitations:

1. The number allows conversation only Hindi and English. It should also allow conversation in regional languages;
2. It lacks the features of an ideal GRM.

The toll-free number should allow conversation in regional languages as well. Retailers from non-Hindi speaking states can easily register their grievances in their respective regional language. The government should also include following features in the GRM:

1. The toll-free number should be well-advertised and communicated to the retailers.
2. The retailer should receive a complaint ID once the grievance is registered.
3. The retailer should be able to track the resolution status through the complaint ID.
4. The government should decide the Turnaround-time (TAT) for grievance resolution.
5. The mechanism should also provide for an escalation or responsibility matrix, which automatically escalates the grievance to the next level in the matrix if it is not resolved within the pre-defined turnaround-time at a particular level.

Figure 38: Features of an Ideal GRM



In addition to the toll-free number, the government can also enable PoS (mFMS application) to register, track, and resolve grievances. This GRM can have the following broad steps:

1. Retailers record their grievances through PoS/mFMS website;
2. The mechanism routes the complaint to the concerned stakeholder;
3. The mechanism generates a complaint ID and the retailers receive the ID;
4. The concerned stakeholder addresses and resolves the issue;
5. The retailer receives resolution communication either through SMS or a message in the PoS, or both.

This mechanism should also have the features of an ideal GRM as discussed above.

10.1.4. The mFMS (PoS) application should be device-agnostic

The retailers are facing issues such as small screen size of the PoS, shortened battery life, and lack of available maintenance and repair services. Moreover, PoS-related maintenance issues are likely to increase as the PoS machines age and becomes less effective. To overcome these challenges, the government should develop mFMS as a device-agnostic application. The government should develop both mobile-based and web-based applications. This would allow the retailers to use various devices at the front-end, such laptops, desktops, tablets, and smartphones. Many retailers and wholesalers, who currently use laptops and desktops to maintain the fertiliser manufacturer's Enterprise Resource Planning (ERP) requirements, can also use these for fertiliser sales.

10.2. Operational Recommendations

10.2.1. Appoint Block Agriculture Officers as a focal point for retailers

District Consultants have played a major role in the smooth implementation of DBT-F in the pilot districts. They have been responsible for retailer training and addressing grievances. They also supported retailers in their daily PoS-related issues. For many retailers, District Consultants have been the first point of contact for any kind of support. Currently, in the national rollout phase, the government has appointed a contact person only at the state level as State Coordinator. The State Coordinators will not be able to manage the programme as effectively as the District Consultants.

Hence, the government should appoint Block Agriculture Officers as the main contact point for retailers. Moreover, 61% of the retailers have already contacted a Block Agriculture Officer for grievance resolution. The government should also use the extension services of the District Agriculture Office.

10.2.2. Enable linkage of mFMS (PoS) application with ERPs/ Tally

Many retailers maintain two systems – one, PoS to record sale transactions and second, ERP for manufacturers. Moreover, retailers cannot use the receipts generated through PoS for bookkeeping purposes as the ink on the receipts fades quickly. To address these challenges, the government should allow linkage of mFMS with manufacturer ERPs or tally. The linkage would enable retailers to download sales record directly into the ERPs for manufacturers and into tally for bookkeeping and taxation.

10.2.3. Enable automatic GST calculation in mFMS (PoS) application

PoS devices do not provide transaction receipts with GST. The transaction receipts only have the MRP of each fertiliser. Retailers, for their taxation and bookkeeping purposes, have to calculate the GST on every transaction manually. This costs retailers their time and adds to the recordkeeping burden. The government should enable GST calculation in the PoS application. Thus, retailers would be able to generate transaction receipts and sale reports with the GST calculation thereby eliminating the need for retailers to calculate GST manually.

10.2.4. Provide better IT infrastructure at rake points and warehouses

Due to delays in updating stock by fertiliser companies/dispatchers in their systems, there is a delay in the update of retailers' PoS systems. However, pressure from the farmers and fear of losing business compel retailers to sell the stock manually without *Aadhaar* authentication. Later, retailers adjust these transactions. Following are some options to address the issue of delayed inputs to the RO module:

1. The government should enable IT infrastructure at rake points and warehouses. The government should provide PoS devices at these points and other front-end devices if the government develops a device-agnostic mFMS application;
2. Dispatch ID as notification should also appear on the PoS device.

10.2.5. Enable selection of retailer's name as well as ID while dispatching fertiliser

In the RO module, wholesalers select only the fertiliser retailer name when dispatching fertiliser. The module does not allow wholesalers to select or check the retailer ID. In cases where more than one retailer exists with the same name, sometimes the wholesalers select and dispatch fertiliser to an unintended retailer with the same name. To address the issue, the government should also enable selection of retailer ID in the mFMS application, as retailer ID is unique to a specific retailer.

10.2.6. Menu option to synchronise server time with PoS time

The PoS devices do not work when the PoS time and the server time are different and at times when the PoS time corresponds to the time of server maintenance. To address this, the government should provide an option to synchronise PoS devices with the server time automatically as soon as the PoS turns on.

10.2.7. Enable printing of old reports

The PoS devices generate stock reports for a limited period and print a limited number of transactions in duplicate. The government should enable printing of reports for at least the previous year. Enabling the mFMS application as device-agnostic and linking the application with ERPs/ tally can help. However, retailers must be made aware that they can print reports from the mFMS website.

10.2.8. Enable generation of transaction receipts in regional languages

PoS devices generate receipts in English that farmers do not understand. Text on the transaction receipts is not easily readable. The government should enable generation of transaction receipts in regional languages. It should be noted that using the existing thermal printer attached to the PoS would not resolve the issue of text readability or fading ink. Enabling the mFMS application as device-agnostic would help. Retailers can generate transaction receipts through printers attached to their laptops or desktops. Additionally, the ink used in these printers does not fade.

10.2.9. Use of 'Iris Scanner'

To address the issue of authentication failure and high transaction time especially when authentication occurs in more than one attempt, the government should provide iris scanners at the retailer's outlet. This would also serve the purpose of exception management.

10.2.10. Use of training videos and MS PowerPoint presentations

The retailers who referred to the online training material found it to be comprehensive. During the rollout phase, the government should focus on disseminating these training videos and MS PowerPoint presentations to the retailers. These would serve as ready reference material for retailers.

Annexures

Annexure I: District Profiles

1. Hoshangabad

General Information	
Farmer sample (quantitative)	✓ 406
Retailer sample (quantitative)	✓ 31 • Private – 20 (65%) • Cooperative – 11 (35%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 10 (32%) 2. Same day or more – 21 (68%)
Updating stock after acknowledgement (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 13 (42%) 2. Same day or more – 18 (48%)
Updating stock after each transaction (n=31)	1. Yes – 28 (90%) 2. No – 3 (10%)
Insights ✓ Most of the retailers received handmade challan and not a printed challan generated through RO module. ✓ Retailers informed that updating RO module at rake points and warehouses is difficult. The rake points and warehouses do not have enabling infrastructure, such as PoS devices, Laptops, desktops, etc. ✓ Retailers also informed that they did not receive SMS when the dispatchers update the stock on RO module.	
Training	
Training received (n=31)	1. Yes – 30 (97%) 2. No – 1 (3%)
Training sufficiency (n=30)	1. Yes – 28 (93%) 2. No – 2 (7%)
Insights ✓ District agriculture department and LFS Company organised training at the block level. ✓ Retailers informed that the training was helpful and they do not face difficulty in operating PoS devices.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=31)	1. Yes – 12 (39%) 2. No – 19 (61%)
Insights ✓ Retailers who said that managing transactions during peak season were difficult also switched to adjusted transactions. These retailers did not want to lose the business as the farmers would have left and purchased fertiliser from another shop if they had asked farmers to wait. ✓ Retailers faced authentication issues due to reasons such as fingerprint mismatch, connectivity issues, and server issues. ✓ Retailers reported the issue of text size on the transaction receipts. They faced difficulty in differentiating between '6 and 8' and '9 and 8' on transaction receipts. ✓ Retailers' workload has increased after the introduction of GST. They manually calculate GST for each transaction for taxation purpose.	

GRM	
Retailers satisfies with the GRM (n=31)	1. Yes – 29 (94%) 2. No – 2 (6%)
Insights ✓ Major points of contact to register grievances are district consultant and block agriculture officer. ✓ Retailers with lower turnover complained that their grievances were not addressed as effectively as done for retailers with higher turnover. ✓ Retailers faced issues related to server and receipt acknowledgement.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=397)	1. Yes – 371 (93%) 2. No – 26 (7%)
Insights ✓ District agriculture department and LFS company representatives printed posters and asked retailers to paste it outside their outlets. The posters contained information about fertiliser distribution through *Aadhaar* authentication and requirement of *Aadhaar* to buy fertiliser. ✓ Majority farmers knew that the government provides subsidised fertiliser. ✓ Few farmers believed that the government would initiate cash transfers in fertiliser.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=406)	*1.* *Aadhaar* authenticated – 330 (81.3%) a. Authentication successful – 323 (79.6%) b. Authentication failed – 7 (1.7%) i. Manual transaction – 6 (1.5%) ii. Fertiliser denied – 1 (0.2%) 2. Manual Transaction (latest transaction) – 53 (13.1%) 3. Manual Transaction (never through *Aadhaar*) – 9 (2.2%) 4. Enrolment ID + EPIC/ KCC – 12 (3.2%) 5. Fertiliser Denied – 1 (0.2%)
Average number of attempts to authenticate – (n=323)	1. One – 202 (63%) 2. Two – 87 (27%) 3. Three – 34 (11%) 4. Four or more – 0 (0%)
Average transaction time using PoS	Four minutes
Insights ✓ Farmers do not carry their *Aadhaar* every time especially when they work in farms. Therefore, when the farmers visit fertiliser retailer outlet directly from the farms, they do not take *Aadhaar* with them. They ask other farmers to authenticate on their behalf to buy fertiliser.	

2. Karnal

General Information	
Farmer sample (quantitative)	✓ 397
Retailer sample (quantitative)	✓ 30 • Private – 25 (83%) • Cooperative – 5 (17%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 15 (50%) 2. Same day or more – 15 (50%)
Updating stock after acknowledgement (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 18 (60%) 2. Same day or more – 12 (40%)
Updating stock after each transaction (n=30)	1. Yes – 26 (87%) 2. No – 4 (13%)
Insights ✓ Most of the retailers received handmade challan and not a printed challan generated through RO module. Additionally, the dispatchers did not mention dispatch ID on the challan. This delays stock receipt acknowledgement in RO module by retailers. ✓ A few retailers also complained of delays in the update of stock after receipt acknowledgement in the RO module. In these situations, the retailers sell fertiliser manually and adjust transactions later, when PoS devices show the updated stock.	
Training	
Training received (n=30)	1. Yes – 27 (90%) 2. No – 3 (10%)
Training sufficiency (n=27)	1. Yes – 26 (96%) 2. No – 1 (4%)
Insights ✓ District agriculture department and LFS Company organised training sessions at the block- and at the district-levels. ✓ A majority of retailers were satisfied with the training and were able to operate the PoS devices. ✓ Retailers conveniently logged in on a single attempt into the PoS device.	
Transaction Status and Experience	
Average number of attempts to log in	✓ One
Problem faced during peak season transaction (n=30)	1. Yes – 7 (23%) 2. No – 23 (77%)
Insights ✓ Retailers conveniently logged into the PoS device in first authentication attempt. ✓ Retailers complained of the small screen size of PoS devices, as they had to scroll up, down, left, and right to enter the sales data. ✓ A few retailers complained of difficulty to manage sales during peak agriculture season. Other retailers managed the sales by selling fertiliser manually and adjusting transactions later. ✓ Farmers from Uttar Pradesh come to Haryana to buy fertiliser, as the MRP of urea in Haryana is lower than the MRP in Uttar Pradesh. Before the introduction of PoS, the retailers and wholesalers used to divert urea trucks to Uttar Pradesh. However, after the introduction of PoS, this has reduced.	

GRM	
Retailers satisfies with the GRM (n=30)	1. Yes – 25 (83%) 2. No – 5 (17%)
Insights ✓ Retailers faced issues related to the server, receipt acknowledgement, and authentication failure. ✓ Retailers contact the block agriculture officer, district consultant, and District Agriculture Officer the most for grievance resolution. ✓ Retailers suggested that the government should provide a formal GRM, such as a toll-free number.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=388)	1. Yes – 359 (93%) 2. No – 29 (7%)
Insights ✓ After the training, retailers started informing farmers in their vicinity about *Aadhaar* requirement to buy fertiliser. ✓ The government launched the DBT-F in the district in December 2017. The cooperatives informed the farmers who came to sell their last year's Kharif produce at the cooperatives about *Aadhaar* requirement to buy fertiliser. ✓ Farmers suggested that the government should communicate about important programmes through more reliable sources, such as government officials and mass media.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=397)	1. *Aadhaar* authenticated – 330 (83.1%) a. Authentication successful – 317 (79.8%) b. Authentication failed – 13 (3.2%) i. Manual transaction – 12 (3%) ii. Fertiliser denied – 1 (0.2%) 2. Manual Transaction (latest transaction) – 34 (8.6%) 3. Manual Transaction (never through *Aadhaar*) – 9 (2.3%) 4. Enrolment ID + EPIC/ KCC – 12 (3%) 5. Fertiliser Denied – 12 (3%)
Average number of attempts to authenticate – (n=317)	1. One – 239 (75%) 2. Two – 66 (21%) 3. Three – 10 (3%) 4. Four or more – 2 (1%)
Average transaction time using PoS	Four minutes
Insights ✓ Some farmers complained that private retailers forced them to buy pesticides along with urea. The retailers refused to sell urea if the farmers do not buy pesticides along with urea. Farmers said that the retailers earn higher margins in pesticides than that in urea. ✓ The average transaction time through PoS devices of four minutes is lower than the overall average transaction time of five minutes.	

3. Kishanganj

General Information	
Farmer sample (quantitative)	✓ 411
Retailer sample (quantitative)	✓ 32 • Private – 29 (91%) • Cooperative – 3 (9%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=32)	1. Immediately after receiving the physical stock and dispatch ID – 9 (28%) 2. Same day or more – 23 (72%)
Updating stock after acknowledgement (n=32)	1. Immediately after receiving the physical stock and dispatch ID – 19 (59%) 2. Same day or more – 13 (41%)
Updating stock after each transaction (n=32)	1. Yes – 26 (81%) 2. No – 6 (19%)
Insights ✓ Majority of retailers face acknowledgement and stock updating issues. Retailers not wanting to lose their customer sell fertiliser manually and adjust these transactions later. ✓ Retailers do not comply with the FCO of not selling fertiliser in loose. They also charge INR 8 (USD 0.12) per kg of urea when ideally the price should be INR 6 (USD 0.09) per kg as Maximum Retail Price (MRP) of a 50 kg bag is INR 295 (USD 4.54).	
Training	
Training received (n=32)	1. Yes – 32 (100%) 2. No – 0 (0%)
Training sufficiency (n=32)	1. Yes – 26 (81%) 2. No – 6 (19%)
Insights ✓ All the retailers surveyed had received the training. A majority of them do not face issues in operating PoS devices. ✓ Retailers who have outlets nearby help each other if they faced any issue. Only the retailers who are old and do not have any other retailer near to them face issues in operating PoS.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=32)	1. Yes – 18 (56%) 2. No – 14 (44%)
Insights ✓ Approximately, only half of the retailer surveyed complained of difficulty in managing sales during peak season. A higher percent of adjusted transactions (56%) also indicates that the retailers adjust transactions during peak season. Hence, they do not face difficulty in managing sales during peak season. ✓ Retailers raised the issue of poor connectivity in the district. Of the retailers, 51% assessed connectivity from average to very poor. Only 3% retailers said that the connectivity was very good, that is, they faced connectivity issues rarely.	

GRM	
Retailers satisfies with the GRM (n=32)	1. Yes – 20 (63%) 2. No – 12 (37%)
Insights (Issues) ✓ Initially, retailers seek each other's help to resolve issues. Then they approach either the district consultant or the block agriculture officer for grievance resolution. ✓ The district administration had replaced 50 PoS devices (until the time of research) due to hardware issues. This hampered the implementation of DBT-F in the district. ✓ Retailers primarily faced issues related to server and network connectivity	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=409)	1. Yes – 307 (75%) 2. No – 102 (25%)
Insights ✓ Farmers were aware that *Aadhaar* is required to buy fertiliser. However, 73% farmers received this information for the first time when they had visited the retail outlet to buy fertiliser.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=411)	1. *Aadhaar* authenticated – 199 (48.4%) a. Authentication successful – 193 (47%) b. Authentication failed – 6 (1.4%) i. Manual transaction – 5 (1.2%) ii. Fertiliser denied – 1 (0.2%) 2. Manual Transaction (latest transaction) – 210 (51.1%) 3. Manual Transaction (never through *Aadhaar*) – 2 (0.5%) 4. Enrolment ID + EPIC/ KCC – 0 (0%) 5. Fertiliser Denied – 0 (0%)
Average number of attempts to authenticate – (n=193)	1. One – 25 (13%) 2. Two – 78 (40%) 3. Three – 54 (28%) 4. Four or more – 36 (19%)
Average transaction time using PoS	Eight minutes
Insights ✓ Contrary to the overall average, the district has only 13% first attempt authentication for farmers. ✓ A high percent of manual transactions corresponds to the fact that farmers did not face issues while buying fertiliser, as the retailers did not ask for *Aadhaar* (36%) to authenticate farmers. ✓ Poor network connectivity in the district also corresponds to the fact that average transaction time using PoS device as eight minutes. ✓ Farmers pay an average INR 398 (USD 6.12) for one bag of urea. The price is higher than the urea MRP. This is due to a shortage of supply created by diversion of urea to neighbouring countries, that is, Nepal and Bangladesh. ✓ Majority of the farmers in Kishanganj did not receive a transaction receipt. Retailers overcharge farmers and do not provide transaction receipts, as the farmers would know that they have been overcharged.	

4. Krishna

General Information	
Farmer sample (quantitative)	✓ 391
Retailer sample (quantitative)	✓ 30 • Private – 16 (53%) • Cooperative – 14 (47%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 16 (53%) 2. Same day or more – 14 (47%)
Updating stock after acknowledgement (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 23 (77%) 2. Same day or more – 7 (23%)
Updating stock after each transaction (n=30)	1. Yes – 29 (97%) 2. No – 1 (3%)
Insights ✓ Retailers sell fertiliser manually without uploading the stock in PoS devices through RO module. The retailers adjust these transactions later. ✓ A few retailers also reported that the district administration had not corrected the wrong initial stock updated at the time of 'Go Live'.	
Training	
Training received (n=30)	1. Yes – 29 (97%) 2. No – 1 (3%)
Training sufficiency (n=29)	1. Yes – 28 (97%) 2. No – 1 (3%)
Insights ✓ On average retailers have received 3-4 training. However, they complained that the government did not provide any training on RO module. ✓ The district administration also provided a training manual on PoS functionalities and error list. ✓ Visiontek (PoS device manufacturer and supplier) also provided manuals to the retailers. The manuals describe the PoS and its components.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=30)	1. Yes – 2 (7%) 2. No – 28 (93%)
Insights ✓ Retailers did not face authentication issues hence, 97% sales are *Aadhaar* authenticated. Good network connectivity (100% said very good and good connectivity) also corresponds to the fact that retailers do not face much connectivity issues.	

GRM	
Retailers satisfied with the GRM (n=30)	1. Yes – 30 (100%) 2. No – 0 (0%)
Insights ✓ Retailers reported shortening battery life as a major issue. ✓ Retailers faced issues related to server and receipt acknowledgement.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=391)	1. Yes – 377 (96%) 2. No – 14 (4%)
Insights ✓ District authorities advertised about the DBT-F through local newspaper to create awareness about the system among farmers. ✓ Fertiliser manufacturers also provided collateral to their retailers. The retailer displayed these outside their outlets. ✓ Farmers believed that the government would initiate cash transfers in fertiliser subsidy	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=391)	1. *Aadhaar* authenticated – 383 (98%) a. Authentication successful – 381 (97.5%) b. Authentication failed – 2 (0.5%) i. Manual transaction – 2 (0.5%) ii. Fertiliser denied – 0 (0%) 2. Manual Transaction (latest transaction) – 2 (0.5%) 3. Manual Transaction (never through *Aadhaar*) – 0 (0%) 4. Enrolment ID + EPIC/ KCC – 1 (0.2%) 5. Fertiliser Denied – 5 (1.3%)
Average number of attempts to authenticate – (n=381)	1. One – 129 (34%) 2. Two – 233 (61%) 3. Three – 16 (4%) 4. Four or more – 3 (1%)
Average transaction time using PoS	Eight minutes
Insights ✓ Farmers reported that the price of urea has stabilised in the last one year. Retailers did not overcharge the farmers. ✓ Successful *Aadhaar* authentication in first three attempts is at 99%. Farmers do not face issues in *Aadhaar* authentication. Farmers also said that the authentication system has improved in the past one year. ✓ Average transaction time of eight minutes is higher than the overall average transaction time of five minutes. It can be due to the introduction of BHIM *Aadhaar* pay. Farmers authenticate their *Aadhaar* twice, one to confirm the quantity of fertiliser bought and second to pay for the fertiliser.	

5. Kurukshetra

General Information	
Farmer sample (quantitative)	✓ 407
Retailer sample (quantitative)	✓ 30 • Private – 26 (87%) • Cooperative – 4 (13%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 9 (30)% 2. Same day or more – 21 (70%)
Updating stock after acknowledgement (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 13 (43%) 2. Same day or more – 17 (53%)
Updating stock after each transaction (n=30)	1. Yes – 23 (77%) 2. No – 7 (23%)
Insights ✓ Majority of retailers delayed receipt acknowledgement due to delayed receipt of dispatch ID. Additionally, the updated stock did not reflect correctly in the PoS after acknowledgement of dispatch ID. In such situations, retailers sold fertiliser manually and adjusted transactions later.	
Training	
Training received (n=30)	1. Yes – 26 (87%) 2. No – 4 (13%)
Training sufficiency (n=26)	1. Yes – 24 (92%) 2. No – 2 (8%)
Insights ✓ District agriculture department and LFS Company organised training at block and district level. ✓ Majority retailers were satisfied with the training and were able to operate the PoS devices.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=30)	1. Yes – 13 (43%) 2. No – 17 (57%)
Insights ✓ Retailers complained of difficulty in managing sales during peak agriculture season. Other retailers managed the sales by selling fertiliser manually and adjusting transactions later. However, the retailers who complained of difficulty in managing sales also switched to adjusted transaction occasionally.	
GRM	
Retailers satisfies with the GRM (n=30)	1. Yes – 24 (80%) 2. No – 6 (20%)
Insights ✓ Unlike other districts where the retailers relied on both the block agriculture officer and district consultant equally for GRM, retailers in Kurukshetra mostly relied on the block agriculture officer.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=399)	1. Yes – 379 (95%) 2. No – 20 (5%)
Insights ✓ Farmers suggested that the government should communicate about important programmes through more reliable sources, such as government officials and mass media.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=407)	*1.* *Aadhaar* authenticated – 358 (88%) a. Authentication successful – 348 (85.5%) b. Authentication failed – 10 (2.5%) i. Manual transaction – 10 (2.5%) ii. Fertiliser denied – 0 (0%) 2. Manual Transaction (latest transaction) – 35 (8.5%) 3. Manual Transaction (never through *Aadhaar*) – 8 (2%) 4. Enrolment ID + EPIC/ KCC – 4 (1%) 5. Fertiliser Denied – 2 (0.5%)
Average number of attempts to authenticate – (n=348)	1. One – 282 (81%) 2. Two – 61 (18%) 3. Three – 5 (1%) 4. Four or more – 0 (0%)
Average transaction time using PoS	Three minutes
Insights ✓ The average time through PoS device is three minutes. This is lower than the overall average transaction time of five minutes. A high percentage of first-attempt authentication (81%) corresponds to the fact that average transaction time is lower in the district as compared to the overall average transaction time of five minutes.	

6. Narmada

General Information	
Farmer sample (quantitative)	✓ 429
Retailer sample (quantitative)	✓ 30 • Private – 15 (50%) • Cooperative – 15 (50%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 12 (40%) 2. Same day or more – 18 (60%)
Updating stock after acknowledgement (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 10 (33%) 2. Same day or more – 20 (67%)
Updating stock after each transaction (n=30)	1. Yes – 28 (93%) 2. No – 2 (7%)
Insights ✓ Delay in receipt acknowledgement happens due to delay in updating of RO module by dispatchers, non-sending of dispatch ID along with the physical stock, and lack of training.	
Training	
Training received (n=30)	1. Yes – 29 (97%) 2. No – 1 (3%)
Training sufficiency (n=29)	1. Yes – 28 (97%) 2. No – 1 (3%)
Insights ✓ Retailers received the information about DBT-F through their fertiliser manufacturer representatives or District Consultants. ✓ On an average, retailers have participated in two training sessions. LFS in the district, that is, Gujarat Narmada Valley Fertilizers Company (GNFC) organised the training along with the district administration and the District Consultant.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=30)	1. Yes – 22 (73%) 2. No – 8 (27%)
Insights ✓ Majority retailers faced issue to manage sales during peak agriculture season. ✓ Majority of the retailers used Wi-Fi connectivity to update version 2.4 in PoS devices.	
GRM	
Retailers satisfies with the GRM (n=30)	1. Yes – 26 (87%) 2. No – 4 (13%)
Insights ✓ Majority of the retailers contacted district consultant and block agriculture officer for GRM. ✓ Retailer faced issues related to server, receipt acknowledgement, updating software, updating stock, and small screen size.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=425)	1. Yes – 352 (83%) 2. No – 73 (17%)
Insights ✓ Most of the farmers received information about *Aadhaar* requirement to buy fertiliser from the retailers. However, many farmers also received this information through the panchayat. ✓ A majority of farmers knew that the government provides subsidised fertiliser.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=429)	*1.* *Aadhaar* authenticated – 414 (96.5%) a. Authentication successful – 400 (93.2%) b. Authentication failed – 14 (3.3%) i. Manual transaction – 8 (1.9%) ii. Fertiliser denied – 6 (1.4) 2. Manual Transaction (latest transaction) – 8 (1.8%) 3. Manual Transaction (never through *Aadhaar*) – 4 (1%) 4. Enrolment ID + EPIC/ KCC – 2 (0.5%) 5. Fertiliser Denied – 1 (0.2%)
Average number of attempts to authenticate – (n=400)	1. One – 227 (57%) 2. Two – 102 (25%) 3. Three – 48 (12%) 4. Four or more – 23 (6%)
Average transaction time using PoS	Six minutes
Insights ✓ The average transaction time is higher than the overall average transaction time of five minutes. ✓ Due to the high demand for particular urea in the district, the retailers charge a higher price than the MRP. Farmers pay an average INR 311 (USD 4.78) for one bag of urea.	

7. Nashik

General Information	
Farmer sample (quantitative)	✓ 382
Retailer sample (quantitative)	✓ 30 • Private – 23 (77%) • Cooperative – 7 (23%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 10 (33)% 2. Same day or more – 20 (67%)
Updating stock after acknowledgement (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 12 (40%) 2. Same day or more – 18 (60%)
Updating stock after each transaction (n=30)	1. Yes – 28 (93%) 2. No – 2 (7%)
Insights ✓ Delay in receipt acknowledgement happens due to delay in updating of RO module by dispatchers and non-sending of dispatch ID along with the physical stock. ✓ Many retailers do not receive printed challan copy from the dispatchers. The dispatchers share the dispatch ID over SMS or WhatsApp.	
Training	
Training received (n=30)	1. Yes – 30 (100%) 2. No – 0 (0%)
Training sufficiency (n=24)	1. Yes – 24 (80%) 2. No – 6 (20%)
Insights ✓ Retailers received the information about the DBT-F and training mostly through the district agriculture office. The district agriculture office actively involved the District Consultant in the process.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=30)	1. Yes – 12 (40%) 2. No – 18 (60%)
Insights ✓ Retailers noticed that auto drivers also come to buy fertiliser on behalf of farmers. The farmers pay the auto drivers extra amount of money to buy and deliver fertiliser at their doorstep. ✓ Bookkeeping efforts for retailers have increased, as they calculate GST manually and maintain manual records for taxation. The receipts generated through the PoS devices do not serve any purpose as the ink on the paper fades away. Retailers have suggested that the government should link the PoS application with the ERP or tally at their end.	

GRM	
Retailers satisfies with the GRM (n=30)	1. Yes – 22 (73%) 2. No – 8 (23%)
Insights ✓ Retailers contacted the Block Agriculture Officer and District Consultant for GRM. ✓ Retailers suggested that the government should provide a toll-free number for GRM. ✓ Retailers primarily faced issues related to server and updating stock.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=382)	1. Yes – 345 (90%) 2. No – 37 (10%)
Insights ✓ Farmers received the information about DBT-F and *Aadhaar* requirement to buy fertiliser mostly through the retailers. Most of them received this information at the fertiliser retail outlets when they had arrived at the outlet to buy fertiliser.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=382)	*1.* *Aadhaar* authenticated – 378 (99%) a. Authentication successful – 332 (87%) b. Authentication failed – 56 (12%) i. Manual transaction – 37 (9.7%) ii. Fertiliser denied – 9 (2.3) 2. Manual Transaction (latest transaction) – 2 (0.5%) 3. Manual Transaction (never through *Aadhaar*) – 0 (0%) 4. Enrolment ID + EPIC/ KCC – 1 (0.25%) 5. Fertiliser Denied – 1 (0.25%)
Average number of attempts to authenticate – (n=332)	1. One – 196 (59%) 2. Two – 95 (28%) 3. Three – 32 (10%) 4. Four or more – 9 (3%)
Average transaction time using PoS	Five minutes
Insights ✓ The district has a higher percent of authentication failure of 12% compared to overall authentication failure of 3.40%.	

8. Pali

General Information	
Farmer sample (quantitative)	✓ 402
Retailer sample (quantitative)	✓ 31 • Private – 12 (39%) • Cooperative – 19 (61%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 26 (84%) 2. Same day or more – 5 (16%)
Updating stock after acknowledgement (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 27 (87%) 2. Same day or more – 4 (13%)
Updating stock after each transaction (n=31)	1. Yes – 31 (100%) 2. No – 0 (0%)
Insights ✓ Most of the retailers received handmade challan and not a printed challan generated through RO module. ✓ Retailers informed that updating RO module at rake points and warehouses are difficult. The rake points and warehouses do not have an enabling infrastructure such as PoS devices, laptops, desktops, etc. ✓ The district has the highest percent of retailers (84%) among all the other districts in delaying the acknowledgement of dispatch ID through the RO module.	
Training	
Training received (n=31)	1. Yes – 26 (84%) 2. No – 5 (16%)
Training sufficiency (n=26)	1. Yes – 21 (81%) 2. No – 5 (19%)
Insights ✓ LFS and district agriculture office imparted training to the retailers. ✓ Compared to the other districts, a lesser number of retailers have received training. Additionally, retailers also said that the training imparted was not helpful. They did not understand the PoS functionalities well enough in the training, which hampered the PoS operations during the initial period. Over a period, they learnt to operate the PoS devices.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=31)	1. Yes – 4 (13%) 2. No – 27 (87%)
Insights ✓ A few retailers faced issues of time mismatch between the PoS and server. The PoS devices do not work when the time on PoS devices corresponds to the time of server maintenance activity. ✓ Auto drivers often also come to buy fertiliser on behalf of the farmers.	

GRM	
Retailers satisfies with the GRM (n=31)	1. Yes – 28 (90%) 2. No – 3 (10%)
Insights ✓ The retailers contacted the Block Agriculture Officer and District Consultant for GRM. ✓ Retailers faced issues related to the server, receipt acknowledgement, and authentication.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=402)	1. Yes – 239 (59%) 2. No – 163 (41%)
Insights ✓ Most of the retailers received the information of *Aadhaar* being mandatory to buy fertiliser at the retail outlet after they arrived at the outlet to buy fertiliser.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=389)	*1.* *Aadhaar* authenticated – 395 (98.3%) a. Authentication successful – 389 (96.8%) b. Authentication failed – 6 (1.5%) i. Manual transaction – 5 (1.3%) ii. Fertiliser denied – 1 (0.2%) 2. Manual Transaction (latest transaction) – 7 (1.7%) 3. Manual Transaction (never through *Aadhaar*) – 0 (0%) 4. Enrolment ID + EPIC/ KCC – 0 (0%) 5. Fertiliser Denied – 0 (0%)
Average number of attempts to authenticate – (n=389)	1. One – 244 (62%) 2. Two – 86 (22%) 3. Three – 37 (10%) 4. Four or more – 22 (5%)
Average transaction time using PoS	Two minutes
Insights ✓ The average transaction time through PoS at two minutes is lower than the overall average transaction time of five minutes.	

9. Raigarh

General Information	
Farmer sample (quantitative)	✓ 401
Retailer sample (quantitative)	✓ 30 • Private – 28 (93%) • Cooperative – 2 (7%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 11 (37%) 2. Same day or more – 19 (63%)
Updating stock after acknowledgement (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 13 (43%) 2. Same day or more – 17 (53%)
Updating stock after each transaction (n=30)	1. Yes – 26 (87%) 2. No – 4 (13%)
Insights ✓ Most of the retailers received handmade challan without the dispatch ID. This delayed the dispatch ID acknowledgement in PoS devices.	
Training	
Training received (n=30)	1. Yes – 29 (97%) 2. No – 1 (3%)
Training sufficiency (n=29)	1. Yes – 25 (86%) 2. No – 5 (14%)
Insights ✓ District agriculture office and District Consultants imparted the training. ✓ On an average, retailers participated in two training sessions.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=30)	1. Yes – 13 (43%) 2. No – 17 (57%)
Insights ✓ Retailers' workload has increased after the introduction of GST. They manually calculate GST for each transaction for taxation purpose.	
GRM	
Retailers satisfies with the GRM (n=30)	1. Yes – 23 (77%) 2. No – 7 (23%)
Insights ✓ Retailers faced issues related to server, receipt acknowledgement, network connectivity, updating stock, and authentication. ✓ They contacted the Block Agriculture Officer and District Consultant for grievance resolution.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=401)	1. Yes – 307 (77%) 2. No – 94 (23%)
Insights ✓ Major sources of information for the farmers were fertiliser retailers and fellow farmers. ✓ Some of the farmers also believed that the government would initiate cash transfers in fertiliser subsidy.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=401)	*1.* *Aadhaar* authenticated – 387 (96.5%) a. Authentication successful – 342 (85.3%) b. Authentication failed – 45 (11.2%) i. Manual transaction – 38 (9.5%) ii. Fertiliser denied – 7 (1.7%) 2. Manual Transaction (latest transaction) – 13 (3.3%) 3. Manual Transaction (never through *Aadhaar*) – 0 (0%) 4. Enrolment ID + EPIC/ KCC – 0 (0%) 5. Fertiliser Denied – 1 (0.2%)
Average number of attempts to authenticate – (n=342)	1. One – 221 (65%) 2. Two – 97 (28%) 3. Three – 21 (6%) 4. Four or more – 3 (1%)
Average transaction time using PoS	Six minutes
Insights ✓ Private retailers ask farmers to buy pesticides as well from their outlets. Otherwise, the retailers refuse to sell fertiliser, especially urea. The retailers follow this practice as they earn higher margins from the sale of pesticides.	

10. Rangareddy

General Information	
Farmer sample (quantitative)	✓ 428
Retailer sample (quantitative)	✓ 30 • Private – 20 (67%) • Cooperative – 10 (33%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 8 (27)% 2. Same day or more – 22 (73%)
Updating stock after acknowledgement (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 9 (30%) 2. Same day or more – 21 (70%)
Updating stock after each transaction (n=30)	1. Yes – 24 (80%) 2. No – 6 (20%)
Insights ✓ Delay in updating stock and acknowledging dispatch ID compels retailers to adjust transactions. A Higher percent of adjusted transactions (28%) in the district also corresponds to this fact.	
Training	
Training received (n=30)	1. Yes – 29 (97%) 2. No – 1 (3%)
Training sufficiency (n=29)	1. Yes – 26 (90%) 2. No – 3 (10%)
Insights ✓ Introduction of PoS and GST has increased the recordkeeping load for retailers, as they manually calculate GST on every transaction and maintain manual records for taxation purposes. Receipts generated through the PoS devices do not serve this purpose, as the ink on the paper (thermal paper) fades away within a month or so.	
Transaction Status and Experience	
Average number of attempts to log in	✓ One
Problem faced during peak season transaction (n=30)	1. Yes – 21 (70%) 2. No – 9 (30%)
Insights ✓ A majority of retailers faced problem in managing transactions during peak agriculture season. However, they resorted to adjusted transactions to manage sales during the peak season. ✓ Retailers conveniently logged in one attempt into the PoS device.	
GRM	
Retailers satisfies with the GRM (n=30)	1. Yes – 24 (80%) 2. No – 6 (20%)
Insights ✓ Retailers faced issues related to the server, dispatch ID acknowledgement, updating PoS version to 2.4, updating stock, *Aadhaar* authentication, and small screen size on the PoS. ✓ Retailers contacted the Block Agriculture Officer and District Consultants for grievance resolution.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=395)	1. Yes – 362 (92%) 2. No – 33 (8%)
Insights ✓ A major source of communication for farmers was the fertiliser retailer. The retailers informed farmers about DBT-F and *Aadhaar* requirement to buy fertiliser. However, most of the farmers received this information only when they had arrived at the retail outlet to buy fertiliser.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=428)	*1.* *Aadhaar* authenticated – 318 (74.3%) a. Authentication successful – 308 (72%) b. Authentication failed – 10 (2.3%) i. Manual transaction – 10 (2.3%) ii. Fertiliser denied – 0 (0%) 2. Manual Transaction (latest transaction) – 77 (18%) 3. Manual Transaction (never through *Aadhaar*) –33 (7.7%) 4. Enrolment ID + EPIC/ KCC – 0 (0%) 5. Fertiliser Denied – 0 (0%)
Average number of attempts to authenticate – (n=308)	1. One – 242 (79%) 2. Two – 59 (19%) 3. Three – 5 (1.7%) 4. Four or more – 1 (0.3%)
Average transaction time using PoS	Five minutes
Insights ✓ The percent of adjusted transactions at 28% is higher than the total sample percent at 20.70%.	

11. Thrissur

General Information	
Farmer sample (quantitative)	✓ 393[69]
Retailer sample (quantitative)	✓ 31 • Private – 14 (45%) • Cooperative – 17 (55%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 18 (58%) 2. Same day or more – 13 (42%)
Updating stock after acknowledgement (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 29 (94%) 2. Same day or more – 2 (6%)
Updating stock after each transaction (n=31)	1. Yes – 21 (71%) 2. No – 9 (29%)
Insights ✓ Delay in updating of RO module by the dispatcher delays the dispatch ID acknowledgement. ✓ Only the retailers who sell fertiliser through PoS face these issues.	
Training	
Training received (n=31)	1. Yes – 31 (100%) 2. No – 0 (0%)
Training sufficiency (n=31)	1. Yes – 31 (100%) 2. No – 0 (0%)
Insights ✓ Retailer training efforts by the district agriculture office and LFS are laudable, as all the retailers surveyed have received the training. Additionally, all the retailers said that they were able to understand the functionalities of PoS devices. They can easily operate the PoS devices after the training.	
Transaction Status and Experience	
Average number of attempts to log in	✓ One
Problem faced during peak season transaction (n=31)	1. Yes – 24 (77%) 2. No – 7 (23%)
Insights ✓ Retailers conveniently logged in into the PoS in one attempt. The average number of attempts for the total sample is two.	
GRM	
Retailers satisfied with the GRM (n=31)	1. Yes – 28 (90%) 2. No – 3 (10%)
Insights ✓ Retailers faced issues related to the server, dispatch ID acknowledgement, updating stock, and *Aadhaar* authentication. ✓ Majority of the retailers said that they do not face issues related to network connectivity.	

69. The district had 351 out of 393 farmers who had not bought fertiliser through Aadhaar even once. The survey team did not administer part of the questionnaire to these farmers. Hence, the effective sample size for these questions is 42.

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=42)	1. Yes – 42 (100%) 2. No – 0 (0%)
Insights ✓ Although the farmers were aware of the *Aadhaar* requirement fertiliser purchase, they do not carry their *Aadhaar* card when they visit retailer outlet to buy fertiliser.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=393)	*1.* *Aadhaar* authenticated – 33 (8.5%) a. Authentication successful – 32 (8.1%) b. Authentication failed – 1 (0.3%) i. Manual transaction – 1 (0.3%) ii. Fertiliser denied – 0 (0%) 2. Manual Transaction (latest transaction) – 8 (2%) 3. Manual Transaction (never through *Aadhaar*) – 351 (89.30%) 4. Enrolment ID + EPIC/ KCC – 0 (0%) 5. Fertiliser Denied – 1 (0.2%)
Average number of attempts to authenticate – (n=32)	1. One – 27 (84.5%) 2. Two – 4 (12.5%) 3. Three – 0 (0%) 4. Four or more – 1 (3%)
Average transaction time using PoS	Six minutes
Insights ✓ Of the farmers surveyed, 89.30% had not bought fertiliser through *Aadhaar* authentication even once. Either the farmers do not carry their *Aadhaar* card or the retailers do not ask for the *Aadhaar* number to authenticate sale. ✓ Farmers believed that the government would phase out subsidy in fertiliser over a period.	

12. Tumkur

General Information	
Farmer sample (quantitative)	✓ 402
Retailer sample (quantitative)	✓ 30 • Private – 25 (83%) • Cooperative – 5 (17%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 7 (23%) 2. Same day or more – 23 (77)%
Updating stock after acknowledgement (n=30)	1. Immediately after receiving the physical stock and dispatch ID – 5 (17%) 2. Same day or more – 25 (83%)
Updating stock after each transaction (n=30)	1. Yes – 9 (30%) 2. No – 21 (90%)
Insights ✓ A majority of retailers do not acknowledge the dispatch ID in time. This compels them to adjust transactions. Adjusted transactions in the district at 25% is higher than the total sample percent at 20.70% ✓ Among all the states, the district had the least number of retailers who had updated their PoS devices with version 2.4.	
Training	
Training received (n=30)	1. Yes – 17 (57%) 2. No – 13 (43%)
Training sufficiency (n=17)	1. Yes – 12 (71%) 2. No – 5 (29%)
Insights ✓ District agriculture office, LFS, and District Consultant organised the training. ✓ On an average, the retailers had received only one training session as compared to an average of two training sessions for the total sample.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Three
Problem faced during peak season transaction (n=30)	1. Yes – 10 (33%) 2. No – 20 (67%)
Insights ✓ Retailers adjusted transactions during peak agriculture season to manage sales. ✓ Retailers require an average three authentication attempts to login into the PoS device. It is the highest among all the districts.	

GRM	
Retailers satisfied with the GRM (n=30)	1. Yes – 3 (10%) 2. No – 27 (90%)
Insights ✓ Retailers were not satisfied with the existing informal GRM. They mostly approached Block Agriculture Officer for grievance resolution. ✓ Retailers faced issues related to server and *Aadhaar* authentication.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=402)	1. Yes – 226 (56%) 2. No – 176 (44%)
Insights ✓ A major source of information was retailers or cooperatives.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=402)	*1.* *Aadhaar* authenticated – 304 (75.6%) a. Authentication successful – 299 (74.4%) b. Authentication failed – 5 (1.2%) i. Manual transaction – 5 (1.2%) ii. Fertiliser denied – 0 (0%) 2. Manual Transaction (latest transaction) – 95 (23.7%) 3. Manual Transaction (never through *Aadhaar*) – 0 (0%) 4. Enrolment ID + EPIC/ KCC – 3 (0.7%) 5. Fertiliser Denied – 0 (0%)
Average number of attempts to authenticate – (n=299)	1. One – 191 (64%) 2. Two – 30 (10%) 3. Three – 43 (14%) 4. Four or more – 35 (12%)
Average transaction time using PoS	Five minutes
Insights ✓ The district has a higher number of adjusted transactions (25%) than the total sample (20.70%).	

13. Una

General Information	
Farmer sample (quantitative)	✓ 404
Retailer sample (quantitative)	✓ 31 • Private – 8 (26%) • Cooperative – 23 (74%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 15 (48%) 2. Same day or more – 16 (52%)
Updating stock after acknowledgement (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 20 (65%) 2. Same day or more – 11 (35%)
Updating stock after each transaction (n=31)	1. Yes – 31 (100%) 2. No – 0 (0%)
Insights ✓ The district fared better than some districts on updating the RO module and acknowledging dispatch ID. However, most of the retailers also receive handmade challan without a dispatch ID.	
Training	
Training received (n=31)	1. Yes – 30 (97%) 2. No – 1 (3%)
Training sufficiency (n=30)	1. Yes – 28 (93%) 2. No – 2 (7%)
Insights ✓ District agriculture office, LFS, and District Consultant organised the training.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=31)	1. Yes – 14 (45%) 2. No – 17 (55%)
Insights ✓ Retailers adjust transactions to manage sales during the peak agriculture season.	
GRM	
Retailers satisfies with the GRM (n=31)	1. Yes – 28 (90%) 2. No – 3 (10%)
Insights ✓ Retailers faced issues related to the server, dispatch ID acknowledgement, updating software, updating stock, and authentication. ✓ Retailers contact Block Agriculture Officer, District Consultant, and District Agriculture Officer for grievance resolution.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=404)	1. Yes – 371 (92%) 2. No – 33 (8%)
Insights ✓ Major sources of information were retailers or cooperatives and fellow farmers.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=404)	*1.* *Aadhaar* authenticated – 382 (94.5%) a. Authentication successful – 374 (92.5%) b. Authentication failed – 8 (2%) i. Manual transaction – 6 (1.5%) ii. Fertiliser denied – 2 (0.5%) 2. Manual Transaction (latest transaction) – 22 (5.5%) 3. Manual Transaction (never through *Aadhaar*) – 0 (0%) 4. Enrolment ID + EPIC/ KCC – 0 (0%) 5. Fertiliser Denied – 0 (0%)
Average number of attempts to authenticate – (n=374)	1. One – 240 (64%) 2. Two – 96 (26%) 3. Three – 31 (8%) 4. Four or more – 7 (2%)
Average transaction time using PoS	Four minutes
Insights ✓ Farmers in the hilly areas face *Aadhaar* authentication issues due to poor network connectivity.	

14. West Godavari

General Information	
Farmer sample (quantitative)	✓ 406
Retailer sample (quantitative)	✓ 31 • Private – 26 (84%) • Cooperative – 5 (16%)

Retailer-level Findings	
Compliance	
Time of dispatch ID (receipt) acknowledgement in RO module (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 7 (23%) 2. Same day or more – 24 (77%)
Updating stock after acknowledgement (n=31)	1. Immediately after receiving the physical stock and dispatch ID – 8 (26%) 2. Same day or more – 23 (74%)
Updating stock after each transaction (n=31)	1. Yes – 29 (94%) 2. No – 2 (6%)
Insights ✓ Delay in updating RO module and acknowledging dispatch ID hamper the retailers' business and compel them to adjust transactions.	
Training	
Training received (n=31)	1. Yes – 31 (100%) 2. No – 0 (0%)
Training sufficiency (n=31)	1. Yes – 29 (94%) 2. No – 2 (6%)
Insights ✓ District agriculture office, LFS, and District Consultant organised the training. ✓ On an average, the retailers have participated in three training sessions.	
Transaction Status and Experience	
Average number of attempts to log in	✓ Two
Problem faced during peak season transaction (n=31)	1. Yes – 17 (55%) 2. No – 14 (45%)
Insights ✓ Retailers adjust transactions to manage sales during peak agriculture season.	
GRM	
Retailers satisfies with the GRM (n=31)	1. Yes – 28 (90%) 2. No – 3 (10%)
Insights ✓ Retailers face issues related to the server, dispatch ID acknowledgement, updating software, and updating stock. ✓ Retailers mostly contact Block Agriculture Officer for grievance resolution.	

Farmer-level Findings	
Communication and Awareness	
Awareness of *Aadhaar* being mandatory for fertiliser purchase (n=406)	1. Yes – 401 (99%) 2. No – 5 (1%)
Insights ✓ Major sources of information were retailers or cooperatives and fellow farmers.	
Transaction Status and Experience	
Fertiliser purchase mode (number) – (n=406)	*1.* *Aadhaar* authenticated – 386 (95%) a. Authentication successful – 369 (91%) b. Authentication failed – 17 (4%) i. Manual transaction – 17 (4%) ii. Fertiliser denied – 0 (0%) 2. Manual Transaction (latest transaction) – 20 (5%) 3. Manual Transaction (never through *Aadhaar*) – 0 (0%) 4. Enrolment ID + EPIC/ KCC – 0 (0%) 5. Fertiliser Denied – 0 (0%)
Average number of attempts to authenticate – (n=369)	1. One – 251 (68%) 2. Two – 110 (30%) 3. Three – 8 (2%) 4. Four or more – 0 (0%)
Average transaction time using PoS	Eight minutes
Insights ✓ Average transaction time of eight minutes is higher than the average time of the total sample. Although Successful *Aadhaar* authentication in first three attempts is 100%.	

Annexure II

Year-wise Fertiliser Consumption, Production, and Subsidy Budget[70]

	Fertiliser Consumption and Production (In MMT)								Subsidy Budget	
Year	Nitrogen		Phosphate		Potash		Total		INR (crore)	USD (Million)
	Consumption	Production	Consumption	Production	Consumption	Production*	Consumption	Production		
1976-77	2.46	1.86	0.64	0.48	0.27	0.00	3.36	2.34	60	9
1977-78	2.92	2.00	0.87	0.67	0.32	0.00	4.10	2.67	266	41
1978-79	3.42	2.17	1.11	0.78	0.59	0.00	5.12	2.95	343	53
1979-80	3.50	2.22	1.15	0.76	0.61	0.00	5.26	2.99	604	93
1980-81	3.68	2.16	1.21	0.84	0.62	0.00	5.52	3.01	505	78
1981-82	4.07	3.14	1.32	0.95	0.68	0.00	6.07	4.09	375	58
1982-83	4.22	3.43	1.44	0.98	0.73	0.00	6.39	4.41	605	93
1983-84	5.20	3.49	1.73	1.06	0.78	0.00	7.71	4.56	1,042	160
1984-85	5.49	3.92	1.89	1.32	0.84	0.00	8.21	5.24	1,927	297
1985-86	5.66	4.32	2.01	1.43	0.81	0.00	8.47	5.75	1,924	296
1986-87	5.72	5.41	2.08	1.66	0.85	0.00	8.65	7.07	1,897	292
1987-88	5.72	5.47	2.19	1.67	0.88	0.00	8.78	7.13	2,164	333
1988-89	7.25	6.71	2.72	2.25	1.07	0.00	11.04	8.97	3,201	492
1989-90	7.39	6.75	3.01	1.80	1.17	0.00	11.57	8.54	4,542	699
1990-91	8.00	6.99	3.22	2.05	1.33	0.00	12.55	9.04	4,389	675
1991-92	8.05	7.30	3.32	2.56	1.36	0.00	12.73	9.86	4,800	738
1992-93	8.43	7.43	2.84	2.32	0.88	0.00	12.16	9.75	6,138	944
1993-94	8.79	7.23	2.67	1.87	0.91	0.00	12.37	9.11	4,916	756
1994-95	9.51	7.94	2.93	2.56	1.13	0.00	13.56	10.50	5,769	887
1995-96	9.82	8.77	2.90	2.59	1.16	0.00	13.88	11.36	6,735	1,036
1996-97	10.30	8.59	2.98	2.58	1.03	0.00	14.31	11.17	7,578	1,165
1997-98	10.90	10.08	3.91	3.08	1.37	0.00	16.19	13.16	9.918	1,525
1998-99	11.35	10.48	4.11	3.20	1.33	0.00	16.80	13.68	11,596	1,784
1999-00	11.59	10.87	4.80	3.45	1.68	0.00	18.07	14.32	13,244	2.037
2000-01	10.92	10.94	4.22	3.73	1.57	0.00	16.70	14.68	13,800	2,123
2001-02	11.31	10.69	4.38	3.84	1.67	0.00	17.36	14.53	12,595	1,937
2002-03	10.47	10.51	4.02	3.90	1.60	0.00	16.09	14.41	11,015	1,694
2003-04	11.08	10.56	4.12	3.62	1.60	0.00	16.80	14.17	11,847	1,822
2004-05	11.71	11.31	4.62	4.03	2.06	0.00	18.40	15.33	15,879	2,442
2005-06	12.72	11.33	5.20	4.20	2.41	0.00	20.34	15.54	18,460	2,840
2006-07	13.77	11.53	5.54	4.44	2.34	0.00	21.65	15.97	25,222	4.034
2007-08	14.42	10.90	5.52	3.71	2.64	0.00	22.57	14.62	39,990	6,152
2008-09	15.09	10.90	6.51	3.42	3.31	0.00	24.91	14.32	96603	14,862
2009-10	15.88	11.92	7.27	4.37	3.63	0.00	26.79	16.30	61,264	9,425
2010-11	16.56	12.18	8.05	4.37	3.51	0.00	28.12	16.55	62,301	9,584
2011-12	17.30	12.29	7.91	4.36	2.58	0.00	27.79	16.65	70,013	10,771
2012-13	16.82	12.19	6.65	3.54	2.06	0.00	25.54	15.74	65,613	10,094
2013-14	16.85	12.38	5.63	3.71	2.10	0.00	24.58	16.09	67,339	10,359
2014-15	16.95	12.39	6.10	3.88	2.53	0.00	25.58	16.27	71,076	10,935
2015-16	17.37	13.42	6.98	4.39	2.40	0.00	26.75	17.81	72,438	11,144
*Government of India imports all types of potassic fertiliser										

70. https://www.indiastat.com and http://www.faidelhi.org/statistical-database.htm

Annexure III: Fertiliser Management System and Neem-coated Urea

1. Fertiliser Management Systems

The Indian government has been digitising the fertiliser value chain over the past decade through technology interventions. This digitisation aimed to overcome the challenges of fertiliser movement and ensure that the fertiliser reaches the intended beneficiaries. The technology interventions employed include the Fertiliser Management System (FMS) in 2007, Mobile Fertiliser Management System (mFMS) in 2012, and Integrated Fertiliser Management System (iFMS) in 2016.

1.1. Fertiliser Management System (FMS)

GoI launched the FMS to monitor the movement of fertiliser at various stages in the value chain.[71] The government monitored the production, dispatch, receipt, and sale of fertiliser from points of production to district warehouses.

1.2. Mobile Fertiliser Management System (mFMS)

GoI introduced mFMS to bring more visibility and transparency in the fertiliser supply chain from production to receipt at the last sale point – fertiliser retailers. The mFMS captured data from all intermediary stakeholders including wholesalers and retailers. It monitored the movement and sales of fertiliser from fertiliser manufacturers or importers to wholesalers and from wholesalers to retailers across the country. It was a centralised system with the web, mobile, and Point of Sale (PoS) device access channels. The web application facilitated companies, wholesalers, and retailers to report fertiliser sales, receipts, and stocks.

1.3. Integrated Fertiliser Management System (iFMS)

In 2014, the government decided to develop a comprehensive system that integrated the features of the earlier systems, that is, FMS and mFMS. The government launched iFMS in 2016. Apart from monitoring the movement and management of fertiliser supply, it also enables processing of subsidy claims. (The terms mFMS and iFMS are used interchangeably but most commonly used is mFMS)

2. Neem-coating of Urea

According to the economic survey 2015-16, approximately 31% of the urea produced is diverted to non-agriculture (mostly industrial) uses and abroad.[72] Primarily to restrict the use of urea for industrial use the government, in 2015, mandated manufacturers to supply 100% neem-coated urea (NCU) for both imported and indigenously produced urea.[73]

In 2017, Agricultural Development and Rural Transformation Centre (ADRTC) conducted a study on the 'Impact of Neem-coated Urea on Production, Productivity, and Soil Health in Karnataka'.[74] Following are the brief findings of the study, which indicate the positive impact of NCU:

71. http://urvarak.co.in/
72. http://indiabudget.nic.in/budget2016-2017/es2015-16/echapvol1-09.pdf
73. http://pib.nic.in/newsite/PrintRelease.aspx?relid=159903
74. http://www.isec.ac.in/NCU-Karnataka-Final-Report-19052017.pdf

1. Improvement in soil health,
2. Reduction in pest attack, hence, reduction in expenditure on plant protection chemicals,
3. An increase in yield of paddy, sugarcane, maize, soybean, and red gram to an extent of 5.79%, 17.5%, 7.14%, 7.4%, and 16.88%, respectively, and
4. Reduced diversion of subsidised urea towards non-agricultural purposes among farmers

Neem-coating of urea has reduced the diversion of urea for industrial use. Further, to limit the diversion of urea to industries and abroad, GoI introduced Direct benefit Transfer in Fertiliser (DBT-F).

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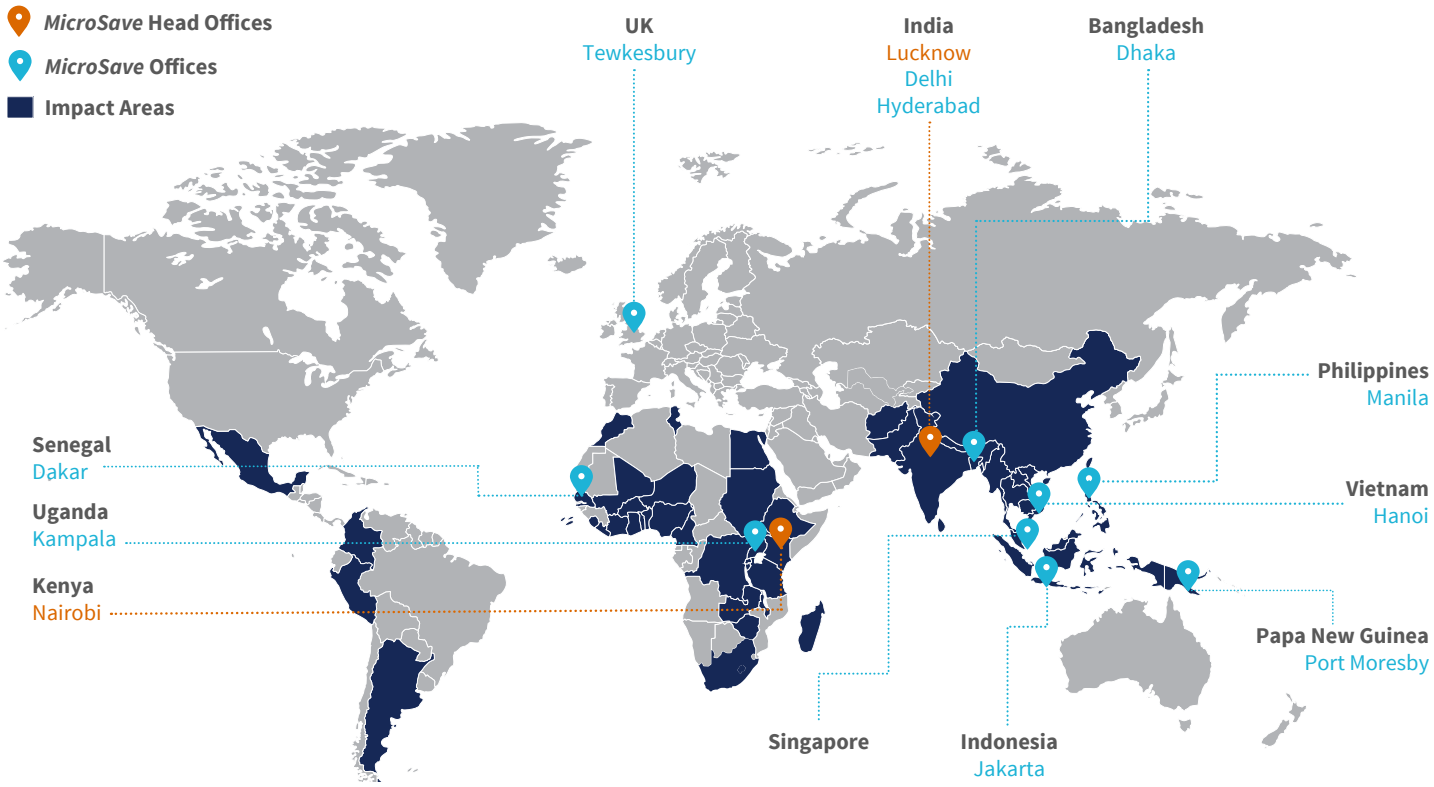

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