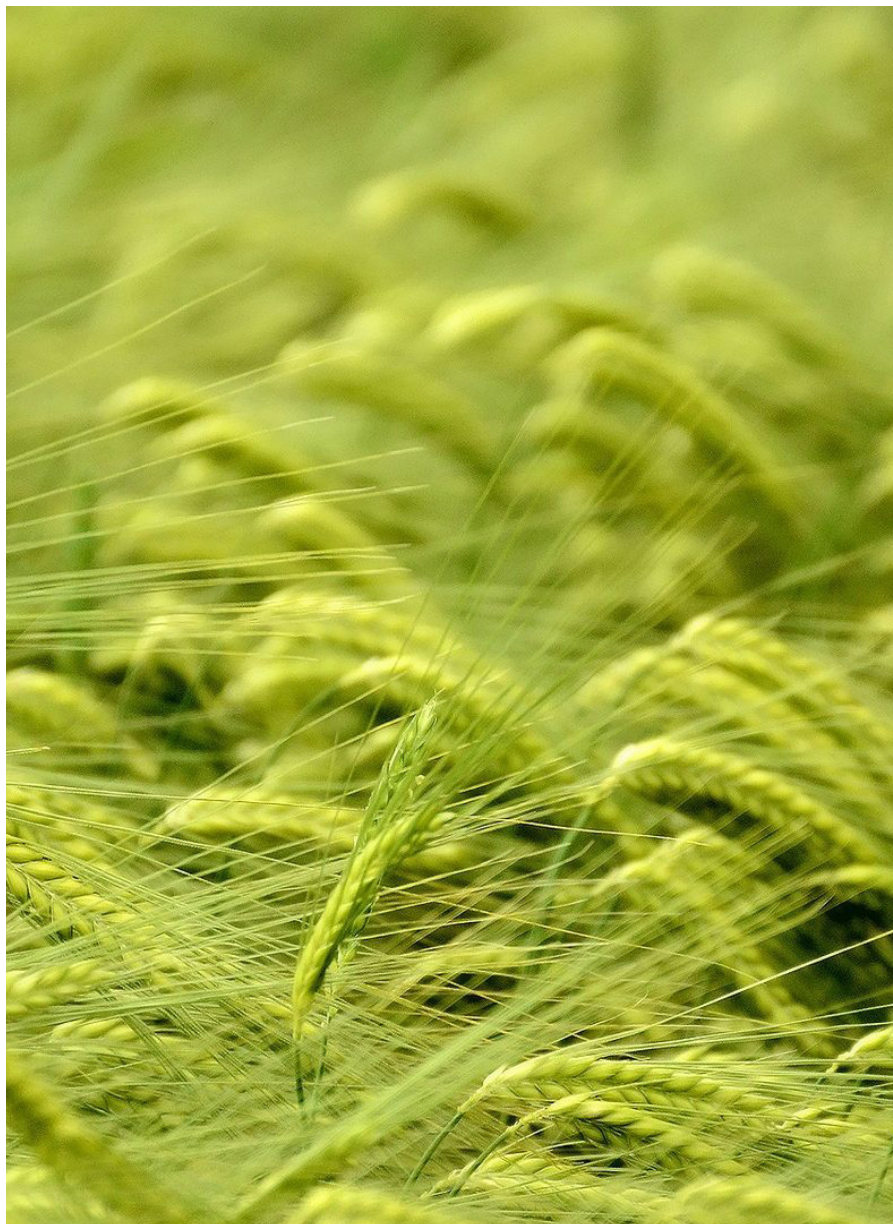


# Agro-Economic Policy Briefs

*Aiding the Future of India's Farmers and Agriculture*



For kind attention of:  
The Hon'ble Prime Minister's Office,  
the Ministry of Agriculture and Farmers Welfare,  
and all others interested

## On critical policy issues in India's Agricultural Economy

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# Kisan Call Centres (KCC): A Decision-Oriented Information Systems for Farmers

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## Introduction

- The Kisan Call Centres (KCC) (Farmer Call Centres) scheme has been launched as an innovative and modern scheme of the government for expeditiously delivering extension information and support to the farmers, using the vast telecommunication network which has grown remarkably. It helps overcome the handicaps of the traditional personal extension system which is often inadequate in meeting the pressing queries and demands for the latest information from the farmers. The KCC scheme was launched by the Ministry of Agriculture & Farmers Welfare, Government of India in 2004. The study has examined the design, implementation and performance of the KCCs, and also observed the related systems of Kisan Knowledge Management System (KKMS), Farmers Portal, and M-Kisan Portal.
  - To make correct decisions on various critical matters, farmers frequently need information and advice on many different technical and economic aspects. The information helps them to make correct decisions on matters such as the right crop & variety to plant, the correct inputs to apply to solve problems, and the right practices to follow so as to manage their farms successfully and achieve the best productivity and returns. Inadequate and imperfect information leads to poor decisions, poor farm performance, and in the worst cases even to crop failures and suicides. Systems to provide good & up to date information and knowledge to the farmers are therefore extremely crucial for their productivity & livelihoods as well as the performance of the agriculture sector.
- The modern management approach to designing a good information system focuses on the main decision-making needs of the firm or managers. The approach first identifies the key decision-making needs for best achieving the objectives of the firm. Then, in order to make these key decisions well, it identifies what key information that will be required. This includes not only “what”, but also “when”, “where” and “who” of the information. Then, squarely based on this examination, a tailor-made information system is designed and implemented, which would most effectively and directly provide the information when and where it is needed. The result is an information system which directly leads to better decision-making and performance.

## Method & Coverage

- The study was designed & implemented by the Centre for Management in Agriculture (CMA), IIM Ahmedabad, in cooperation with the state Agro-Economic Research Centres (AERCs) involved. Based on multiple criteria, the following 5 KCC units were selected for study: Chandigarh-Punjab, Ahmedabad-Gujarat, Pune-Maharashtra, Bangalore-Karnataka, and Guwahati-Assam. The 5 KCCs covered 18 different states/ territories with operation in 14 different languages. For a comprehensive study, three different levels were investigated: the Kisan Call Centres (KCC) - 5, the Farm Tele Advisors (FTAs) - 140 FTAs, out of a total of 210 FTAs, and Farmers - 561 farmers, including 458 users and 103 non-users.

## KCC National Call Data

- The Kisan Knowledge Management System (KKMS) database at the national level records the broad information on the calls received by all the KCCs in the country. Examination of this data indicates that over 61 lakh live calls were recorded during 2016-17. This amounts to over 16,000 calls per day indicating the large response to the KCCs. The highest number of calls were received from Uttar Pradesh, followed by Maharashtra. Among the sample states, Maharashtra had the highest number followed by Karnataka, Punjab, Gujarat and Assam. If the IVR (recorded) calls are added, the number rises to 80 lakh calls in 2016-17 or about 22,000 calls per day, a huge number. Among the crop subjects for calling, Rice had the highest share followed by Cotton, and Wheat. Among the reasons for calling, the highest number of calls were for weather information,





followed by plant protection, government schemes, market information, fertilizers, and variety choice. This indicates a diversity of topics, with weather, plant protection and government schemes as important ones.

### KCC Centre & Supervisor Survey

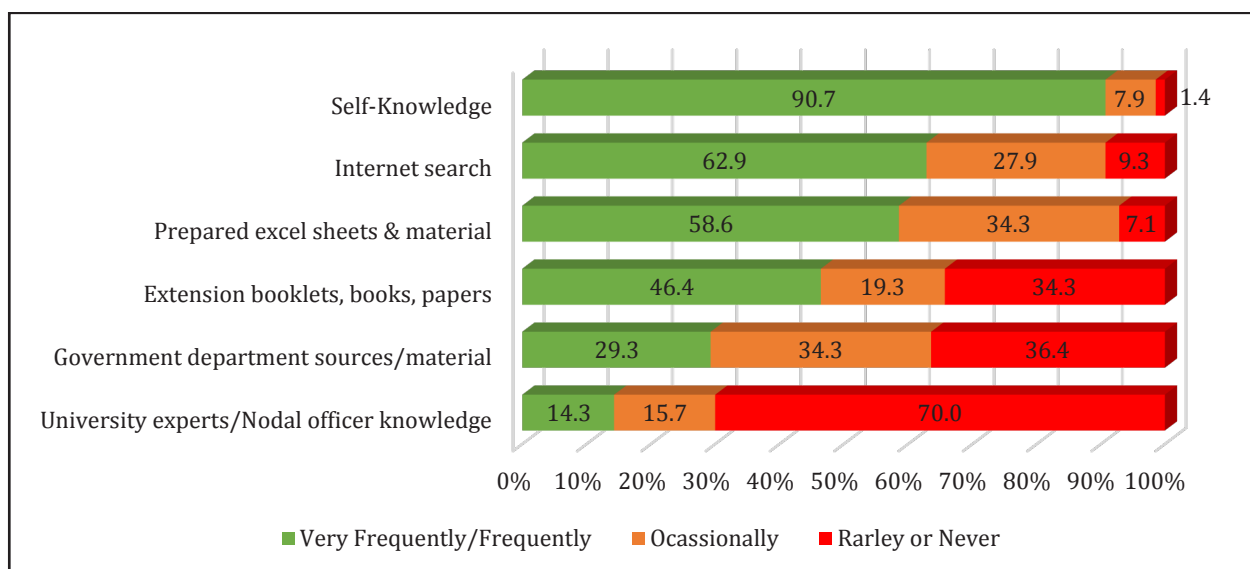
- Centre Supervisors head the KCCs and their responses indicate that each sample KCC covers at least 2 states/UTs, with Guwahati KCC covering 7 in the north-east. The KCCs can communicate in all the local languages. Over the years after being launched in 2004, the KCCs have undergone significant improvement and change, particularly since 2012 when outsourcing was done to IFFCO. Comparing the past KCCs to the present, all the KCC Supervisors agree or strongly agree that the changes have brought about better hardware, better software, better connectivity, better database and better ability to respond to farmers' calls. All the KCCs are now equipped with integrated hardware of personal computers, headphones, and printers/scanners. Whereas Gujarat, Maharashtra and Punjab have all-in-one desktops of Windows i5 or i3 type, Karnataka and Assam report HP or Compaq computers. The call handling softwares are identified as Agent Openscape Contact Centre, Openscape Desktop and Real Time Viewer. The performance of the hardware and software is reported to be good by the KCC Supervisors but the internet connectivity is not satisfactory, and there is dissatisfaction regarding infrastructure, service support, and the systems and policies. The KCC Supervisors, report that daily a large number of calls are received and handled efficiently at the KCCs, and the communication between the FTAs and farmers is good. Some problems are reported regarding the availability of the necessary information on time, and with the farmer understanding and satisfaction with the information. But the usefulness of KCCs is reported to be good

to excellent and all KCC supervisors indicate that the KCCs should continue.

### Farm Tele Advisors (FTA) Survey

- The Farm Tele Advisors (FTAs) are the ones who actually receive and respond to the calls of the farmers and therefore, their responses are from direct experience and important. A total 140 Farm Tele Advisors (FTAs) out of 210 FTAs in the 5 Centers were surveyed. All the FTAs were graduates, with 83 percent from B.Sc. Agriculture background, indicating that they are appropriately qualified. Regarding the hardware, about 70 percent of the FTAs find the hardware adequate and working well, but many report problems of breakdown and the headsets not comfortable. Regarding the software, about 65 percent indicate that the software is up to date, fast and user-friendly, but over 50 percent report voice quality problems, and problems of call drop, lost or mishandled calls and inability to block of irrelevant calls. Regarding the knowledge sources used by FTAs to answer farmer's questions, the most frequent is self-knowledge used by over 90 percent, followed by internet search by over 60 percent, jointly prepared excel sheets and materials by 58 percent, and help of colleagues and supervisors by 50 percent. A majority of FTAs indicate the inadequacy of extension booklets and government department sources and materials, and a very large number report the inadequacy in the response of university experts, and nodal officers (Fig.1).
- Regarding the websites, the KKMS website is used almost all the time by the FTAs, and is reported to be easy to use, clear and well organized. However, its response is often slow and the information often not up to date. The Farmers' Portal website is found easy to use and clear but has problems of failing/crashing, information not up to date, and is not frequently used. The M-Kisan website is found to work well, but it is not convenient and very useful

**Figure 1: Frequency of Information Sources used to Answer Farmers Questions**



and it is not frequently used. The FTAs find the KCC office space largely adequate, but many don't find the work environment very satisfactory and see scope for improvement. Regarding the training programs, the main contributions reported by FTAs are in understanding farmers questions, how to handle them, and in obtaining some of the necessary information, but they are inadequate in covering hardware and software operation and the knowledge of government schemes. The FTAs indicate a substantial need for more, better and regular training.

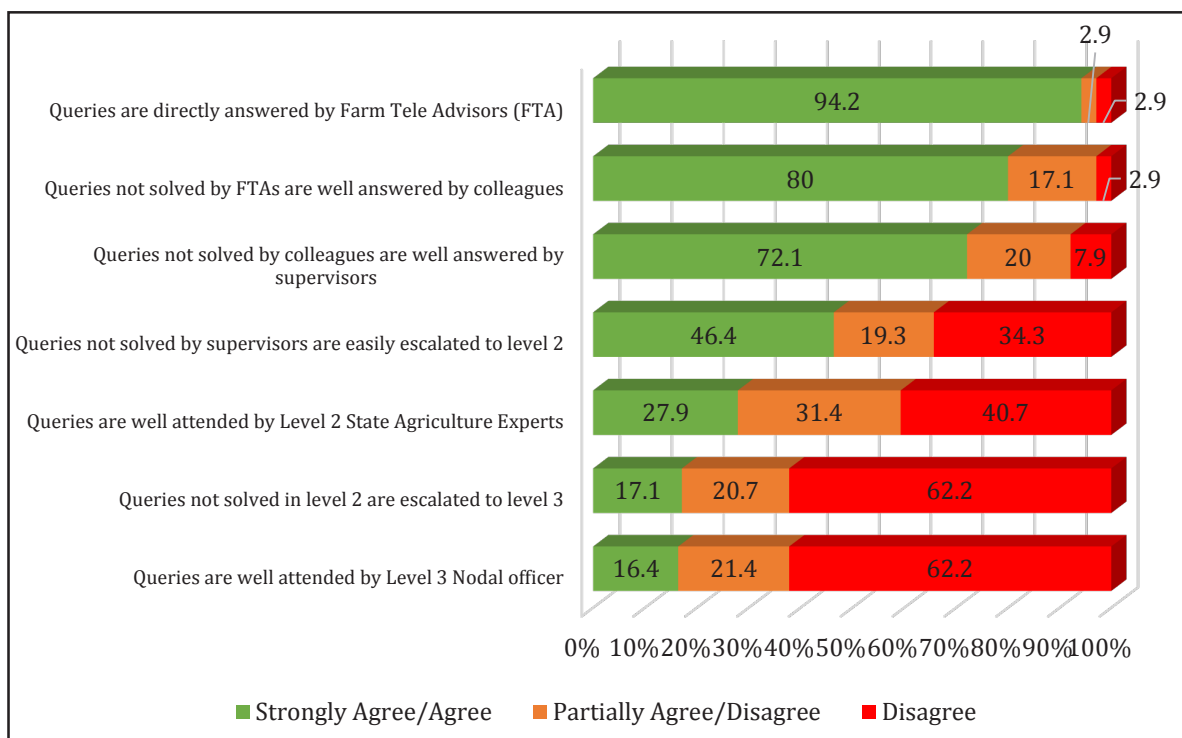
- FTAs indicate that it is not difficult to understand the farmers, and farmers don't have difficulty in understanding them, but farmers have difficulty in understanding scientific and technical terms. FTAs face considerable problem of irrelevant calls and abusive language. Regarding the call answering system, the FTAs report that they generally handle and answer most questions themselves, and else with help of colleagues and supervisors. Escalation to Level 2 is not working well and these calls are not speedily or well attended to by the state agriculture experts. The escalation to Level 3, fares even worse as nodal officers do not often attend even through SMS or other means (Fig. 2). Regarding the information available, about 55 percent FTAs report that adequate information is available at KCC, but the rest see scope for improvement. For technical questions, over 60 percent think that the answers given are adequate, and so also for weather and general information. However, on government schemes and market-related queries, the information provided is considered inadequate by a large majority. Regarding the systems and policies under which the KCC is working, there is substantial dissatisfaction

with nearly 75 percent putting it in the range of poor to satisfactory. However, over 80 percent indicate the usefulness of the KCC to the farmers as good to excellent, and almost all believe that the KCC scheme should continue for the benefit of the farmers.

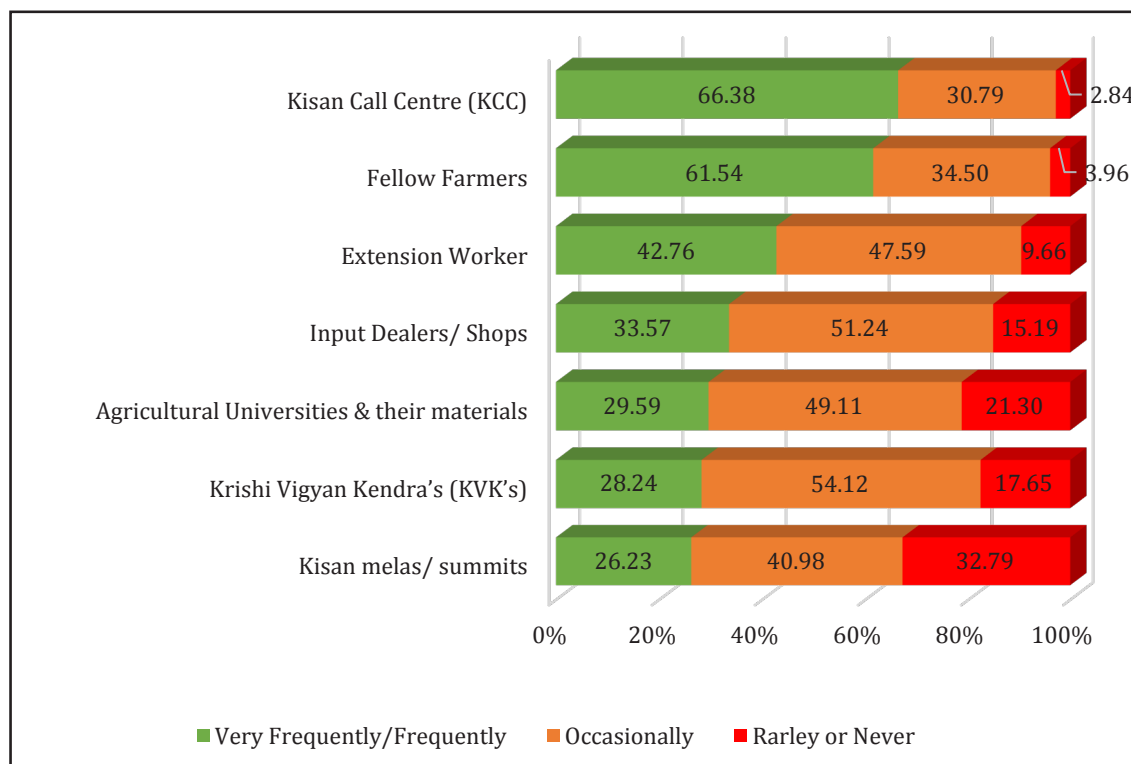
### Farmers' Survey Findings

- A sample of 561 farmers including 458 KCC user and 103 non-user were surveyed in the study across the 5 sample states. The users were found to be somewhat more educated and somewhat younger than non-users, though many illiterate farmers were also using the KCCs. Comparing different sources of information used based on the user sample, the results indicate that KCCs are now frequently or very frequently used by 66.38 percent of the farmer users, which is exceeds even the usual major source of fellow farmers which is at 61.54 percent. This is followed after a large margin by extension workers at 42.76 percent and input dealers at 33.57 percent – the rest of the sources such as kisan melas/ summits, Krishi Vigyan Kendras (KVKs), and agricultural universities/ materials stand considerably below this (Fig. 3). The results indicate that KCCs have risen to become a prominent and the most used source of information by farmers. In terms of the quality/ usefulness of the information the highest average score is obtained by fellow farmers at 3.54 out of 5, but the KCCs follow closely at 3.51. 55.01 percent rate fellow farmer as good to excellent source of information, but followed closely by KCCs at 50.22 percent, and this is considerably higher than all other sources such as extension workers, input dealers, KVKs, universities, or other call centres.
- Results show that on an average a user made 35.1

**Figure 2: Call Answering System Functioning by Level**



**Figure 3: Information Sources most used by Farmers for Advice, by Frequency**

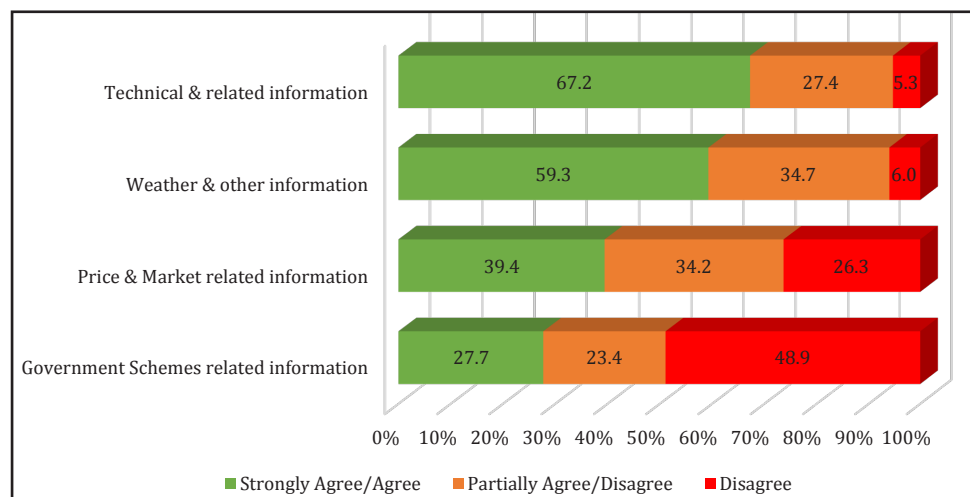


calls per year to the KCC, which is about 3 calls per month. The results indicate that the average waiting time was 2.4 minutes, percent calls not answered 7.9 percent, calls dropped 8.8 percent, and calls were no proper answer was given 9.7 percent. The users report that 75 percent of the calls were effectively answered - indicating that there is scope for improvement. 78 percent of the users find the KCC toll free number easy to reach and 60 percent find the waiting time not too long. Over 70 percent report that the FTAs understand the question or problem easily and provide answers in a clear and understandable way. However, when it comes to the usefulness of the answer and solving the problem, the percentage drops to 57 percent.

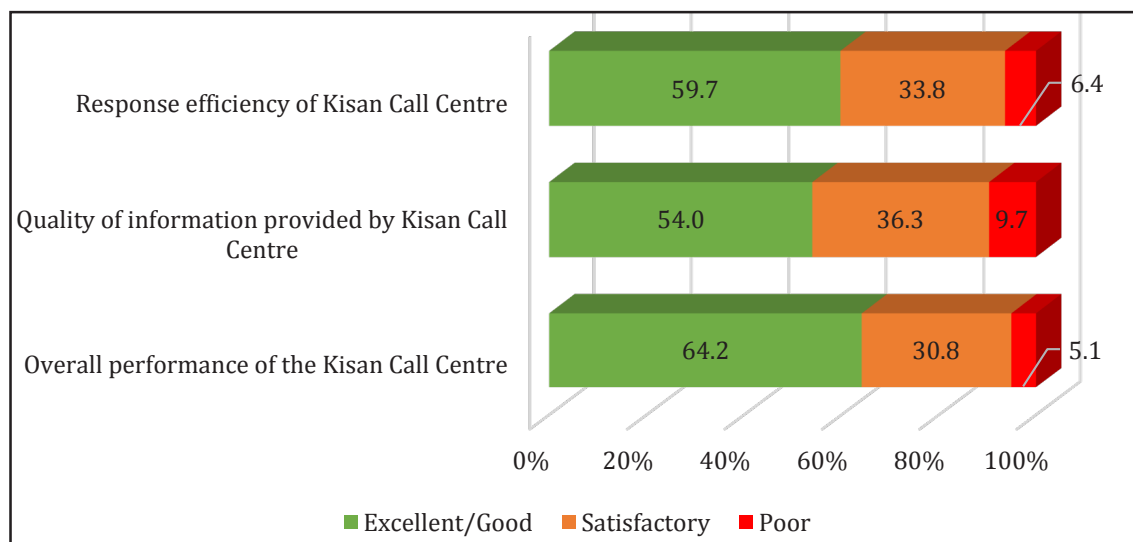
- On technical information, 85 percent farmers

indicate that this is easily available from KCCs, but only 65 percent find it reliable and useful, 60 percent find it up to date, and only 55 percent report that it improves the profit or performance - overall satisfaction 67 percent. On weather, 85 percent indicate that the information is available easily, but only 55 percent find it reliable, helpful and up to date, and only 40 percent say it improves profit or performance - overall satisfaction 59 percent. With respect to prices and markets information only 40 percent are satisfied, and only 33 percent indicates that it improves performance or profit. On government schemes, only 28 percent are satisfied, and only 20 percent indicate that it improves performance or profits. Thus, there is considerable scope for improvement in the content and quality of the information provided through KCCs (Fig. 4).

**Figure 4: Overall Satisfaction of Farmers with the Different Kinds of Information Provided**



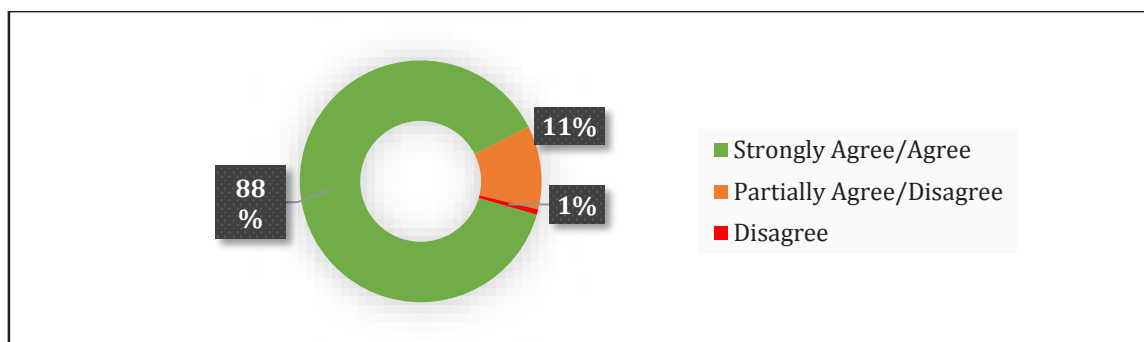
**Figure 5: Farmers Assessment of Different Aspects of Kisan Call Centres**



- In the overall assessment, the majority of farmer users report the performance of KCC to be good. Nearly 60 percent find the call response efficiency to be good to excellent, and on quality of the information, 54 percent consider it to be good (Fig. 5). About

90 percent of the farmers – a huge majority, find the KCCs useful, and despite some weaknesses, they definitely want the Kisan Call Centres (KCCs) to be continued (Fig. 6).

**Figure 6: Overall Opinion of the Farmers on Continuation of Kisan Call Centres**



### Recommendations

- In a short span of years, the KCCs have become the most frequently used source of information by the farmers, even exceeding, fellow farmers and all other sources of information including extension workers, dealers, KVKs and universities. The KCC system is receiving a huge amount of call traffic from the farmers of about 22,000 calls per day. 99 percent of the farmer users want the scheme to continue.
- For further enhancing the use of the KCC system, strong publicity to the farming community should be done especially in some states - to increase awareness about KCCs, how they can help, and how to reach them, so that the user base and the call frequency can be further increased.
- There is great need to regularly monitor the call efficiency statistics of the KCCs and seek to reduce the waiting time, the calls not answered, the call drops, and to increase the percentage of calls effectively answered.

- The latest hardware and software for call handling & filtering and excellent internet connectivity is a must for the FTAs and should enable the use of photographs, useful Apps and other means of communication between the farmers and FTAs. There is also a significant need to improve the functioning of the supporting websites including the KKMS, Farmers Portal and the m-Kisan Portal.
- There are substantial inadequacies in the quality of information provided by the KCCs. The information base available with the KCCs/ FTAs to answer farmers' questions needs to be hugely improved – without this, the system will not be very useful/ helpful. The information needs to be made comprehensive, extensive and up to date and put into a quick access digital database system. A special Unit should be setup to build and maintain such a database.
- Escalation of questions to higher levels is not working in most KCCs. A special in-house Unit of experts should be setup in each KCC to continuously access,

compile, and update the required knowledge base and provide it to the FTAs. The unit could consist of qualified experts or even of qualified or experienced FTAs who are dedicated to this task. They should create and maintain the quick access digital database for the FTAs mentioned above.

- Weather information is a major reason for calling and should be substantially strengthened and kept up to date. The information on government schemes is another major reason for calling and needs considerable strengthening. Besides, market/price and technical information needs substantial improvement.
- Frequent and good training programmes for the FTAs are a must to regularly enhance their skills and knowledge include in system operation, and new/better sources of information, and updating of information including on government schemes.
- Given the availability of good long-distance telecommunication technology and its growing reach, having a larger number of Centres may not be necessary – a limited number of well manned, well equipped and high expertise Centres may be better than many thinly or poorly manned Centres. There may not be a need for highly local Centres – in fact, larger aggregate Centres would better be able to share knowledge & solutions across areas/ regions.
- The FTAs play the most important role in the KCC system and need to be well compensated and supported. There is need to provide good office infrastructure facilities and create a good working environment for them, and the terms and compensation of FTAs need to be enhanced to attract the best talent, motivate them, get the best performance, and retain them. They play a very major role in helping the farmers.

## Dairy Development in Eastern Uttar Pradesh

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### Introduction & Importance

- Much emphasis on dairy development and livestock is still required not only for the main products but also for by-products and waste products, the latter for integrated nutrients management for the health of the soils. However, the productivity of milk per unit of the animal in India is still much lower than in many other countries. There is thus, a need for more intensive efforts to improve the productivity of animals in the integrated farming systems. The country has comparative advantages in dairy development and livestock sector and it must exploit the opportunities now presented under the new world trade agreement towards quantum leaps in the dairy development. This is necessary as a part of our efforts for accelerating economic growth as well as creating employment opportunities in the rural areas. For sustainable dairy development, concerted efforts are required to ensure the sustainability of the advances in animal production, productivity and milk processing technologies. Special consideration must be given on the major issues such as (1) large animal population in relation to the limited availability of feeds and fodders of good quality; poor transfer of technology is hampering the growth of dairy development, (2) Technologies developed so far to enrich crop residues and bagasse and to treat non-

conventional feed resources. Mainly agricultural by products have still not reached the take-off stage. The machinery for transfer of such technologies will have to be geared-up and (3) there is an immediate need to enhance milk procurement, processing, storage and marketing facilities to eliminate non-acceptance of producers milk in flush season.

### Findings

- Farming was the principal occupation in both the DCS (Dairy Cooperative Society) and NDCS (Non-Dairy Cooperative Society) categories of larger milk producers and A.H. and Dairying had emerged as the prominent subsidiary occupation among the sample milk producers.
- Generally, milk producers rear local cows of Deshi, Sahiwal and Haryana breeds. Among crossbred cows, they rear Jersey and Friesian breeds and in Buffalo, only Murra breed was reared by all milk producers in East U.P.
- About average milk yield per day per animal, it was 4 to 4.5 litres in local cows, 11.5 to 12.5 litres in crossbred cows and 8 to 8.5 litres in Buffaloes on an average in East U.P.
- Approximately 60% of the income was spent on cattle feeds and animal's health and 40% on family expenditures by both males and female members jointly under both the categories of milk producers in East U.P.
- Medicines and visits of veterinary doctors were costly affairs among the milk producers of NDCS category too wherein they told that the fee of Rs. 200 per visit by the veterinary doctor was very high in the area under study.
- Majority of milk producers were not aware of vaccination scheme. About sources of information on schemes majority of milk producers told fellow



farmers as the main source and they also told not to be benefitted at all from schemes on dairying.

- Large milk producers rearing crossbred cows had sold a maximum quantity to cooperative society beyond higher milk consumption in their families in DCS category.
- The average price of milk estimated as Rs. 25.33 per litre which was varying from Rs. 22 per litre for crossbred cows milk, Rs. 23 per litre for local cow milk to Rs. 31 per litre for buffalo milk under NDCS category too.
- Majority i.e. 98.33% of milk producers responded that cost of cattle feed and mineral mixtures was very high. Also, 60% of milk producers told that EVS (Emergency Veterinary Services) were not available at all.
- As regards the infrastructural constraints, there was lack of improved equipment under both DCS and NDCS categories of milk producers.
- On an overall, there were severe infrastructural constraints in both the DCS and NDCS categories of milk producers in the whole of Eastern U.P.
- About economic constraints, almost all the milk producers responded that they always faced a high cost for medicines, cattle feed and mineral mixtures, high charges of EVS and faced low provision of loans, incentives and bonus.
- Majority of milk producers said that there was always lack of technical guidance and lack of high genetic merit bulls resulting in poor conception rate in artificial insemination.
- There were also substantial socio-psychological constraints in the potential milk production by the milk producers under both DCS and NDCS categories in Eastern U.P.
- The majority i.e. 95% of the milk producers had expressed need for increasing the milk prices of all types of milk
- All of the milk producers had requested provision of A.I. facilities at village levels, reduce the cost of veterinary services, and to provide veterinary literature in villages.
- Overall almost all the sample milk producers had endorsed the above stated valuable suggestions for the improvement in adoption of dairy schemes in Eastern U.P.

### Conclusions and Recommendations

- Since dairying has emerged as the prominent subsidiary occupation among the sample milk producers of east U.P., every possible effort must be made to convert it into the main and principal occupation by all concerned.
- The milk producers having larger members in their families who can be self-dependent in terms of

employment should adopt dairying either as the main occupation or as a small scale dairy industry.

- The average milk yield rate was extremely low among all the milch animals in east U.P. Hence, the state department of animal husbandry and dairying must play some crucial role to raise the milk yield rates of all milch animals in eastern U.P.
- The cost of veterinary services and medicines was told to be very high by almost all the milk producers. Therefore, government as well others concerned must pay attention to reduce these costs.
- Extension services on dairying must be strengthened on a war footing as majority of milk producers were not at all aware about the schemes of dairying in east U.P.
- The milk producers of DCS category must be encouraged by all means to increase the quantity of milk to be drawn and sold to cooperative societies.
- The average price for milk sold in case of all the milch animals was found to be lower than the cost incurred. Therefore, the prices of milk of local cows, crossbred cows and buffaloes must be enhanced in proportion of the cost increased.
- To remove the irregular sales of milk under both DCS and NDCS categories, the marketing facilities must be provided at village level for the outlets of milk and milk producers.
- For difficulties in getting loans, the procedures for sanctioning the loans must be made easy and the amount of loans for the purchase of dairy animals must be increased in the proportion of the price of dairy animals.
- To meet the demands of milk producers for advances or bonus from the cooperative societies and vendors, the societies and vendors must advance properly and regularly to keep the milk producers to continue milk production.
- The delivery systems for both inputs and output must be improved in accordance with the needs of the milk producers with some incentives or bonus by the societies.
- Concentrates and supplements must be made available in remote villages timely and at affordable and cheaper prices.
- Proper A.I. (Artificial Insemination) facilities at village level and affordable EVS (Emergency Veterinary Services) at door step must be provided to all the milk producers for boosting milk production in east U.P.
- Overall, almost all the milk producers have emphasised the need for the development of dairy infrastructure for attracting more and more cultivators towards the adoption of dairy schemes and farming in eastern U.P.



# Study of Pressurised Irrigation Network Systems (PINS) in Rajasthan

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## Introduction

- Increasing the area under irrigation has been a challenge for the country. It is therefore important to utilize the available water resources more judiciously so that the 'more crops per drop' slogan of the Govt can be realized and farmers' income can be doubled within the stipulated time period. The Pressurised Irrigation Network System (PINS) (a form of Micro-Irrigation System (MIS)) is a common and shared infrastructure (by group of farmers) facilitating individual beneficiary for installing and operating MIS, so as to increase the area under MIS and promote water saving. It comprises of pipe network with controls, pumping installations, power supply, filtration, and intake well/diggy. The present study has assessed the extent of adoption and performance of PINS in the state in terms of increase in crop output, reduction in the cost of cultivation, water saving and energy saving. The functioning of WUAs in PINS command area, the experiences of beneficiary farmers in the command area using MIS in their lands and non-beneficiary farmers around the PINS command area have also been examined. Data were collected from three selected districts, viz., Bikaner, Jalore and Barmer, covering a total of 200 beneficiaries and 100 non-beneficiary households from canal command areas. The broad study findings are as follows:

## Findings

- The Government of Rajasthan has put in lots of efforts to replace conventional irrigation by micro irrigation so as to improve water use efficiency and to increase area under irrigation in the state. The Pressurised Irrigation Network System (PINS) Programme in Rajasthan is mainly concentrated in two major irrigation projects, i.e., Indira Gandhi Neher Project (IGNP) in Bikaner district and Narmada Irrigation Project in Jalore and Barmer districts. Thus, the main feeder source for PINS programme was canal.
- The study finds that PINS with MIS has been highly successful in both Narmada Project in Sanchore and IGNP in Bikaner district. Under IGNP, the PINS project was started on pilot basis in Bikaner district from 2012-13 and initially only 33000 hectare area was covered. About 3,47,566 hectares of culturable command area (CCA) of these projects have been

targeted to be covered, out of which sprinkler irrigation system has already been established in 27,449 hectares. Under Narmada project, the CCA has increased from 1.35 lakh hectares to 2.46 lakh hectares in Sanchore and Chittalwana (Jalore), Gudha Malani and Dhorimanna (Barmer) districts, an increase by 78 per cent. The number of villages benefitted for irrigation has increased from 89 to 233. The value of food production has been estimated to increase by 2.8 times from Rs. 534 crore under flood irrigation to Rs. 1480 crore under sprinkler. Since there is no flood irrigation allowed in the PINS project command areas of Narmada project, the programme has succeeded in increasing the area under micro-irrigation substantially.

## Adoption, Performance and Management of PINS by Farmers

- Promoting MIS was the main purpose of installing PINS in the selected water scarce districts of the state. All sample beneficiary farmers had adopted sprinkler whereas only 1.0 per cent of them had adopted drip system in the state. Since the sprinkler system is very useful on sandy topography in Rajasthan, the same has been very popular in the state. Among different benefits accrued by the beneficiary farmers by participating in WUA, the increase in area under irrigation (100%), increase in agricultural income (99.0%), water saving due to judicious use of water (97.5%), getting water in right time (88.0%), timely information on release of water from canal (82.5%), proper distribution of water among farmers (68.0%), getting more information on how to use water judiciously (56.7%) and electricity saving due to use of shared pump sets attached with PINS (58.0%) were the major ones. The extent of water saving, electricity saving, increase in irrigated area and increase in farmers income due to adoption of PINS-MIS was 39.2 per cent, 39.4 per cent, 58.5 per cent and 44.7 per cent, respectively.

## Adoption, Performance and Management of PINS by Water User Associations (WUAs)

- Major feeding source for PINS in Rajasthan was canal. The average life span of the PINS system was highest of about 24.4 years. The average area covered under each PINS WUA was 246.8 ha per PINS and average number of beneficiaries covered was 84. The size of PINS was much larger in Bikaner, followed by Barmer and Jalore.
- WUAs were found to effectively carrying out various activities such as operation & maintenance of PINS Project. The main sources of income for these WUAs were annual maintenance fees and annual electricity fees collected whereas the major heads of expenditures were the expenditure on electricity bill, repairing expenses, salary expenses. Since none of them got any assistance from Govt, about 96 per cent of the WUAs wanted to get assistance from Government for operation and maintenance of PINS

project.

### Policy Implications and Recommendations

- The average size of WUA (number of member and area coverage) in IGNP Rajasthan is high as sometimes it covers about 900 ha under one PINS project with more than 200 beneficiary farmers. The large size of WUA becomes very difficult to manage as well as difficulty faced in equitable distribution of water. As a result, tail end beneficiaries turned out to be non-beneficiaries in real sense, since they don't get irrigation water. Thus, it is suggested to install more number of PINS and reduce the number of farmers per PINS-WUA, which would help in proper distribution of water among the farmers irrespective of location of plots in the command area of PINS.
  - In case of IGNP, it was observed that, on one side of canal, PINS systems have been promoted, while on other side, farmers are irrigating crops using flow method. It is necessary to discourage the flow method of irrigation and encourage the MIS with suitable incentives, so that more water scarce areas can be irrigated in Rajasthan.
  - It was recommended to provide 15 sprinkler points to each outlet given at farmer's field. However, due to large size of PINS command area and large number of beneficiaries, the number of outlets has not been provided in proportion to size of plots. It is suggested to provide more outlet points in proportion to size of plots, so that required number of sprinklers can be used.
  - It was observed that some promoting companies (supplying the irrigation infrastructures and servicing) are not functioning properly. As a result, the farmers are facing repeated troubles. Due to low-quality materials, frequent repair happens to be inevitable. On the other hand, much more time is being consumed for repairing and high charge is being imposed since the technician covers a long distance to reach the farmer's village.
  - Some instances were found, where there were a large number of incomplete diggies (mainly in Gudha Malani, Barmer district) since the promoting agency left the scene in between without completing the work. Thus, it is suggested to examine the performance of these promoting companies and treat them with appropriate incentives/ disincentives.
  - The farmers have expressed concern over less subsidy on sprinkler as it is evident that only about 15 per cent subsidy has been realised by the farmers. It is suggested to relook at the subsidy policy of the government on MIS, particularly on sprinklers.
  - PINS programme in the command area of IGNP was started on pilot basis in Bikaner district since 2012-13. This project area was not covered fully in many areas due to some reasons, may be due to limited budget. As a result, some diggies were not made functional properly. Moreover, IGNP system is operating since last 20 years and farmers were habituated and benefited through flood irrigation since then. With the changed situation, farmers were worried about the PINS system related technical problems. Thus it is necessary to provide training and counselling to the needy farmers.
  - During first two years of installation of PINS and formation WUA, the WUA members and implementing agency/promoting companies work together. During this period, all maintenance cost are borne by the implementing agency/promoting companies. There is provision to provide proper training to WUAs to manage the PINS system. However, the quality of such training programme needs improvement. The promoting companies that work closely with the PINS system should be allowed to take part in training provided to the farmers.
  - The cost of electricity has been a major share of total cost of crop cultivation. Farmers often requested to subsidise electricity or to provide solar pump sets to lift the water. At some places, electricity infrastructures have been damaged since a long time, for which more than 500 hectares of land failed to be irrigated. In spite of repeated requests from the farmers, the electricity facilities could not be restored. Thus, it is suggested to take up the farmers' concern in a time bound manner.
  - Since the households are located in a highly scattered manner with low population density, the cost of providing electricity infrastructures was found to be very high. Solar power may be more economical in such situations. Thus, fully automated solar systems need to be promoted in order to meet the farmers' energy requirement.
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# Impact of Neem Coated Urea (NCU) on Production, Productivity and Soil Health in Bihar

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## Introduction

- In recent past, several agronomic trials on agricultural crops with Neem Coated Urea (NCU) have been shown to significantly increase yields at different research stations and at the farm level. Seeing the potential, the National Fertilizers Limited (NFL) adopted this technology and started commercial production of NCU since July, 2004. Subsequently, the Government of India (GoI) mandated that all urea manufacturers in the country should produce and sell NCU from May, 2015 (Vide Notification No. 12012/20/2007-FPP dated 25/05/2015 of MoC & F, GoI). The policy for encouraging production and availability of fortified and coated urea in the country is mainly aimed at controlling the excessive use of urea, which is deteriorating soil health and thereby negatively affecting yields of crops. Simultaneously, the GoI has also launched a flagship programme on 19/02/2015, popularly known as Soil Health Card (SHC) scheme. It aims at issuing SHCs to each one of the 140 million farmers of the country once in a cycle of 3 years on a continuous basis. This will facilitate building-up of the soil knowledge and database in the country and monitor the changes occurring in the soil health status periodically. In the above backdrop, the preferred study was undertaken in Bihar on two sample crops viz., paddy and maize and 400 sample farmers for kharif, 2015.

## Consumption of Urea in Bihar ('000MT)

Tri. Avg.	Kharif	Rabi	Total	Consumption of Total Fertilizers (kg/ha)
2004-06	614.40	665.62	1280.02	100.99
2007-09	761.47	988.35	1794.82	156.02
2010-12	740.69	993.91	1734.60	174.13
2013-15	876.42	1092.58	1969.00	164.93
% change in TA 2013-15 over 2004-06	42.65	64.14	53.83	63.31

- Major Findings
- Examining the impact of application of NCU over NU (Normal Urea) as seen in terms of yield obtained by paddy and maize farmers, it was found that NCU increases yields by 9.42 per cent (from 24.51 qtls/acre to 26.82 qtls/acre) and 7.99 per cent (from 23.38 qtls/acre to 25.25 qtls/acre) respectively. The yield increase of main product and by-product in case of paddy and maize was found to be statistically significant at 10 per cent for both and 5 per cent & 10 per cent respectively.
- Studying the impact of NCU over NU on the important indicators of reducing input costs viz. cost of pest and disease control, cost of weed management, cost of NCU/NU and cost of other items of paddy and maize farmers, it was found that the reduction was statistically significant at 5 per cent level, which indicates the application of NCU in both the crops led to reduction in cost over NU.
- Using Partial Budgeting Method to study the economic feasibility of NCU, it was found that an added return per acre of Rs. 2707.94, and the benefit-cost ratio at 1.29 was obtained for paddy, and an added return per acre for Rs. 2048.50 and benefit-cost ratio at 1.21 were obtained for maize.
- Of the total (400 Hhs), only 39 farmers (9.75%) got their soil tested. Impact analysis on soil health reveals that soil texture, soil moisture retention capacities, water infiltration, soil softness and compaction of soil increased in the range of 24 per cent to 53 per cent at the total farms level.

## Policy Suggestions

### Neem Coated Urea (NCU)

- Training/demonstration programmes may be arranged for creating awareness about the benefits of NCU and its proper application.
- Fertilizer outlets at Panchayat level should ensure easy access and reduced transport costs for the purchase of NCU.
- Supply of fertilizer should be based on season's demand so that neither black marketing or rationing of NCU takes place.
- Strict supervision and monitoring for ensuring timely and quality supply of NCU should be arranged.
- To improve the usage of NCU, irrigation is important, so irrigation back-up may be given to the maximum level possible.

### Soil Health Card (SHC)

- Timely distribution of SHCs in hard copy should be ensured so as to encourage adoption of RDF (Recommended Doses of Fertilizers) on the basis of soil test report.
- Involvement of farmers is desirable for successful implementation of SHC scheme. Right from the



collection of the soil samples to distribution of SHCs their involvement may be mandated.

- A coordinated and integrated approach comprising all agencies, such as; KVKs (Krishi Vigyan Kendras), STLS (Soil Testing Labs) and SAD (State Agriculture Department) may be evolved for creating and spreading awareness about the benefits of soil health.

- Adequate manpower, funds, technology and skill should be made available to the implementing agencies.
- Proper training should be imparted to the farmers for the collection of soil samples.
- Mobile soil testing camps may be organized at village/panchayat levels at regular intervals.

## Towards Doubling Farmer Incomes: Direct Procurement by Organised Retailers

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### Introduction

- There has been considerable policy focus in recent times on marketing reforms to benefit the farmers in getting remunerative prices through reducing the long chain of intermediaries from producer to the consumer and helping the former to garner higher share of price paid by the consumers. Organised retailing has been taking roots and growing rapidly over the last decade as a result of these policy initiatives of the government as well as private sector response and demand side factors like rising per capita incomes, urbanisation and demographic shifts. The implications of these changes in the value chains on the Indian farm economy especially on the resource poor small farmers as well as on the consumer food prices have been debated widely in the country. There are apprehensions that the small farmers may not be able to participate in this due to factors such as quality parameters used, and might not benefit even if they participate.
- Research is being conducted by the author at the Institute of Economic Growth specifically on this issue. A field study was conducted in Telangana state through a sample of 245 vegetable growers, among whom are both those selling to organised retailers, and to traditional mandi and commission agents. The objectives of the study are to find out the impact on farmers income of those selling to these modern retailers as well as to understand the determinants of participating in them. Data are analysed with advanced econometric tools to isolate the specific impact by taking care of the fact that better off farmers might self-select into participation of supermarket collection centres.

### Findings

- The first significant finding is that farm size does not impede participation in modern marketing channels. However, it is the possession of irrigation that conditions their participation. Farmer households that are endowed with higher share of plots with access to irrigation are more likely to sell their produce in the supermarket. Expectedly, farmer households located further from alternative marketing channels (such as wholesale markets or Rythu bazaars) than those near traditional markets are more likely to sell their produce to a supermarket. Access to a supermarket significantly reduces the transaction cost of selling produce for farmer households who live far from traditional markets. Having friends and relatives working in the supermarket network significantly increases the probability that they will supply their produce to a supermarket channel.
- Secondly, econometric analysis on impacts on net income of farmers shows that direct selling by farmers to the supermarket collection centres reduced transaction costs and increased net income significantly. The farmers with lower returns from vegetable farming are likelier to earn a higher return if they participate in the supermarket channel, probably because supermarket collection centres solve some of their unobserved shortcomings in marketing their vegetable produce. The results confirm that participation in the supermarket channel increases net margin per acre by Rs. 22,834. A one percent increase in the share of produce sold to the supermarket raises net margin by Rs. 378 per acre.

### Recommendations

Policymakers, therefore, may encourage supermarkets to procure produce directly from farmers. It is worth considering innovative schemes (like direct farmer purchase scheme, as in China) and incentives (like tax exemption for purchases from farmers' cooperatives and construction of collection centres). Higher investment in irrigation, and a policy framework that enables diversification into high-value crops, will go a long way in promoting this transition. Further research at the pan-India level is needed to dispassionately analyse the impacts of this agri-food system transformation.