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## **Rapporteur's Report on Input Delivery System Including Irrigation and Other Services and their Efficiency, Role of Financial Sector**

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### INTRODUCTION

The theme received in all twenty-eight papers. The contributed papers are of diverse dimensions of input delivery, use, and efficiency, and hence, based on their focus, grouped into eight sections, with varying number in each of them, ranging from institutions, credit dimensions, irrigation use, fertiliser and seed supply and use, insurance, use of machinery, and input use efficiency.

### INSTITUTIONS IN INPUT DELIVERY

There are nine papers on institutional dimension of input delivery. One paper is on the impact of Agri-Clinics and Agri-Business Centres (ACABCs) on input and service delivery. The scheme of ACABCs by the agricultural graduates with the financial support from the NABARD, ever since it was launched in 2002, there has been considerable interest among policy makers and scholars on the functioning of these centres, but yet not many analytical studies exist. The paper is based on a study of ten randomly selected agriventures in two nodal training centre (NTIs), one each from two districts of Maharashtra, a state which ranks first in India in terms of candidates trained and agriventures developed under the ACABC scheme. With a sample of 150 beneficiary and 50 non-beneficiary households, the study conducted in 2015-16 shows the positive results of the scheme which not only generated substantial income from crop enterprise but also from various animals reared by them. The beneficiary household annual income generated was 61 percent higher than non-beneficiaries. The difference was due to higher allocation by beneficiaries to high value crops, better crop management, better quality and prices secured. The inputs and extension services provided by agriventures helped in augmenting their incomes. The paper suggests the need for the AIABCs to increase their outreach to more farmers and for improving the ease with which loans could be attained facilitating more clinics to come into existence.

Participatory Irrigation Management (PIM) was extensively promoted in 1980s and 1990s. There is another very perceptive paper on costs and benefits of irrigation institutions like the Water Users' Associations. The institutional arrangement in the form of Water Users' Association (WUAs) have come into existence in many parts of the country with the objective of better maintenance and distribution of irrigation water, but

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not many systematic studies are available. This paper is based on a study of 40 (20 functioning and 20 non-functioning) randomly selected WUAs of Kurinjirapuzha Irrigation Project (KPIP) in Palakkad district in Kerala. The focus is on transaction costs (TCs) in relation to the likely benefits under WUAs. The study develops an appropriate methodology to measure TCs, and, by decomposing the TCs, provides the estimates of information and decision making costs (70.8 per cent) and contractual costs (15.5 per cent) in canal management. The findings show that the net benefit due to collective action under WUAs by way of better maintenance and management was almost Rs. 9000 per hectare and the cost sharing by member farmers was insignificant compared to the benefits. The paper suggests that the defunct WUAs could also revive by introducing cost sharing mechanism that would enhance the responsibility of the members and better functioning.

The other paper on the institutions of Participatory Irrigation Management (PIM) includes a study of two different but collective or cooperative organisations in Rajasthan. The paper on 'transferring irrigation management' in Rajasthan was based on the study of WUAs formed by the government department (CADA) in Kota district, and Lift Irrigation Cooperative Societies (LICs) formed with the help of an NGO in Banswara. The power for the lift for the latter was provided by the State. The results of the study conducted in 2007-08, based on sample of 50 farmers from each of these institutions, shows that these institutions "helped in equal distribution of water resulting in reduction in irrigation water disputes, increased crop yields due to optimum use of irrigation, increased cropping intensity, reduced migration, improved food security and self-employment. An instructive finding of the study was that though both these collective institutions had positive impact on efficiency in irrigation water use and overall farming performance, the benefit-cost ratio (BCR) of farmers in LICs in Banswara was higher at 1.27 compared to those in WUAs in Kota with 1.15. The paper present clear evidence for this difference in terms of level of participation, O&M, water management and financial management, in all of which, Banswara had higher performance score compared to Kota. A clear indication capacity building of collective organisation matters significantly.

Another paper on institutions looks at agricultural marketing information (AMI) as an important input in agriculture. The paper is based on a study of AMI of two regulated markets in Meghalaya. With a sample of 60 farmers representing different size-class holdings from each of these two regulated markets, the paper shows a clear size-class difference in making use of AMI, which, overall, of course is limited to all groups. The large farmers are in a better position to obtain AMI at the regulated markets than the others. The paper suggests that though sparse inhabitation and geographical barriers were limiting factors in the hill region, the use of modern information and communication technology (ICT) could be pressed to the service of AMI. There is one paper on the institution of contract farming. In the context where contract framing is widely recommended as one of the solutions for farmers in accessing inputs, better farming practices and remunerative prices, this paper on 'input delivery system under contract farming' comes out with startling limitations of the system in the case of poultry/broiler production in Maharashtra. The problems faced by contract farmers include not only the usual ones faced by the non-contract farmers, but, in addition, those arising out of non-

adherence to some of the contract requirements like delay in supply of inputs, high feed prices, delay in lifting produce etc. No written contract or insurance was in evidence. The findings show that average net return per Kg of live weight as well as per bird had been found to be higher in the case of non-contract farmers than the ones under contract! The need is, as the paper suggests, proper legislation on contract farming and implementation of the provisions of the same.

One of the papers on the institutional arrangement for the production and delivery of seeds is based on the role of self-help groups (SHGs). To improve timely and quality supply of seeds to farmers, there have been several institutional measures that have emerged in recent times. The idea of 'seed village', and the SHG initiatives in seed production within village are some of the select initiatives. This paper is based on the analysis of a case study of paddy seed production by one SHG in Allahabad district. For the production of seed, some of the members are selected and supplied foundation seed for multiplication. The assigning of this role to members is seen leading to individual benefits. The study shows that access to land, power, and social status, play a role in the choice of the members for seed production which may violate the basic principle of equity in the SHG movement!

Another paper based on a small sample of twenty rice farmers in a couple of villages in one block in Allahabad district analyses the institutional arrangement for the delivery of pesticides. The paper finds that of the four institutional sources, the performance of the three public institutions viz. government department, cooperatives and UP Agro was not satisfactory and hence the fourth viz. 'private shops' end up accounting for more than 90 per cent of the pesticides purchased by the sample farmers. But the private sources charge high prices, often the products are adulterated, and yet remain the sole suppliers especially to remote areas. The paper calls for improved role of cooperatives and UP Agro in reaching the remote ones and the nearer. Also the need is to effective control and regulation of the private pesticide dealers/sellers. Yet another paper related to institutions is the one that attempts the impact of 'Farming Systems' of tribal farmers in Rajasthan. But the paper has no reference to the mechanisms of input use or delivery in the farming systems and may be in for more clarification that should follow in presentation.

There is a very interesting paper on the role of new technology in assessing the soil nutrients that would help design the fertiliser combinations to be used in different locations and also plan for appropriate marketing network to reach the desired inputs to the farmers. The study highlights the role of space technology in agriculture by utilising the Geospatial Information System (GIS) in assessing the nutrient status of soils in UP, and the market network needed to meet the fertiliser demand. The findings show that UP soils are efficient in nitrogen but deficient in Phosphate + Potash, and Phosphorous is not well distributed. The study brings out the deficiency in fertiliser outlets in providing right combination of NPIC, and suggests augmenting the distribution network to supply right combination of fertilisers by locating outlets based on GIS.

Together, these eight papers on the institutional arrangement for input delivery bring out very interesting and, from policy perspective, very significant results. Collective institutions like the ACABCs in the case of access to inputs and farm business as a whole, and the Water Users' Associations (WUAs) and Lift Cooperatives (LICs) have positive

impact on farming and farmers' efficient and profitable use of inputs, but their reach is still limited and the need is to improve their managerial capacity and ease of accessing credit sources. The conventional public institutions like government departments, cooperatives, and agri-corporations seem to be under continued constraints of bureaucratic practices that limit their efficiency, often driving the farmers into the fold of unscrupulous commercial interests. On the contract farming, the Maharashtra example of poultry farming shows there is need for effective machinery for the enforcement of the contracts that would deliver the intended benefits to the farmers. The private traders (not only as pesticide dealers) have emerged principal suppliers of inputs, often extending informal credit at a premium, and still get away without any proper regulatory system in place. The paper on the use of Geographical Information System (GIS) is only the tip of the iceberg in revealing the potential of the remote sensing technology in the aid of not only in designing the appropriate use and supply of inputs but also agriculture as a whole.

#### CREDIT FLOW AND FINANCIAL INSTITUTIONS

There are six papers which deal with the role of financial institutions or credit flow to agriculture. The paper on 'input supply in agriculture and the role of financial institutions' sets out with a very wide scope to examine in the trends in the utilisation of agricultural inputs in the country as a whole and seeks to link the same with the trends in agricultural production and credit supply. The result is a kind of correlation that is likely to be read as the increase in the use of agricultural inputs and the agricultural productivity and production as a result of increase in credit to agriculture. But this kind of macro-analysis may not help to throw any light on the complexity of relationship between the basic institutional situation of land holdings, the differential access to credit and the consequent differences in the input use and productivity across space and structure of agrarian operations! There is another paper, which comes as a quite in contrast to the one above and deals with the questions of financial inclusion and exclusion of marginal and small farmers. Based on the banking statistics and the data from NSSO 59<sup>th</sup> and 70<sup>th</sup> Rounds, the paper shows that though there was phenomenal increase of institutional agricultural credit to agriculture, only 41 percent of the credit disbursed reached small and marginal farmers who constituted about 85 percent of holdings and 45 percent of area cultivated. As a result it is suggested that small-marginal farmers continue to be pushed to non-institutional sources. It concludes that what happened in the name of institutional credit expansion to agriculture was more in the form of credit deepening helping big borrowers including agri-entrepreneurs but not credit widening which could have helped inclusion of small marginal farmers.

A paper on Haryana details a larger picture of the changes in productivity of different crops, the livestock status, the target and achievement of agricultural credit over the years, and finds that much of the credit is taking the form of short-term crop loans, and also diversion of agricultural credit to non-agriculture. The paper recommends that in the interests of growth in agricultural productivity, there is need for increasing the share of long-term credit agriculture.

Another paper is on the 'role of cooperative credit institutions in agriculture'. Based on one single Primary Agricultural Cooperative Society (PACS) under the Manipur State Cooperative Bank (MSCB), the paper analyses the performance of two-tier cooperative credit institutions. The results show that the relative position of the cooperatives have declined because of the rise of the share of commercial bank credit. There were, nonetheless, several positive aspects of the PACS in terms of liquidity position which was satisfactory, efficiency ratio was positive, and recovery performance was also satisfactory. In terms of long-term solvency and profitability was found not up to the mark. But it was surprising to conclude that the PACS was deteriorating, just because its share in credit extended was declining, but not the absolute amount which did show increase! There is another paper again on the North-East which deals with 'agricultural credit as an input enabler'. The basic thrust of the paper is on the gross disparity in the flow of institutional agricultural credit to the North-East region. Though there has been phenomenal increase in the overall increase in the institutional credit flow to agriculture, even in 2016-17 the share of North-East region was a meagre 0.81 percent of the country as a whole. It was much lower than North-East share of 2.83 percent in gross cropped area (GCA) and 2.02 percent in overall foodgrain production. As a corrective the paper suggests improving agricultural credit absorption capacity as much as improvement of infrastructural facilities in the region. One of the papers discusses the 'growth and trends in agricultural credit in U.P.'. Besides the use of secondary sources, the paper also collected primary data from two regions viz. Western U.P and Bundelkhand. Broader trends in U.P., as elsewhere show, that the share of long-term credit to agriculture is on the decline, and the reach is much less to the marginal farmers. The empirical results show that SC farmers in both regions continued to depend heavily on informal sources and often are overburdened to the extent of non-repayment of loans. The paper suggests special strategy of banks towards SCs in U.P. to enable them to overcome their agricultural indebtedness.

These six papers on financial institutions and their agricultural credit flow to agriculture do not have anything specific as a focus on their role on the input delivery system. While the paper on 'input supply and the role of financial institutions' raises some hope on the face of it, it dissipates into lining up aggregate data on the trends in the use of different inputs like fertilisers, pesticides etc. and running a regression on the relationship of aggregate credit flow with agricultural production. The trend growth in the aggregate agricultural credit is seen as improving agricultural input use and increase productivity and production of agriculture. At best some correlation! The paper on Haryana too digresses into agricultural credit diversion and the relatively slower growth of agricultural credit in Haryana and suggests shift in favour of long-term credit. The other paper on U.P. too is too wide in scope but draws attention to the fact that the pace of credit expansion has been much faster than its pace of reaching to small-marginal farmers. Of the two papers on the North-East, one shows the disproportionately low share in the flow of credit to the region, and the other shows the difficulties in the performance of two-tier cooperatives in the region.

## IRRIGATION EFFICIENCY AND GROUNDWATER SUSTAINABILITY

There are two papers, one of which discusses irrigation water use efficiency, and another on private investment in groundwater. The paper on enhancing irrigation water use efficiency compares the efficiency of groundwater use with subsidised or free electricity, with the water use for irrigation under the canal network, and lift irrigation by using diesel. For the purpose comparing electricity use for lift with diesel two villages from Uttar Pradesh, and for comparing with canal water sample villages from Punjab were selected. The findings suggest that low, flat or heavily subsidised canal water or electricity to agriculture as in Punjab gives no incentive to farmer to irrigate crops optimally and the resulting excesses in irrigation not only reduces crop productivity but also severely depletes groundwater to unsustainable levels. In contrast, the use of diesel for lifting water shows controlled use of water since the excess would increase marginal costs. Such an optimal use of groundwater is not only results in better yields, but also better conservation of groundwater. The paper recommends pro-rata pricing of electricity for agriculture instead of flat rate, and volumetric pricing of canal water. The other paper on irrigation is on the role of private investment in groundwater in West Bengal, where the growth of private water market in the post-monsoon season leads to reverse tenancy. The study based on data from a few villages in Murshidabad district applies game theory and comes out with the results that under reverse tenancy in dry season large farmers in the possession of lift irrigation technology extend cultivation that benefits both the small and large farmers from the seasonal leasing, without the fear of loss of the existing tenancy (Barga) rights.

## MECHANISATION

There are two papers on agricultural mechanisation. The one on Himachal Pradesh with an emphasis on mountainous terrain is based on secondary data. The findings show that since the cultivable land is scattered, the extent of farm mechanisation is low and the use of electricity in agriculture is hardly one percent of the total power used in the state. There was nonetheless, more than doubling of sale of tractors in the state from about 2.5 lakh in 2004-05 to 5.5 lakh in 2014-15, and a similar increase in power tillers between 2004-05 and 2011-12, but a reduction in the sale in 2014-15. The paper, besides recommending use of more power tillers that are suitable to the hilly terrain, also recommends facilities like custom hiring to modernise agriculture in the state. The other paper on Punjab shows the way to custom hiring. The paper is on the question of 'inclusive and effective' institutions to facilitate mechanisation. This paper could as well be part of the institutions in input delivery! Based on case studies from Punjab, the paper analyses two types of custom hiring institutions viz. the ones which are part of PACS, and the others which are private enterprises. The focus is on the 'inclusiveness and effectiveness' of various service providers in the custom hiring space. By drawing a sample of PACS attached custom hiring centres in Bathinda district, and a sample of private units of the large scale private enterprise, ZFS, from Fazilka, the study shows that there is large demand for these services by the small farmers. There is a clear indication of better inclusion and effectiveness in terms of small farmers' access to PACS custom



hiring services. Lower cost, availability for infrequent use, and proximity, all weigh in favour of PACS custom hiring by small farmers. The private services, ZFS, are used by both small and large farmers without much of complaints. The paper suggests that there is wide scope to spread the Punjab PACS model of custom hiring to other states as well. May be this should precede the spread of Punjab model of PACS!

#### INSURANCE

There are two papers on insurance, and both relate to Gujarat, which may be leading the insurance wave! Based on the analysis of the data for the period 2000 to 2014, the paper on 'retrospective crop insurance in Gujarat', focuses on the status of crop insurance across crops and districts of Gujarat. There has been striking skewed picture in the coverage of crops and also in the coverage of districts. While some crops experienced double digit growth in insurance coverage, there are others which suffered double digit negative growth! Same pattern of skewed distribution is observed across the districts as well. The paper, as it is, is dense with data-based narration and difficult to expect any explanation but the large patterns do unfold. Most of the crop insurance opted by farmers (97.2 per cent) was in *Khari* season only. The paper suggests that for the fair spread of crop insurance, including the new PMFBY, there is need to sensitise farmers on the need for crop insurance. The other paper on the 'role of socio-economic factors' in crop insurance in Gujarat makes use of the NSSO 70 Round data effectively and comes out with the findings that crop insurance has caste dimension with upper caste more likely to insure, and also a class dimension with better income households preferring insurance. It also shows that those with better irrigation tend to prefer less of insurance and those dependent on crop farming opt more for insurance. This paper too recommends that for better results from the PMFBY, there is a need for a crop insurance campaign to sensitise farmers.

#### FERTILISERS AND PLANT VARIETY

There are two papers, with diverse focus, one on neem coated urea, and the other on relative costs and benefits of two varieties of banana. Since 2015, the Government of India made it mandatory that all urea either domestically produced or imported should be neem coated for selling under the government subsidy scheme. In this context the paper on 'neem coated urea' (NCU) analyses the yield impact on select crops like sugarcane and tur, and also the farmers' preference as well as the economic feasibility of NCU usage in Maharashtra. The study shows growing adoption of NCU and reduced overall consumption of urea by NCU farmers compared to non-NCU farmers. And for both the chosen crops there was positive impact on the returns for NCU farmers compared to the control group. The significant finding is that for the NCU farmers, though there was reduced use of urea, thereby reduced cost, there was increase in the yield which together resulted in substantial increase in the benefits as a ratio to NCU cost. The paper recommends strengthening extension activities for the expansion of coverage of the NCU practice. The other paper is on the relative performance of two varieties of banana cultivated in the Nanded district of Maharashtra. Based on a sample of 42 farmers

cultivating 'grand naïve' variety of banana and an equal number cultivating 'ardhapuri' variety spread across six villages in Nanded, the study finds that the output-input ratio was as higher as 2.19 in 'grand naïve' compared to only 1.96 in 'adhapuri' variety.

#### INPUT USE EFFICIENCY

And at last, here is a lone standing but near outstanding analysis of 'dynamics input use efficiency'. "In this study, ... an attempt has been made to find out the efficiency of different inputs used for cultivating six different crops .... by utilising cost of cultivation survey data from 1985-86 to 2013-14". It shows that the crop output per unit of input has not increased, efficiency of inputs like fertilisers have either decreased or fluctuated, and no evidence to show that inputs are used more effectively in high productivity states than in the low states. In crops like gram and sugarcane, low productivity states outperformed the high productivity ones. Overall, the results show that inputs were not used efficiently in all the selected crops, possibly because of suboptimal price received by the farmers. (And what a way to conclude the report on a theme on input use efficiency? Real, yes. But post-truth manipulations a possibility).

The scope of the theme was intentionally kept wide with the objective of inviting contributions on a wide ranging and even overlapping issues related to agricultural input delivery in terms of institutions, use efficiency and accessibility as facilitated by the financial and technical reach. Large number of papers, expectedly, is on institutions, while other papers focused on one or the other of inputs and the status of their access to the farming community. By and large most of the papers are based on primary data and field-based studies. The methodology used have a range: from a simple ratio or regression to a game-theoretic conceptualisation and analysis. In the process of compressing the ideas and approaches as much as the results, for the purpose this overview, there might have been unintended neglect of some critical aspects which could come alive, hopefully, in the presentation and discussion.



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