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Agricultural Innovation Through Public - Private Partnership

Public private partnership (PPPs) in agricultural R&D are being increasingly viewed as an effective means of conducting advanced research, developing new technologies , and deploying new products for the benefit of small- scale, resource- poor farmers. PPP is any research collaboration between public and private sector entities in which partners jointly plan and execute activities with a view to accomplishing agreed upon objectives while sharing the costs, risks, and benefits incurred in the process. Public investment in productivity enhancing agricultural R&D has been declining in most of the world outside china.

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Introduction :

Agricultural science has always played a critical role in economic progress in both developed and developing economies. Through agricultural R&D, welfare improvement has been realized in the form of lower food prices to domestic population, improved nutrition, expansion in rural employment, agricultural exports and enhanced level of foreign exchange, competitiveness of agricultural commodities in the world markets and strong growth linkages with rest of the economy. During the green revolution period, adoption of new technologies has helped to improve the income distribution across income classes.

The research centre across the country came under the one roof of Indian council of agriculture research. Corresponding changes occurred at the state level with the transfer of research and education to state agricultural Universities (SAUs). All these efforts culminated in the development of agriculture as a modern sector along with rest of the economy and agriculture emerged as key sector. This paper highlights the research, confronts faced and the benefits that was taken place in Indian agriculture.

Indian agricultural faces daunting challenges. The constraints of low productivity in agriculture were realized and thus, central and state governments emphasized the need for accelerated development of agriculture. Despite national food surpluses, wide spread poverty and hunger remain because the growth of agriculture and the national economy have not adequately benefited the poor, policy reform alone will not be enough to increase agricultural growth and to make it more equitable. The policy reform must be accompanied by appropriate and efficient investments in public goods such as rural infrastructure, irrigation, agricultural research and extension, and the education and health of rural people. India has proven in the past that agricultural growth can be success fully achieved with the right public investments, even when economy wide policies were unfavorable towards agriculture. Thus, India's promise of the future lies in combining policy reform with the right levels and kinds of public investments.

Research in Indian Agriculture - Public Sector :

An examination of facts and figures clearly establishes that agricultural research during the second half the 20th century has been remarkably successful. Of any organization depends largely on the commitment of people who work for the organization. A lion share is of the funds go to salary and allowances of regular employees (about 75% of financial support provided by the state government) and, of the remaining 15 per cent, large part of it is used for meeting the operating costs. Only 10per cent of the total budgetary provision is available for infrastructure which is hardly sufficient to meet the upkeep of the existing infrastructure. Obviously,modernization of research infrastructure is not moving forward at a pace, it is expected to move. The SAUs receive 60 to70 per cent of the budget form the respective state government ; it covers three fourth of the salary of staff and the remaining part it met from ICAR and other sources. Though about 20 per cent of the funding comes from ICAR, almost 70 per cent is allocated under all India Coordinated Research project. The state government allocates 10-15 million annually under part II plan schemes exclusively meant for funding research projects of immediate importance or for creating specific

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infrastructure. This provision can also be reduced unexpectedly (in a financial year) by either the state planning commission whose approval is necessary for budgetary allocation or by Agricultural secretary to accommodate other purposes with in the agricultural ministry. Even though the annual growth rate of research expenditure is estimated to be 7 per cent, the annual salary increments, increases in dearness allowance and rise in the cost of operating costs just compensate the enhanced budget. But, the growth in allocation to research in real terms is much smaller.

Research in Indian Agriculture - Private Sector :

The private sector in India has also made large investments in research and development relevant to agriculture. This investment has increased rap idly over time. The amount of agricultural research and development in the private sector is now approximately half the amount in the public sector.

The private sector investment in agricultural R&D has been accompanied by consolidation of chemical seed and biotechnology companies. With the decontrol of regulations, the private research expenditure increased by 70 per cent between 1985 and 1995 in India and the momentum is continuing. In the year 1991, private sector investment on research was only of 231.7 million and by 2009 , the investment got multiplied by almost 14 times. The companies which have made investment in agricultural research fall in the categories of seeds, fertilizers, agrochemicals, agricultural machinery and sugar. While machinery, seeds, and agrochemicals categories have shown an increasing trend in R&D investment, fertilizer and sugar companies have not raised the level of research investment over the years.

The liberalization of Indian economy since early 1990s has opened up opportunities for MNCs dealing with agro inputs, seeds and agricultural machinery to expand their activities in India and many of them have launched joint ventures. Thus, the private sector agricultural research has achieved a credible performance contributing to increase in TFP in Indian agricultural. R&D on fertilizers can be categorized as one relating to fertilizer production and the other relating to consumption.

On the production side, research comprises fertilizer production processes, product development, and market research and supply chain and is carried out by both public sector and private sector R&D units of the respective fertilizer manufacturing companies. Besides 9 large public sector fertilizer companies. 15 private sector fertilizer companies have established strong in- house R&D centre. Over the years, to ensure that it is well prepared to meet the challenges of fast changing world and remain the market leader in the industry, the fertilize R&D centre are involved in the in depth surveys to understand the market demand and plan their production. These centres are spearheaded by highly qualified and experienced scientists; engineers and technologists.

Now the emphasis of private sector R&D units of fertilizer companies is on creativity and ingenuity to develop products most suitable for the end-users. They are also seeking the recognition by the Department of scientific and Industrial Research, Govt. of India and look obtaining patents and allow the researcher to publish scientific papers. R&D in micro irrigation is getting priority in investment. Private companies having known the huge market ahead for micro irrigation are investing sizeable quantum of funds on R&D in micro irrigation.

Returns and outcomes :

Private sector research and modern inputs were important during this period. The returns estimated for public agricultural research are high and consistent with evidence from other studies. The returns to investment in public sector agricultural research and extensions programs are high far higher than the average from public sector investment in India. Several types of investments are associated with and contribute toTFP growth. Public agricultural research explains nearly 30 per cent of TFP growth between 1956 and 1987 and almost half of it since the Green Revolution.

Expansion in the private sector R&D has been motivated primarily by advances in biotechnology-strengthened IPRs, globalization of markets, and new opportunities to collaborate with public sector institutions. Recent years have witnessed a different story with more farmers using hybrid seeds of cotton, maize ,millets, sunflower and vegetables with rice hybrid slowly picking up. The private sector strengthens their activities by sourcing breeder seed from ICAR and SUAs.

The performance of private sector in seed production business of private sector in seed production business has become superior as the private firms have been commercializing and marketing new varieties more efficiently through their network than the public sector does.Fertilizer product are largely the outcome of R&D efforts of the private sector , particularly the MNGs. The consumption of chemical fertilizer has in doubled a period of fifteen years. The industry is developing fast in terms of using the latest world class technology in manufacturing processes to prepare innovative new products, For significant yield losses in food grains due to pests and non-essential herbs, agrochemicals application has proved to be an effective solution. The dynamics of product development in agro chemicals show that newer and newer products are being introduced in the market due to technological advancements and competition.

Leading national and multinational companies apart, a number of small sized companies are involved in production and sale of agro- inputs, For the production of inputs such as bio-pesticides , bio- manures, bio- fertilizers, small machinery and implements, the small companies source the technologies developed at the public research institutions. The continuous quest for higher productivity

in the global agricultural markets has a direct effect on the demand for engine powered products. Private R&D develops current generation equipment providing farmers with all levels of power and higher efficiencies. The new models of machinery are expected to be more productive. New, a number of database are available and used for forecasting the models. Currently, there are about 19 tractor manufacturers in India (Agricultural Research Data Book, 2009).

Economic surplus approach was used to project the welfare benefits of adopting Bt eggplant in India, Bangladesh, and the Philippines. The welfare benefits ware estimated at $411million, $37million, and $28 producers was about 57% and 43% of the total surplus respectively.

Conclusion :

Public private partnership (PPPs) in agricultural R&D are being increasingly viewed as an effective means of conducting advanced research, developing new technologies , and deploying new products for the benefit of small- scale, resource- poor farmers. PPP is any research collaboration between public and private sector entities in which partners jointly plan and execute activities with a view to accomplishing agreed upon objectives while sharing the costs, risks, and benefits incurred in the process. Public investment in productivity enhancing agricultural R&D has been declining in most of the world outside china.

Private investments and capability, on the other hand, continue to grow. These trends open up the need and opportunities for R&D partnerships that pool assets to farmer's benefit. While the public sector provides strength in crop improvement, private organizations contribute expertise in plant sciences, genomics, bioinformatics, and the marketing and delivery of products and services. PPP in agricultural R&D is increasingly emerging as an effective means of conducting research in frontline areas of science and technology, commercializing new technologies, and deploying new products for the benefit of small- scale farmers, food insecure consumers other marginalized groups. The partnerships offer a means of tapping the strength of various partners and channeling knowledge and resources into areas where they can address complex development problems. The private sector plays a particularly critical role in spurring agricultural R&D, especially when combined with public sector initiatives within mature markets with strong intellectual property rights (IPR) to protect returns on investment. This synergetic effect enables returns on investment by taking advantage of the private sector's technical expertise, and the public sector's knowledge of local needs and networks.

The future of Indian agriculture will be one of knowledge and technology intensive and wider dissemination of the same cannot be accomplished in isolation. All categories of players, viz, public and private, and large and small must be involved in promoting the technologies. The agro-input industry has to closely work with government to realize the objectives. Policy environment must ensure a continuous encouragement to the private sector for attracting more investment. Mechanisms can be evolved for accreditation of private R&D,MOUfor forging functional relationship and protocols for transferring / sharing technologies, materials and unique facilities. There is ample scope for intensifying human resource development through initiation of fellowship and professorial chairs by the private sector in focused areas of research. Private sector has a good amount of expertise which can be used in agricultural management process within NARS.

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Agriculture needs and credit for marginal producers and the role of Regional Rural Banks : A study of Gwalior district

The main purpose of establishing Regional Rural Banks is to provide credit and other facilities particular to small and marginal farmers, agricultural laborers, rural artisans and small entrepreneurs for developing agriculture trade, commerce, industry and other productive activities in rural areas. The present study aims to show the agriculture needs of marginal producers and the role played by the Regional Rural Bank in Gwalior district by providing credits for cultivation. I endeavor to throw light on the geographical and environmental factors which cause the reduction in production and how Regional Rural Banks are helpful for marginal farmers and agricultural laborers. Key Words : Agriculture Credit, Regional Rural Bank, Budget.

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Introduction :

India is agriculture country where about two- third of its population depends on agriculture. In this way agriculture is the core sector and the back bone of Indian economy and the means of livelihood for most of the population of India. India is developing country where farmers are less equipped to use entire land for cultivation because of lack of money. Besides this, rural people also face the geographical and climatic forces which affect the production of crops. Indebtedness is an age- old problem in India. Through the centuries, farmers have been exploited by moneylenders, landlords and traders etc. because as a non- institutional agency they provided money on high rate of interest to the weaker section of the society. In India, there is abundance of resources for agriculture and industrial development but they are not distributed in a proper manner and this imbalance in distribution decreases the productivity of cultivation. Partial distribution of money in agriculture sector is another drawback in economic development of country.

Institutional agencies comprise of Co-operative institutions, Scheduled Commercial Banks and Regional Rural Banks. Regional Rural Banks were established on 2nd October 1975. It stepped a great move to set free marginalized farmers from the clutches of moneylenders by providing cheap and cost- effective financial services to farmers. The Narasimhan committee on rural credit (1975) recommended the establishment of Regional Rural Bank, as it was of the view that neither commercial banks nor co-operative institutions were able to meet agricultural credit needs. Another major step taken towards the development of rural credit was the establishment of NABARD in 1982 by a special act of Parliament on the recommendation of the committee to Review Arrangement for institutional Credit for Agriculture and Rural Development. Its mission is to "promote sustainable and equitable agriculture and rural prosperity through effective credit support, related services, institution development and other innovative initiatives."[(1)] There are more than 30,000 Commercial Bank branches, 14,000 RRBs and about 100000 rural credit co-operatives.

Objectives of the study :

(1) To discuss the agricultural needs and credit for needy producers in Gwalior district.

(2) To show the role of RRBs in improving the conditions of the weaker section of the society in Gwalior district.

Research Methodology :

To achieve the objectives, the study is based on secondary data. Secondary data are obtained from the published Annual Reports of Gwalior- Datia RRBs, journals and research papers.

Gwalior District at a glance :

According to District Ground Water Information Booklet, Gwalior District lies between North latitude 25° 43' and 26° 21' and East longitude 77° 40' and 78° 39' of Madhya Pradesh. The district is bounded by Bhind and Morena in the North, Datia in the East and Shivpuri in the southern direction. There are 3 Tehsils and 4 Blocks in the district. The block headquarters are Ghatigaon, Morar, Dabra and Bhitarwar and the total population of the district is 16, 29881 (As per census 2001). Gwalior district falls under

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Ganga basin, Yamuna Sub basin, Sindh and Kunwari Minor basin. The climate of Gwalior district is characterized by hot summer and dryness except during southwest monsoon season. The soil of the district can be divided into 4 groups: Well drained clayey soil on moderate slopes, deep well drained firm soil on gently sloping, very shallow, well drained loamy soil on gentle slopes and moderately deep to deep, well drained to mod drained fine soils on very gentle slopes. Principal crops of this area are wheat, paddy, jawar, Bajra and others.[2]

Geography and geomorphology of Gwalior district vividly show the agricultural needs of farmers. The needs of farmers have been discussed on the basis of climatic factors and soil types. There are certain agricultural needs of needy producers as:

Agricultural Machinery :

Indian economy is based on agriculture therefore to enhance the progress of country it is essential to adopt modern scientific techniques of agriculture. With the help of machine, agriculture work can be done with great ease, less efforts and with minimum labors. With the explosion of human population the agricultural land is being contracted day by day. Human labor and farm animals are not enough to cope with the increased demand of food production. The needs of machine are felt deeply because it reduces time and labor expenditure. But some weaker sections of the society are not able to purchase machines and are being indebted to non-institutional sources.

Animal husbandry :

For more than hundred years animals are being used for agriculture in India. Animals are used in agriculture for tillage, sowing and to carry the production from home to market. The lack of animal not only affects economic condition of producers but market also. Increment of human population affects the crop production. In the same way, the need of animal production is also felt. To meet the excessive demands of milk, meat and eggs and for earning farmers adopt the mixed farming. The people of Gwalior district suffers from lack of animals in agriculture.

Irrigation :

Without irrigation crop cultivation is not possible. The necessity of irrigation equipment is felt deeply. For better crop cultivation, farmers use equipment to produce crops twice and thrice. The reduction in stream run-off adversely affects the irrigation. The average annual rainfall of Gwalior district is 900mm. Ground water is the main source of irrigation in the district. Surface water irrigation facilities are also available in Gwalior. The other irrigation practices adopted in the district are through dug wells, tube wells and tanks. Changing patterns of rainfall and warming temperatures affect the crop production adversely. Low and excess of rainfall severely reduce the crop production and affects agriculture.[3]

Gwalior - Datia RRBs :

According to Annual Report of Gwalior- Datia RRBs, there are 22 branches of Gwalior- Datia RRBs which have been established in Gwalior district on 29 April 1987. These 22 branches have been divided into 5 development blocks as Morar, Ghatigaon, Dabra, Bhitarwar and Bhander. In present, due to merging of Bhander block in Datia district, there remain only 4 development blocks. The extension of branches of Gwalior- Datia RRBs has been shown year wise in four development blocks in table 1.

Table 1 : Branches of Gwalior - Datia RRBs in Gwalior district

SN	Name of branches	Development block	Date and Years
1	Gwalior	Ghatigaon	17.06.1988
2	Girwai (Tigra)	Ghatigaon	10.08.1987
3	Panihar (Jakhoda)	Ghatigaon	4.09.1987
4	Shankarpur Marg(Aaron)	Ghatigaon	24.10.1988
5	Dorar Marg,Mohana(Rehat)	Morar	4.09.1987
6	Sirsod	Morar	22.05.1987
7	Morar (Bijoli)	Morar	24.10.1988
8	Baretha	Morar	24.10.1988
9	Dabra (Salbai)	Dabra	3.06.1987
10	Pichhore (Sookhapatha)	Dabra	26.08.1987
11	Kariyavati	Dabra	3.06.1987
12	Magrora marg (chandpur)	Dabra	24.10.1988
13	Gijorra	Dabra	26.08.1987
14	Banvaar	Bhitarwar	4.09.1987
15	Bhitarwar(Kerua)	Bhitarwar	12.08.1987
16	Sankhni	Bhitarwar	24.10.1988
17	Karhiya Tiraha (Mastura)	Bhitarwar	12.08.1987
18	Devrikala	Bhitarwar	12.08.1987
19	Antari(Kachhoa)	Bhitarwar	24.10.1988

Source : Compiled from Annual report of Gwalior - Datia Regional Rural Bank, Holipur Marg, Datia.

It is clear that there were 22 branches of Gwalior-Datia RRBs for agriculture and rural development which were reduced in no. and remain 19 branches in Gwalior district. RRBs play vital role in extending institutional credit in agriculture sector in Gwalior district. The figures relating deployment of credit in agricultural and non-agricultural sectors by RRBs have been shown in table 2.

Table 2 : Credit Deployment by RRBs and Share of Agriculture

	1997-98	1998-99	1999-2000	2000-01
Total deployed credit	40854	46833	85918	128782
Agriculture	20041	12648	46988	81990
Small Industries	9201	5917	6636	11321
Small Business	3127	2019	1309	3486
Other credit	8485	26249	7104	31985
Priority sector	32369	20584	62087	84583
Non-priority sector	8485	26249	23831	44199

Source : Figures compiled from annual report of Gwalior - Datia RRBs From 1997-2001.

The share of agriculture sector in the total credit deployed by RRBs is 48.28% during the period from 1997 to 2001. An annual growth rate of credit deployed in agriculture sector during 1997 to 2001 is 309.11% is recorded.

Findings :

The loan granted by institutional agencies strengthens the farmers and helps in removing imbalance between different regions. The share of agriculture credit in Gwalior district indicates that institutional credit has been increased in given years. High rate of growth of credit deployment is noticed in agriculture sector than non- agriculture sector in Gwalior district. The share of agriculture sector in total credit deployment by RRBs is about to 50% which is recommendable.

Suggestions :

(1) It is found that marginal farmers are needed to become aware of credit schemes.

(2) It is essential to make them aware of the modern scientific agriculture technique for better productivity and guidance to employ modern cultivation practices.

(3) Banks are expected to encourage rural people for taking more loans.

(4) The main drawback to Indian economy is delay in repayment of loans by farmers. To improve the economic condition of the country, we need to design special packages for recovery of loans.

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