

**Determinants of Adoption of HYV Rice in West Bengal by Anamitra Saha\* Published by K. P. Bagchi & Company, Kolkata, 2004, Page: 200, Price Rs. 300**

The history of agriculture is the history of intensification. Intensification follows successful innovations. It was innovation in the yields that is Green revolution in the mid-sixties, that catalyzed a metamorphosis from the conditions of food shortage to one of self-sufficiency and beyond- making India in the process, a world leader in the number of agricultural commodities. Agricultural growth witnessed a sharp turnaround in the immediate post-green revolution phase, largely driven by the growth in yields. In India, the growth in agricultural output has been largely yield driven with the contribution from marginal acreage being only minimal. Today, while India is a world leader in the production of number of agricultural commodities, its yield levels for most of the crops are nowhere near comparable with what some of the other countries of have achieved. One of the main attributes for the low levels of yield attained in India is the unsatisfactory spread of new technological practices, including cultivation of High Yielding Varieties (HYV).

Placed in this perspective, the book under review – an outcome of the author's Ph. D work mirrors a brilliant exposition of typical case of rice cultivation and the persistence of incomplete adoption new technology- HYV in West Bengal. The study gains a sharp focus when seen in the context that the last two and a half decades have been an eventful era in the West Bengal countryside. The study at the outset, begins with a historical voyage, tracing the temporal changes in the institutional/agrarian structure of West Bengal- rural discontent and peasant uprisings in the mid-sixties, culminating in

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the launching of “*Operation Barga*” in the late seventies, and consequent realignment of balance of rural power and agrarian relations leading to a higher growth trajectory in agriculture during the eighties. With the advent of institutional changes in the agrarian structure, West Bengal moved away from a situation of stagnancy to one of the highest growth performances among the States of India. Agriculture in the State witnessed a sharp rebound in the 1980s, recording a growth of 6.4 per cent, which was impressive compared with a mere 2.8 per cent growth attained in the preceding decade. To a large extent, this growth was fuelled by rice production owing to more efficient use of resources, driven by the incentives embedded in the land reforms. The growth, however, could not be sustained in the 1990s, with rice production sliding down to a mere 2.2 per cent from the high of 6.3 per cent in the earlier decade. The inadequate spread of new technology imposed binding constraints on the sustainability of growth process. It is in the context of historic change in the forces of production in the West Bengal agriculture, that the importance of present book is rooted.

The present study makes an earnest endeavor to examine these developments by exploring the underlying pattern of adoption of HYV technology in *aman* rice (principal crop) production. Drawing upon the farm level cost of cultivation data, for the late 1980s and early 1990s, the author undertakes a microscopic detailed empirical analysis of role of learning, uncertainty, risk and liquidity constraints, which influence the farmer’s adoption behaviour. While data on some of the aspects like education, occupational status, access to credit, household consumption and assets- were compiled from the original survey of schedules, painstakingly by the author himself, the richness of the data so compiled allowed the author to test for alternative explanations of adoption behaviour- the explanations that could not be explored in the earlier literature, owing to the constraints of data availability.

The book represents a skillful demonstration of rigorous econometric modeling. While the concepts like risk, uncertainty, learning, and liquidity constraints are relatively easy to model theoretically by specifying alternative values of the relevant parameters, their identification in an empirical framework could be rather challenging, the author has successfully circumvented this challenge.

Alluding to the existing micro-theoretic models of farmer's adoption behaviour, which ascribe four factors responsible for sub-optimal rate of adoption of modern technology, *viz.*, preference for output derived from traditional technology, risk aversion tendency, incomplete learning and fixity of inputs or working capital, the author goes a step ahead in adding that, institutional structure for dissemination of new technology, agrarian structure including distribution of assets, structure of markets and the availability of other inputs like credit concurrently act as crucial determinants of farmer's adoption behaviour.

While having conducted the preliminary analysis of cost of cultivation data, the author delineates three broad patterns, typical to the HYV rice cultivation in West Bengal-the dominant influence of agro-climatic factors on the process of diffusion of HYV cultivation in *aman* season; widespread use of fertilisers despite the lower adoption of HYV cultivation; presence of higher proportion farmers with irrigation facility among HYV cultivators. Contrary to the general perception that the availability of irrigation is a precondition for cultivation of HYV rice, the author asserts that adoption of HYV cultivation even in the absence of irrigation could be profitable relative to the cultivation of traditional rice, if the rainfall is normal.

The author has applied the alternative forms of heteroskedastic models to quantify the risk of HYV technology. Having estimated the stochastic yield function in three stages using non-linear

regression techniques, the author demonstrates that cultivation of rice involved higher variability and hence, higher risk as well as higher mean yield compared to traditional rice, while other inputs including fertilisers were largely risk neutral. One, however, needs to see higher variability in conjunction with the presence of other complementary factors such as rainfall/irrigation, topology and the soil nutrient conditions, *etc.*, as HYV cultivation by itself does not entail higher risk. The concept of dispensable inputs and non-dispensable inputs is dealt with by means of an innovative specification of production functions, which allows for positive outputs even when one or some of the inputs are equal to zero.

Another important area of policy intervention, touched upon by the author is the impact of binding liquidity constraint on farmer's degree and intensity of adoption of HYV cultivation. Although, limited access to working capital is perceived to be a barrier to the process of diffusion of technology, the existing literature remains mute on the suitable methodology to test it empirically in the process of adoption. It is in this context, the present study scores over the extant literature.

To identify the liquidity constrained and unconstrained farmers, the author has cleverly deployed the advanced econometric models of switching regressions with endogenous sample separation. The estimated coefficients of two regimes indicated that greater availability of liquidity or funds had a positive impact on utilization of funds for productive purposes per unit of land, while greater requirement for consumption reduced such expenditure. For the unconstrained farmer, on the contrary, expenditure per unit of land was influenced by factors such as the degree of adoption, agro-climatic environment and wage rate. Thus, the author's exercise in this context supports the general intuitive conjectures.

The author adduces that the institutional credit per unit of gross cropped area in the State remained abysmally low as compared to other major States. In this context, it could be observed that there is also a case for *bi-directional causality*-demand driven approach of Joan Robinson-“*Where enterprise leads, finance follows*” *i.e.*, the areas, endowed with better topological conditions, irrigation, adoption of modern technology, *etc.*, attract more credit. For instance, States like Haryana, Punjab and UP have performed better on this count. Lending to agriculture in these States becomes relatively a safe proposition as these States being in the Indo-Gangetic plains, are well endowed with favourable topological conditions and perennial rivers, which has facilitated the adoption of modern technology in turn, reducing the downside risk perception associated with such credit transactions (Binswanger, Khandker and Rosenzweig, 1989)\*

The author has developed a unified empirical methodology to examine the factors that influenced the farmers’ decisions pertaining to allocation of land and input between the traditional and HYV rice. Having arrived at the estimates in a simultaneous equation framework, he concludes that all the three factors, *viz.*, liquidity constraint, risk aversion and social learning had significant impact on these decisions. While highlighting the importance of social learning, he pin points that farmer’s adoption decisions are crucially influenced by the decisions taken by others in his close vicinity. As per the findings of the study, there was no significant impact of farm size on the intensity of fertiliser usage, while the impact of farm size on the degree of adoption (HYV) was weakly significant, which appears to be counterintuitive

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\* Binswanger Hans P, Shahidur R. Khandker and Mark R. Rosenzweig, How infrastructure and Financial Institutions affect Agricultural Output and Investment in India, *Working paper, World Bank*, 1989.

as large farms have the tendency of using more fertilizers and HYV in view of their easy access to the resources.

The author ascribes the slow progress of HYV cultivation in the 1980s, to the failure of public policy to circumvent agro-climatic barriers of adoption and also to the failure of State extension service system. The author recommends that any process of rural development must address the issue of removing technological barriers in the form of imperfections and distortions in the market and put in place an efficient network of distribution. The study, however would have enriched itself, if it had delineated some specific policy measures to be initiated in the above context. Moreover, one tends to be doubtful over the author's contention that poor institutional mechanisms for introducing suitable varieties was responsible for some of the non adopting villages and not the resource constraint or favourable agro-climatic factors or ignorance of the farmers, While as a matter of public policy, it is important to concentrate on strengthening the institutional mechanisms for providing extension services and distribution networks, the possibility of interplay of above factors cannot be ruled out.

While an integrated approach ensuring availability of storage/marketing, improved technical, economic and infrastructural services could be more useful in augmenting the farm productivity, there is no denying the fact that intensive agriculture in the face of constrained extension necessarily calls for the adoption of new technological practices, which alone can increase the productivity even while the farm size decreases. Viewed from this angle, the study indeed represents an important micro level farm investigation, that too at a time, when such topics hardly attract the attention of young researchers.

The present book in toto, mirrors an excellent demonstration of quality empirical work supported by rich theoretical models and micro level data. The book re-kindles a deep insight into decision making and

behaviour at the farm level under credit constraints. The specific issues analysed in the book may vary across different crops depending upon the typical agro-climatic conditions, presence of other complementary factors and State specific conditions, nevertheless, the approach and analysis of the present study could indeed be of help to the scholars grappling with the problems of agricultural and rural development today.

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