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Keying Economic Development to Improved Infrastructure

Developmental Impact of Rural Infrastructure in Bangladesh. *Raisuddin Ahmed and Mahabub Hossain International Food Policy Research Institute in collaboration with the Bangladesh Institute of Development Studies, Washington, DC, 1990, 150 pages Free*

Reviewed by Richard F Nehring

It seems obvious that an improved infrastructure is the key to economic development and sustained gains in agricultural productivity for many countries in Latin America, Africa, and Asia The relevant literature spans the treatise of von Thunen and the work of economists, such as Antle, Lewis Mellor, and Ruttan Why then do most countries fail to accord adequate priority to infrastructure development? Is it because the impact of infrastructure on agricultural development is not well quantified and, hence poorly understood? Ahmed and Hossain say, yes, and the allocation of public expenditures to infrastructure development is niggardly and inefficient They argue persuasively taking the inquiry of the impact of infrastructure on agricultural productivity a step forward By developing a thorough empirical case study, they assess the effect of rural infrastructure on farm output, employment, income, consumption, savings and investment, and market and social development

Their basic analysis relies primarily on 1982 survey data from 16 villages which were part of a 129-village survey, representing 640 household observations From the myriad infrastructural elements that influence development and productivity, the authors constructed a single quantitative index The index is a composite of a village's access to primary markets, secondary markets, secondary schools for boys, banks bus stops, and local political offices This procedure for measuring the degree of infrastructure is based on a method developed for ranking countries by levels of economic development The effects of infrastructure are then measured by comparing developed and underdeveloped villages by using the infrastructure index or individual elements of the index in regression equations

The paradigm of two well-defined categories promotes a tractable analysis The richness of the data set allows the authors to go into considerable detail to explain the infrastructure of this Bangladeshi case Their results characterize the local situation and justify reliance on two development categories in their subsequent analysis

The authors' chapter on infrastructure and agricultural production traces how infrastructure affects price variation, differences in management use, efficiency of resource use, and level of production Comparing data for the three most developed villages and the three least developed, the study finds that the price paid to farmers for paddy rice is about the same in all of the villages, but fertilizer prices are 14 percent lower and labor costs 12 percent higher in the developed villages Moreover, 105 percent more farmland is irrigated, 71 percent more is sown with high-yielding varieties (HYV's), and use of fertilizer is 92 percent higher in developed villages These differences in adoption of new technology and prices had only a small effect on the total use of labor, but they substantially influenced the composition of labor use The combined effects of wider and more efficient use of new technology as a result of infrastructure development is estimated to have raised agricultural production in developed areas as much as 32 percent

Employing a profit function, the authors use the sample of farms to test the hypothesis that infrastructure contributes to agricultural productivity The Cobb-Douglas profit function is specified as a function of two variable inputs (labor and fertilizer), two fixed inputs (capital and land), and a dummy variable (which has a value of one for households operating in infrastructurally developed villages and zero for others) The value of the coefficient of infrastructure is positive and statistically highly significant, suggesting that farms in developed areas are more technically efficient than farms in underdeveloped areas The authors argue that this may be the result of wider availability of irrigation facilities, higher rates of adoption of HYV's of rice, and better management in the developed villages I suggest, however that these results must be interpreted with caution in that technical efficiency comparisons should involve comparisons on the same production function Ideally, one would, for example, compare irrigated winter rice production, which depends on the diffusion of new technologies in both developed and underdeveloped villages

The values of coefficients on labor and fertilizer are statistically highly significant This implies that farmers in Bangladesh adjust output and input levels in response to price changes The results imply an output price elasticity of 0 56 and a price elasticity of demand for fertilizer of -1 12

The study's important results on irrigation deserve close scrutiny because of their implications for public investment versus private investment The authors extended the paradigm based on the 1982 survey and analyzed irrigation data on a 1988 census of 1,609 vil-

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lages They divided the data into three groups in terms of access to transportation easy, moderate, and difficult They found that installation of small-scale irrigation tubewells was much higher in easy-access areas, that tubewells were better maintained in these areas, and that electrification of tubewells, which cuts operating costs by more than half, was seven times more extensive Twelve percent of villages in the easy-access groups had no shallow tubewells, while 29 percent did not have shallow tubewells in the difficult access group And, 60 percent in the easy-access group had no deep tubewells, while 70 percent had deep tubewells in the difficult-access group Deep tubewells are generally installed by public agencies in Bangladesh because of relatively high overhead Shallow tubewells are left to private initiative The different rate of diffusion of deep and shallow tubewells in the three groups of villages supports the hypothesis that some public measures, though expensive, can help overcome constraints imposed by infrastructural backwardness

This implies that a policy to encourage small-scale irrigation diffusion through the private sector, a policy now favored by aid donors to Bangladesh, is most likely to enjoy success where infrastructure is developed

Estimations based on the most and least developed villages indicate that infrastructure improvement causes household income to rise by about a third As opportunities for off-farm employment are generated, households in developed villages substitute hired labor for self-employed farm labor This process tends to raise wages and significantly benefits lower income groups While the development process in Bangladesh and other underdeveloped countries may increase the income of rich households at a faster rate than that of poor households, the increase in the absolute level of income of the poor is significant

Few results are surprising in the remaining chapters, which examine how infrastructure development changes consumption, savings and investment, and social development Households in developed areas spend a larger share of incremental income on noncereal foods, commodities other than food, and services And, the supply of such commodities to meet increased demand is facilitated by lower marketing costs, improved operation of input and output markets, and improved linkages with other sectors Infrastructure development encourages savings and investment indirectly through increases in income, with 14 percent higher investments per household in developed villages One result is surprising Development of infrastructure does not appear to improve literacy Rather, literacy appears to be explained by the size of landholding and gender

Although the authors characterize the data as pertaining to 16 villages in various parts of Bangladesh, the reader is left to speculate on how representative are the data of agricultural production and rural development in Bangladesh Even though Bangladesh is a small country, the production base is diverse, with food-surplus districts in the northwest and food-deficit districts in the south and east The potential for small-scale irrigation also differs sharply, with, for example, relatively little scope for deep tubewells in the northwest And, the potential for expansion into winter rice and wheat, which depends on the diffusion of new technologies, differs by region

The book is generally well organized, and results are carefully reasoned and interpreted The statistics and economics are sound Production and consumption issues could have been more completely investigated by pursuing a household production function approach and assuming that farm household's utility and profit maximization decisions were not likely to be independent Nonetheless, the analysis of Ahmed and Hossain explores many important development issues in Bangladesh and will undoubtedly serve as a model for other analyses in Latin America, Africa, and Asia

The effects of infrastructure on agricultural production and rural development as described in this book are definitive The study's results serve to encourage efforts that identify potential infrastructure projects and to more rigorously rank benefit-cost ratios and fund them accordingly The authors suggest that the private initiative now being encouraged by the donor community may benefit from a higher priority on selected public expenditures in infrastructure