



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

D. P. CHAUDHRI*

Human Capital, Structures of Production and the Basic Needs

INTRODUCTION

The role of human capital formation through education, nutrition and public health in economic development has been examined in the literature from the point of view of rates of return approach, income share approach, and social welfare approach.¹ Schultz (1980) considers human capital formation as an important means for dealing with the problem of persistent poverty which is largely concentrated in the rural areas of developing countries.²

Sen (1981) while examining the nature of poverty and occurrence of famines has articulated the role of 'entitlements' in meeting one of the absolute basic needs, namely food and nutrition, for bare survival. He draws a sharp distinction between 'need' and 'demand'. In this way we are forced to view a market system based on economic organisation as a 'democracy of dollars'. If dollars are equally distributed, claims on production will be equitable and need will get translated into demand, otherwise not.³

The distributional questions cannot be separated from the structure of production. Thus the 'causes' which lead to persistent poverty are rooted in the structure of production and the value added shares. The poor are poor because their value added shares in the production system are low. This can be illustrated through a simple model.⁴

STRUCTURE OF PRODUCTION AND INCOME SHARES

We begin by assuming that the economy is divided into three sectors: agriculture, industry and services, and the population is equally divided into three income groups: rich, middle and poor. Let X be a (3×1) vector of outputs from the three sectors, and Y a (3×1) vector of incomes accruing to the three groups. There are two types of relationships between X and Y . On the one hand there is the process of income generation showing how the income generated in each sector is distributed among the different groups, shown by the equation

*Presented by D. M. Etherington

$$Y = AX \quad (1)$$

where A is a (3×3) matrix of elements a_{ij} representing the income accruing to the i -th group from a unit output of the j -th sector. On the other hand there is a pattern of consumption showing how the income of each group is spent on the output of the various sectors shown by the equation

$$X = BY \quad (2)$$

where B is a (3×3) matrix of elements b_{pq} representing the demand for the output of the p -th sector arising from a unit increase in the income of the q -th group.

In practice not all the output of any sector is available for final consumption and not all the value of output is distributed as income to the factors of production, as each sector may be buying part of its output from other sectors. For the present simple exposition we shall assume away the existence of such inter-industry transactions and assume instead that all incomes in each sector are derived from the value of production in that sector, and are fully spent on final output. Thus we get

$$X = BAX \quad (3)$$

a homogeneous set of equations which completely determine the structure of outputs up to a scale factor. Also we have

$$Y = ABY \quad (4)$$

another homogeneous set of equations which completely determine the distribution of incomes, again up to a scale factor. So long as the co-efficients of the A and B matrices are fixed the structure of production and the distribution of incomes are completely determined. The only levers for changing the distribution of income are the co-efficients of these matrices.

The model may be illustrated by a simple numerical example. The co-efficients of matrices A and B have been chosen to reflect a low share of the bottom groups in the incomes generated in each sector, especially the agricultural sector, and the high propensity to spend on agricultural products by the bottom group. These values correspond roughly to those prevailing in India, and seem quite realistic for other parts of Asia with high land concentration and high rates of rural landlessness.

		Agr.	Industry	Services	
(Value added shares)	A =	.12	.20	.15	poor (bottom 1/3rd)
		.40	.33	.25	middle (middle 1/3rd)
		.48	.47	.60	rich (top 1/3rd)

and,

		Poor	Middle	Rich	
(Expen-	$B =$.80	.51	.40	Agriculture
diture		.13	.29	.36	Industry
shares)		.07	.20	.24	Services

With these values of matrices A and B the structure of output and the distribution of income are given by

$$\begin{array}{l} \text{(Sectoral output)} \end{array} \quad X = z \begin{bmatrix} .5 \\ .3 \\ .2 \end{bmatrix} \begin{array}{l} \text{Agric. Sector} \\ \text{Industry, and} \\ \text{Services Sector} \end{array} \quad Y = z \begin{bmatrix} .15 \\ .35 \\ .50 \end{bmatrix} \begin{array}{l} \text{Poor (bottom } \frac{1}{3}\text{rd's share)} \\ \text{Middle (mid. } \frac{1}{3}\text{rd's share)} \\ \text{Rich (top } \frac{1}{3}\text{rd's share)} \end{array}$$

where z is total output.

In this example the structure of production and the distribution of income are completely determined by the A and B matrices; therefore the only way to alter the distribution of income is to change these co-efficients by policy. Note that we have also assumed away supply constraint in this simple illustration.

ROLE OF THE STATE

As demonstrated by Sinha *et al.*, (1979) for a 77 sector model for India, attempts at income transfers from the rich to the poor, with serious inequalities in the value added shares left untouched, the outcomes would accentuate inequality further and would benefit the rich *more* than the poor. Booth, Chaudhri and Sundrum (1980) through the illustrative model of the type given above, show that policy attempts dealing with greater emphasis on a particular sector of income transfer from rich to poor would benefit the rich more than the poor as long as the inequality of value added shares and therefore income shares *within* the agricultural sector stays as high as assumed in the numerical example.

Thus attempts at meeting the basic need for food of a section of the population through food stamps, free midday lunches or food for work programmes would indefinitely keep the poor dependent on their welfare payments unless such transfers influence the structure of production in favour of the poor. Historical experience shows that such transfers do not influence the structure of production.

Since the time of Adam Smith the role of the state as an initiator and facilitator of economic development has been increasing. This may be termed the 'late development effect'. This is partly due to technological advance and partly because the list of the duties of the sovereign is getting longer. This is not because of welfare reasons alone. In fact, it is mainly because our understanding of the role of public goods, infrastructure and education in the development process has considerably improved.⁵ Schultz (1963) drew the profession's attention to the economic value of education. In his Nobel lecture drawing on his own work and that of others in this field, Schultz concluded by quoting Alfred Marshall – 'knowledge is the most powerful engine of production: it enables us to subdue nature and satisfy our wants'.

Production and distribution of knowledge of which schooling is an important component is one of the important duties of the sovereign partly because one of the peculiarities of the knowledge industry is that

both its demand and supply are positively sloped with respect to individual's and society's income. It is both a cause and consequence of economic progress. One of the most important attempts at social engineering in recent history has been provision of free and *compulsory* school education in present-day developed countries. This has resulted in occupational and geographical mobility of labour within the country and went a long way towards improving the value added shares of the poor in these countries.

However, education is never neutral in content or consequence. Different types of educational policies affect different socio-economic groups differently. In most of the 'low income' countries education of the poor and particularly the rural poor is sadly neglected in their public education policies.

EDUCATION IN AGRICULTURAL PRODUCTION

We developed a conceptual breakdown of the effects of education of agricultural output and productivity in Chaudhri (1968) and elaborated on it in Chaudhri (1972). Essential argument is that a farmer's education could be relevant because it enables him to acquire:

- (a) Ability to decode new information – know what, why, where, when and how.
- (b) Ability to evaluate costs and benefits of alternative sources of economically useful information.
- (c) Ability to establish quickest access to newly available economically useful information.
- (d) Ability to choose optimum combinations of crops, new inputs and agricultural practices in least number of trials.
- (e) Ability to perform agricultural operations more effectively in economic sense, i.e., ability to produce more from a given amount of inputs.

Conceptually, we can think of the educational impact, if any, as comprising the following components:

- (1) Innovative effect – this would consist of (a), (b) and (c) described above.
- (2) Allocative effect – according to the above description (d) would belong here. This can be seen to consist of two parts, namely (i) business activity and (ii) production activity.
- (3) Worker effect – quality of labour as described in (e) above.
- (4) Externality – neighbouring farmers and other producers in the vicinity who are in direct contact with educated farmers would be able to consult the educated farmers without paying any price for it and being able to copy (without paying any price) his sources of information, crop and input combinations and related production and business techniques of proven success.⁶

The following chart depicts various components of educational impact.

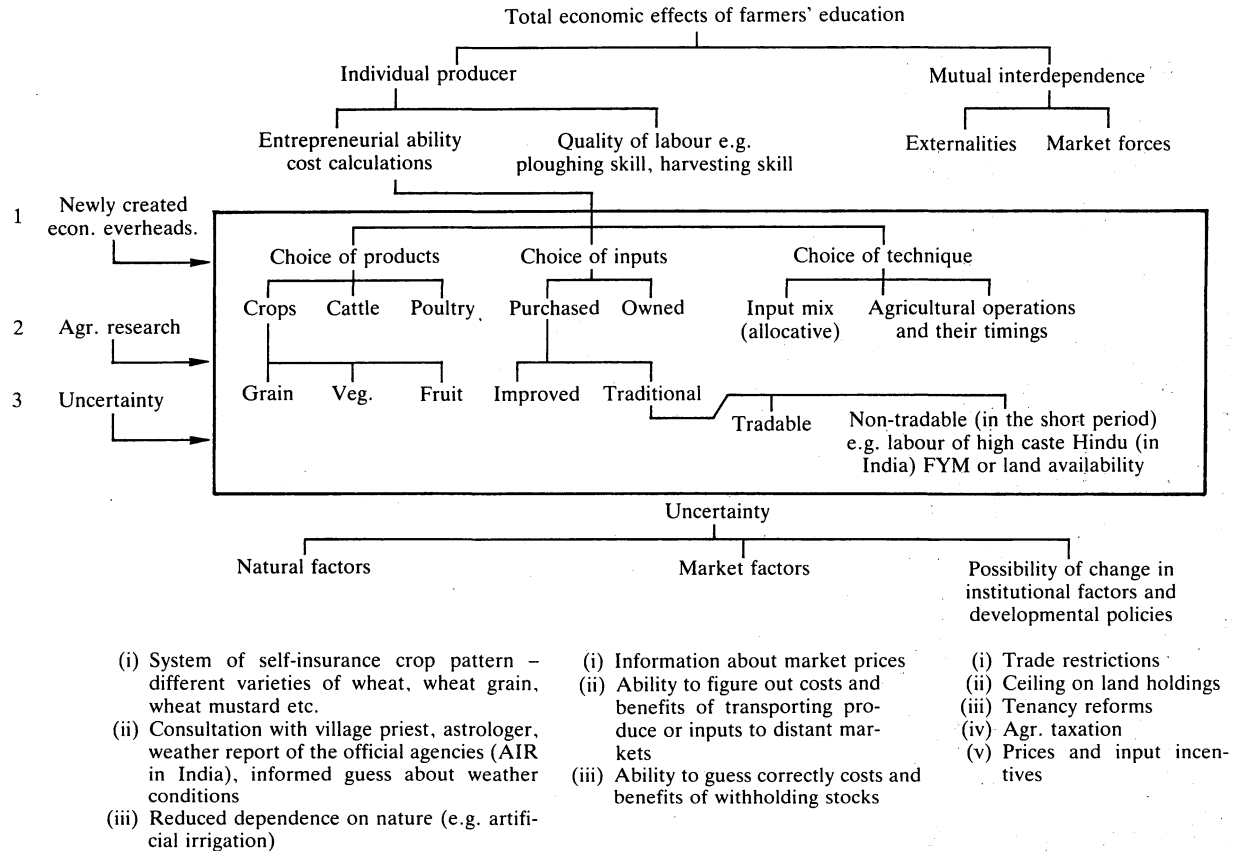


Figure 1

In a situation of traditional agriculture as defined by Schultz (1964) when there are no additional economic overheads, no additional research results becoming available and no institutional changes being induced by development planners, farmers find themselves in a state of long-term equilibrium. The only two sources of disturbance are (1) natural factors, and (2) market factors, as is clear from the chart given above. The response of the small-subsistence farmers and the large market-oriented farmers, being economically rational, turns out to be different. The small subsistence farmers choose cropping patterns which give them not necessarily maximum yield in any particular year but assured yield each year, e.g., the mixture of wheat and grain sown by small farmers in North India. Being illiterate and thus handicapped in decoding market information, they find it economically profitable not to participate in the sale of output and purchase of inputs. They diversify their cropping pattern so as to produce mainly for self-consumption thus minimising the twin risks of natural and market uncertainties. Large market-oriented farmers, on the other hand, diversify their cropping pattern to the extent necessary to safeguard against vagaries of weather but find it necessary and useful to acquire market information decoding ability.⁷ Thus, economic dualism as described by Sen (1966) emerges. We get a set of subsistence farmers, economically rational, but having a different objective function (maximisation of utility) and a set of market-oriented large farmers, maximising profit.

Functional literacy or education in such a situation of long-run equilibrium in traditional agriculture would be of very little economic value to small, utility maximising farmers but would be an important economic input for farmers largely participating in the market system.

Now let agents of change appear on the scene in the form of state authorities wanting to provide:

- (a) Economic overheads.
- (b) Market regulations in terms of economic incentives/restrictions.
- (c) Changes in the institutional structure, e.g., provision of agricultural credit through co-operatives in an attempt to replace high-cost moneylenders.
- (d) Agricultural research information about high yielding varieties of seed and new inputs through extension agents, radio and printed leaflets.⁸

The sources of information of two sets of farmers would be different. Small utility maximising subsistence farmers would be passive involuntary recipients of information through local sources, e.g., other farmers and occasionally extension agents or a radio if they have equal access to the latter two sources in the village; while the market-oriented large farmers would have more cosmopolitan sources of information, including printed leaflets.

The use of extension agents is obviously inconvenient and inefficient when compared to the potential of printed media.⁹ Unless the adminis-

trators of development strategy specifically take corrective steps, one would inevitably find that farmers with greater access to economically useful information and ability to decode it (education) and greater access to required capital would be early adopters of new technology and thus termed as innovators.¹⁰

If this change is once for all, e.g., extension of an artificial irrigation facility to some regions for the first time, the subsistence farmers would also be found adapting to change with a lag, probably through the 'externality' caused by the demonstration effect of the market-oriented large farmers. But if the contemplation is for a continuous change, which has to be in a dynamic agriculture, the role of externality cannot continue to be large.

Contrary to the expectations of the development planners, the rest of the subsistence farmers are not likely to follow, even with a lag, as long as their twin handicaps of restricted ability to decode new information and limited access to the capital market exist. To the extent that they are able to overcome these handicaps they would be found to be imitating the innovators. Some empirical evidence in this connection is reported in Chaudhri (1979).

The information decoding ability of the farmer is also crucial in establishing a two-way process of communication between the researchers and the farmers, otherwise the research results may not be directly relevant to the immediate problems of the farmers. It is this ability which education provides among its other benefits. In principle, it is always possible to think of alternatives to farmers' education, for example, the use of television. But these have to be evaluated in terms of their relative costs and effectiveness.

Public provision of education for the small farmers on an equitable basis with appropriate market integration can go a long way towards improving the value added shares of the poor small farmers.

BASIC NEEDS AND RURAL EDUCATION POLICY

Considerable difficulty remains in defining a basket of basic needs goods. A decision at the national level in respect of the components of the bundle of goods will be arbitrary. On the other hand, as Burki and Streeten (1978) p. 414 put it:

We cannot ask the individuals to order these items according to the priority they attach to them because all actual choices are incremental – more or less extra food compared with more or fewer clothes – and individuals do not assess and compare the total value to them of food and clothes. The problem is rendered even more difficult by the consideration that individual ordering would be an inappropriate indicator in the presence of consumption externalities.

This applies to the purchased consumption basket only. Provision of free and perhaps compulsory public education along with appropriate policies

minimising the opportunity cost of participation of the children of the poor in the schooling process is perhaps the most important means of changing the magnitudes of the co-efficients of the value added matrix in favour of the poor. The policy, like land reform, is bound to be opposed by the vested interests and we can easily cheat the poor by providing them with poor quality education as is done in some market-oriented high-income countries today. We hope that Keynes was right in pointing out that the power of vested interests is grossly exaggerated and that of ideas (i.e. knowledge) must prevail.

NOTES

¹See Sen (1966) and Chaudhri (1979) for the underlying theoretical assumptions and implications of these approaches.

²See IBRD (1975) for statistical magnitudes and the procedures of measurement.

³See Chaudhri (1974) and Sen (1981) for elaboration of this point.

⁴This model is from Booth, Chaudhri and Sundrum (1980).

⁵Despite a lot of contradictory empirical estimates the direction of causation seems clear and is cogently summarised in Schultz (1975, 1980).

⁶The industrial sector innovations are patented and thus can be copied only at a price through market interdependence; but in agriculture this takes the form of externalities.

⁷This probably explains why it is highly respected in these communities, but is mainly accessible to large farmers only. Apart from having higher ability to pay, its economic utility also seems to be higher for the large farmers in traditional agriculture.

⁸Assume that all this information about new technology is scale neutral and the developmental authorities are benevolent (and not short-period production results conscious) and want to help small farmers as much as large farmers.

⁹See Wharton (1965) pp. 208–11.

¹⁰See Rogers (1971).

REFERENCES

- Booth, A., Chaudhri, D. P., and Sundrum, R. M., 'Structure of Production and Income Distribution', unpublished paper, Department of Economics, Research School of Pacific Studies, Australian National University, 1980.
- Burki, S. J., and Streeten, P. P., 'Basic Needs: Some Issues', *World Development*, vol. VI, no. 3, 1978.
- Chaudhri, D. P., *Education and Agricultural Productivity in India*, Ph.D. thesis, University of Delhi, April 1968.
- Chaudhri, D. P., 'Education in Production in Modernising Agriculture in Asian Under Developed Countries', *Research Quarterly*, vol. 1, no. 2, January 1972.
- Chaudhri, D. P., 'Rural Education and Agricultural Development – Some Empirical Results from Indian Agriculture' in Foster and Shiefeld (eds), *International Year Book of Education 1974 – Education and Rural Development*, Evans, London, 1974.
- Chaudhri, D. P., *Education, Innovations and Agricultural Development*, Croom Helm, London, 1979.
- IBRD *Assault on World Poverty*, Johns Hopkins University Press, Baltimore, 1975.
- Rogers, E. M., and Shoemaker, F. F., *Diffusion of Innovations*, New York, Free Press of Glencoe, 1971.
- Schultz, T. W., *Economic Value of Education*, Colombia University Press, 1963.
- Schultz, T. W., *Transforming Traditional Agriculture*, Yale University Press, New Haven, 1964.
- Schultz, T. W., 'The Value of the Ability to Deal with Disequilibria', *Journal of Economic Literature* 13, September 1975, pp. 827–46.

- Schultz, T. W., 'Economics of Being Poor', Nobel Lecture reproduced in *Journal of Political Economy*, August 1980, vol. 88, no. 4, pp. 639-51.
- Sen, A. K., 'Economic Approach to Education and Manpower Planning', *Indian Economic Review*, April 1966.
- Sen, A. K., 'Peasants to Dualism With or Without Surplus Labour', *Journal of Political Economy*, September 1966.
- Sen, A. K., *Poverty and Famines: An Essay on Entitlement and Deprivation*, Oxford University Press, 1981.
- Sinha, R., Pearson, P., Kadekodi, G., and Gergory, Mary, *Income Distribution, Growth and Basic Needs in India*, Croom Helm, London, 1979.
- Wharton, C. R. Jnr., 'The Role of Education in Early Stage Agriculture', *Education and Economic Development*, in Anderson, C. Arnold, and Bowman, Mary Jean, (eds), Aldine Publishing, Chicago, 1965.