

PART III

INNOVATION AND APPROPRIATE TECHNOLOGY

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This section reviews some of the main issues which arise with regard to innovation and appropriate technology as they apply to the development of entrepreneurs.

Introduction

Evidence from the industrialised countries suggests that a larger number of genuine innovations are produced by small firms for every dollar spent on research than by large businesses. Whilst comparative figures for developing countries are scarce, there is nonetheless plenty of evidence to suggest that small firms in developing countries are highly innovative. Moreover, many small firms employ technologies or processes which use local and scrap materials. This is in contrast to the many cases when firms, large and small, in developing countries, are encouraged to use capital-intensive machinery, most of which is imported. This has many negative implications with respect to capital, foreign exchange, labour, spare parts, as well as increasing dependence and stifling indigenous innovation. The major issues are thus concerned with deciding what is appropriate and with the choice of technology.

Definition, relative cost and choice of appropriate technology

Technology is said to be appropriate when it is the most economic (i.e. the best balance between cheapness and effectiveness) way of performing a certain function in the context of the costs of resources where it is used. A distinction needs to be made here between intermediate and appropriate technology: whilst appropriate technology is that which is most economic in a given set of circumstances, intermediate technology is that which lies between two extremes, between the most basic and the most advanced.

Given that most developing countries have an abundant labour supply but possess little capital, one might expect to find production methods which are relatively labour-intensive. However, in many instances, the reverse obtains in industry and, indeed, in agriculture. One explanation is that because of a variety of structural, institutional and political factors, the actual 'market' price of labour is higher and that of capital lower than each of their true scarcity or 'shadow' values would dictate. The price of scarce capital is kept artificially low by a combination of liberal capital depreciation allowances, lower interest rates, low or negative effective rates of protection on capital good imports, tax rebates, overvalued exchange rates, etc. The net result of these distorted factor prices is the encouragement of inappropriate, capital-intensive methods of production in both manufacturing and agriculture.

The issues are not, however, solely concerned with the economic cost of capital, labour and materials. The choice of technology affects and is itself affected by other factors such as maintenance of new machines, availability of foreign exchange for necessary materials or spare parts and the effects of new technology on the people who will have to operate it. In addition, current and future availability of fuel, electricity, water and other services need to be considered, along with supply, training and supervision of labour. For the small business person, as indeed for any businessman/woman or investor, the ultimate consideration is profitability.

The fundamental issue is whether there are in fact real technology choices in most industries; whether in fact the small businessman, or whoever is advising or financing him, can choose between alternatives or whether there is no other choice but to accept a particular package which may have been designed for totally different purposes, because nothing else is available.

Choice does exist in most industries. In this respect, one expert has commented: "Cement, sugar, steel reinforcing bars, plastic containers, motor vehicles and even aeroplanes can be made on a small scale, using labour intensive technology which is appropriate for the resource costs of poor countries." (Harper, 1984). Moreover, it is noteworthy that the alternatives to inappropriate technology do not merely comprise local innovations, but indeed also include the use of second-hand equipment which may be 'redundant' in the developed countries and can usually be purchased at very low prices.

Implications for development assistance

The implications of all this for assistance to the small business are summarised by Harper:

"Actual equipment, designs for equipment or the potential for locally designed solutions to technical problems already exist; it is, however, not being effectively marketed. The marketing failure in itself can be similarly analysed: some of the target consumers are not aware of the possibilities, some lack the skills to decide for themselves what technology is appropriate while others may appreciate the economic benefits but may be blinded by the glamour of the more modern solution. The promoter must therefore overcome the lack of information, the skill and the attraction and must also identify those who influence decisions.

It may therefore be necessary to reach out ... to small business people themselves, in order to influence their plans and to discourage them from applying for funds to buy inappropriate equipment ... Extension advisers can be trained to recognise unprofitable proposals, and to 'sell' more appropriate methods". (Harper, 1984 p. 111-112).

FURTHER READING ON INNOVATION AND APPROPRIATE TECHNOLOGY

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