ABSTRACT

The apparent inability of urban-industrial, growth oriented strategies to spread benefits spatially and to lower income groups has led to increased interest in such alternative strategies as the development of small towns and rural areas. Building construction often embodies a large proportion of investment and activities in such strategies. In most cases, however, the building component is treated solely as an engineering activity. Its potentials to promote broader socio-economic objectives like employment and income distribution are overlooked.

The potentials of building construction to promote employment in large urban areas has been well established in development theory and practice. But neither research nor practice has systematically investigated these potentials in the rural context.

This thesis examines the costs, employment and income effects of building construction in a rural district in Pakistan. It focuses on how these effects can vary with the technologies adopted in construction and materials' production, and what this implies for technology choice in public buildings in the rural areas.[1]

In Pakistan, a surprisingly large proportion of public investment in the rural areas - upto 60% in some sectors - is in building construction. Construction is also a major activity of the rural development agency. There has been a steady trend in this construction to move away from indigenous technologies

(those using local resources) towards imported technologies (those with a high import content).[2] This shift has been supported by a strong government commitment to its cement and steel industries.

On the other hand, for the first time, the new Sixth Year Plan 1983-88 backed up statements in support of using local materials with substantial financing for a new national building research centre to undertake this task. Also unprecedented, rural housing has been given priority, and the Housing Finance Corporation, instructed to extend credit to this sector. Implementation of rural building and housing projects are being delegated to the local development councils.

In this context the study compares the indigenous and imported technologies not only for their costs, employment and income effects but also for other criteria, some implicit, some qualitative and some competing, which represent the processes through which technology choices emerge. Typically analysis deal only with a single or single set of criteria.

In the absence of a quantitative methodology that is rigorous yet simple enough to evaluate small-scale, informal activities, one is developed here - a comprehensible and easily applied computer model of construction and production processes, which uses simplified costing, cash flow and cost-benefit techniques.

The data for both the quantitative and qualitative analysis are drawn from approximately 100 case studies and interviews done by this researcher. For construction technology, detailed quantitative analysis is performed on the two most common

indigenous and imported construction technologies: typical low-income, self-help and public building construction, respectively. For materials' production technology, similar analysis is done for agri-waste fired against coal and oil fired brick production. Orders of magnitude assessments are made for the remaining construction and production types.

Some expected and unexpected results emerge from the analysis. The indigenous construction technologies are more cost-effective even with their higher maintenance costs. Indigenous materials' production techniques have higher productivity and are more profitable. The negative impact of income distribution on savings may be offset by the substantial construction savings accruing from the use of indigenous methods, and that public investment in construction and materials' using indigenous technologies would result in substantially more rural employment and income distribution. The above findings remain valid for existing price trends.

The reasons for the shift to imported technologies partly result from a misconception of such advantages as their long-term cost effectiveness. Economic costs are also not reflected in government decisions. Other reasons include the lack of a building maintenance procedure, the image of "backwardness" projected by indigenous technologies and a well-entrenched system among public agencies and contractors to implement imported construction technologies which is reinforced by "kickbacks".

A shift to indigenous technologies will require addressing the above. For example a building maintenance system could be

funded by the savings in construction costs and run by the local councils. Research and development, credit and technical assistance to the indigenous sector will also be required. The adoption of indigenous technologies in public buildings will promote them in the private sector, thus increasing the demand for the indigenous inputs and thereby greatly expand local employment and income effects.

Footnotes

1. The term "rural areas" here includes the small towns up to approximately 25000 population whose main functions usually include administrative, commercial and social services for the surrounding rural population.

2. Although the study has been on buildings many of the premises and the implications apply to infrastructure as well. The same materials are used, the same agency personnel are involved and often the masons and workers are interchangeable.

OUTLINE

The Role of Building Construction in the Development of Small Towns and Rural Areas: the Effect of Technology Choice in Promoting Employment and Income Distribution and Community Participation.

Summary

Building construction often embodies a substantial proportion of public investment and activity in strategies for the development of small towns and rural areas. It could be used to generate employment and income distribution, and to enhance community participation. What is required is the adoption of local resource utilising (indigenous) technologies and the devolution of decision making, budgets and responsibility for building construction to locally elected councils.

1.0 Appropriate Building Technologies and Rural Development: Themes from the Literature.

This chapter reviews the literature on regional-rural development, housing and appropriate technology. It finds that (a) the importance of building construction in the development of small towns and rural areas is acknowledged, (b) the building technologies suggested are those that are low cost, use local resources and community participation, and generate local employment. Critics respond that definitions of appropriateness [of technology] will vary with the national development objectives of the country. A wider range of criteria must be considered and there must be some indication of how potentially conflicting criteria may be resolved in making technology choices.

It is suggested that, although a number of demand and supply

determinants of technology choice may be identified, of these the decision maker, his preference (criteria) and powers relative to others is the key to how choices are made. Empirical studies on small scale activities, especially on their economic performance in the rural sector, are lacking, and no studies take account of the necessary range of criteria to be considered.

2.0 Methodology

Chapter two presents a methodology - a simple computer model based on cost-benefit analysis and cash flow techniques - to assess the performance of alternative construction and materials' production technologies against a range of criteria, some potentially conflicting. A conceptual model is suggested to demonstrate how technology choices result from the interaction of decision makers, their preferences and relative powers to influence decisions. The case studies and interviews undertaken for this research are discussed as well as the process of obtaining, often sensitive, information from builders and entrepreneurs in the informal sector, and crosschecking for accuracy.

3. Pakistan's Development, Rural Development and Housing Policies: Effects on Rural Building Construction.

Chapter three gives the background to Pakistan's development, rural development and housing policies.

Pakistan's growth oriented policies have resulted in a strong effective demand for upper income, urban housing and support for large-scale industries in cement and steel at the expense of the low-income, especially rural market oriented and

small industries. On the other hand, successive governments have attempted to develop the rural areas through a variety of rural development programs.

The present government seems to be particularly intent on giving a greater role [in development] to the local councils.The current five year plan has, for the first time, made rural housing and R and D on local materials a priority. The local councils have been given responsibility for rural housing, among other things. The emphasis on local bodies detracts attention from the lack of democratic representation at the federal level. Thus, behind the government's emphasis on local council involvement in rural projects is its interest that councils channel their energies into projects rather than into politics.

Studies based on recent census have also shown small towns (population less than 25000) to be growing rapidly and rural housing conditions in them to be much worse relative to urban housing.

Sahiwal district, the study's site, is among the wealthiest, best served by community facilties and most accessible of districts. Thus if indigenous technologies appear favourable here the findings should apply more so in other districts.

4. The Economics of Alternative Technologies: Who Gains, Who Loses and Why? (Comparing the Economic Performance of Indigenous and Imported Technologies.)

This chapter begins with a discussion of the construction and materials production and supply methods practiced in the district: their spatial spread, ownership, technology and

markets. The economic performance of the indigenous and imported construction technologies and brick firing methods are then analysed in detail relative to the following:(a) their performance against the range of criteria to be considered,(b) the extent to which potentially conflicting criteria such as low construction versus low maintenance costs, income distribution and savings divide along indigenous versus imported technology lines, (c) who are the gainers and losers from the government's adoption of imported technologies and why? and (d) to what extent will such factors as price trends and income levels influence technology choice? The results suggest that the indigenous technologies are preferable for most of the criteria. Even losses in savings through income distribution and taxes, through using non-taxed materials, are offset by the substantial savings in construction costs.

5.0 The Institutions and Processes of Alternative Technologies: their Implications for Community Participation in Building Projects.

This chapter begins with a discussion of how the government's definition of community participation - community contribution of free funds, labour and materials - is at odds with that of the community organisations, the local councils, that wish to assume the budgets and decision making for local projects. The informal institutions and processes, particularly decision making on technology choice, involved in building construction implemented through self-help or mutual aid and the technologies they adopt (as reflected in case studies) are then compared to the formal ones as practiced by the line agencies.

The characterisitics of the indigenous and imported technologies, especially the cost, complexity, and maintenance characteristics, are compared to suggest how the indigenous technologies better suit the informal processes and community participation while the latter technologies are better suited to the construction practices of the government. For example, the frequent maintenance required in indigenous technologies is more difficult to administer through centralised channels.Centralised decision making by sectoral agencies supports the adoption of the imported technologies since such decision makers have no incentive to cut development expenditures, and little faith or knowledge of local construction practices. Thus the adoption of the imported technologies may hinder attempts to have them implemented through community participation and lack of community participation in decision making may reinforce the use of the imported technologies.

6.0 The Feasibility of Promoting Indigenous Technologies

This chapter begins with a summary of the conclusions from the previous two chapters, namely: (a) that for the range of national and local objectives and criteria - especially the criteria of cost-effective, employment and income generating technologies and simpler, more manageable technologies to encourage community participation in projects at the local level - the characteristics of the indigenous technologies emerge as more appropriate than those of the imported technologies, (b) that devolving decision making in technology choice to the local (district) level may increase the adoption of the indigenous technologies.

This is followed by a discussion of the factors that hinder the development and adoption of indigenous technologies in public projects such as not taking economic costs into account, the appeal of imported technologies as being "modern", and the weak link between building research institutes and the operational agencies such as the Public Works Department. The possibilities of overcoming these problems are discussed including recent government action to set up a national building researh institute, reduce technical standards, increase coverage of basic facilities in small towns and rural areas and devolve control of development projects to local councils.

The thesis proposes that the recent moves to devolve budgets, planning and implementation of development projects to the local councils be expanded to include building as well. Building projects could be the practical component of training in local planning underway for district councillors. Training in improved indigenous technologies could be extended to the local engineers of the Works and the Rural Development departments. These engineers would provide the technical support to the local councillors for implementing building projects. The provincial building research institutes would set a range of standards and technical guidelines stressing indigenous technologies appropriate to different building types and conditions to guide technology selection by the councils and the technical supervision of the buildings by the engineers.

Local councils have greater incentive to select the more cost-effective indigenous technologies than public agencies do

since cost savings mean either more facilties can be constructed in their area or money left over for other purposes. Furthermore councillors have closer connexions to local builders and materials suppliers and are less prone to call on those further afield.

However this more 'appropriate ' technology choice is not assured, since local councillors would also be susceptible to such influences as the modernity image of imported construction and bribes. The engineers of the public works and rural development departments may continue to favour the imported technologies for which they have been better trained although the simplicity of supervising the indigenous technologies should also appeal to them. Perhaps more problematic, sectors such as health and education would be reluctant to hand over their substantial construction budgets to local councils. However, building in small towns and rural areas do not comprise a major proportion of their total budget and, if the turnover were phased by building type, it would be more acceptable. Primary schools in some districts have already been passed on to the local councils to implement.

Government leadership in supporting and adopting indigenous technologies would be essential in popularising such technologies in the private sector. The international aid agencies in turn could assist the government in taking the lead by offering financial support for research and development and training in building projects and materials' industries using indigenous technologies.