



Appropriate infrastructure: No choice but change

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SOUTH AFRICA, LIKE many countries, is striving to add a socio-economic dimension to the traditional infrastructure project targets of quality, cost and speed of construction. This means a re-examination of the construction process, to determine ways in which projects can generate more employment and make more effective use of local resources. The concept of self-help is attractive, in principle, as a way of mobilising the local community, but is seldom as cheap or attractive in practice as it might appear in theory. Simple projects can be built by amateurs, but self-help groups may not make optimum use of scarce materials and they may put themselves and others at risk by building badly. Thus there is much to be said for entrusting the construction (and maintenance) process to those whose business it is, and whose skills can gradually develop as their experience grows.

Ideally the beneficiaries of this process of entrustment should be small firms rather than large, because they can potentially offer the best value for money to clients on small, disparate and often geographically dispersed schemes.¹ Small firms are also more likely to generate local employment, make effective use of local materials and provide a continuing resource for maintenance and gradual upgrading.

Where there is an ample supply of efficient and cost-effective local contractors, the client can commit the construction work to them with confidence that quality, time and cost targets will be met, while useful local employment will be generated and thereby stimulate economic development in the local community. However, in the absence of a well directed and properly resourced programme of enabling inputs, emerging contractors may not survive to reach a stage of self-sufficiency, with the skills and financial and other resources that they need in order to provide a responsive service to their clients.

This paper examines the role of the construction industry in the implementation of infrastructure projects, and suggests ways in which local enterprises can be enabled to perform more effectively through technical and management training and other selective assistance. It is a difficult industry to understand, due partly to the institutional framework which governs it. Some of the features that characterise construction are the following; the responsibility for design is totally separated from the responsibility for production, the place of work constantly changes and is subject to interference from the weather, the work force comprises a large number of diverse specialised trades and employment is often casual in nature.

The industry is in general poorly documented and statistics relating to it are often unreliable, but there can be no doubt that it is very significant in virtually all developing countries both in economic and employment terms. In our book *Foundations for change*², Geoff Edmonds and I estimated that it typically consumes 50-70 per cent of public investment, contributes up to 5-10 per cent of gross domestic product (GDP), and provides employment to a comparable proportion of the labour force. A more detailed study of 11 developing countries by UNCHS (Habitat)³ suggested that its share of gross fixed capital formation is in the range of 35-83 per cent (with an unweighted average of 56.5 per cent), that value added by the construction industry (excluding building materials and transportation) is typically in the range of 3-8 per cent and employment is in the range of 2-9 per cent (with a heavy clustering around 4-5 per cent).

Some basic definitions will help to guide us through the uncertainties. In her classic text *Economic theory and the construction industry*⁴, Patricia Hillebrandt defined construction as a single industry whose total product is durable buildings and works.

The contracting part of the industry undertakes to organise, move and assemble the various materials and component parts so that they form a composite whole of a building or other work. The product which the contracting industry is providing is basically the service of moving the earth and material, of assembling and managing the whole process. Individual contractors may seek to enhance their influence over their business environment through backward linkages (manufacturing and/or distributing building materials) or forward linkages (real estate development in one form or another).

Mixing building with speculative housing development is a common practice in industrialised countries, but is rarer in developing countries in view of difficulties in mobilising additional working capital coupled with already limited management capacity. This situation may change, with the growing emphasis on private sector shelter provision together with widespread perception of real estate as a safe haven for savings during periods of inflation and currency instability. However, for the immediate future it is reasonable to adopt Hillebrandt's definition for the contracting part of the industry, and focus on measures to increase its effectiveness in carrying out the process of organisation, moving and assembly in accordance with quality, time and cost targets.

This definition helps to emphasise the importance of developing a judicious combination of technical and management skills if building and associated infrastructure work is to be carried out satisfactorily. Good managers are hard to find, and management development requires a more subtle and sophisticated approach than a series of lectures on book-keeping and cash flow (although these may be useful components of a practical management development programme). In *Small business in the third world*⁵ Malcolm Harper noted that the performance of many enterprises, of all sizes, suggests that the scarcity of competent managers is a more serious constraint on economic development than the shortage of finance. Small enterprises are often preferred because they use less capital which is a scarce resource; it may be even more important to promote them because they use less management, which is even more scarce.

In most cases, the analysis of constraints facing small contractors will itself suggest how, as a group, they might be assisted. *Foundations for change*⁶ argued that the policies and regulations affecting national construction industries should be recast to provide a reasonable environment in which domestic contractors can operate. Where they perform inadequately, the usual response of government (which, after all, is in the regulatory business!) is to introduce still tighter controls in order to induce these recalcitrants to mend their ways. Although this may be seen as a 'natural' response, it is evident that the tightening of controls from outside reduces the authority and accountability of the management of the enterprise and endangers its viability: thus the effect of imposing additional controls may be quite the opposite of what was intended. This is not to say that the loosening of controls will automatically increase efficiency. However, the fewer the constraints which are imposed, the more possible it becomes to assess the competence with which management exercises its discretion. Incompetent or frivolous contractors can then be identified and removed from tender lists, thereby encouraging the survival of the fittest. Tight constraints, on the other hand, provide a permanent and justifiable alibi for inefficiency and make it difficult to distinguish the competent from the incompetent.

If the strategy of emancipating, rather than shackling, the domestic contractor is accepted, there will be at least a prospect of engineering an equitable and balanced institutional framework, in which all members of the construction team (not just the designers and administrators) have a chance to contribute to a more effective industrial effort. One example is the question of how much risk should be borne by the client and how much should be borne by the contractor. Large firms in industrialised countries have sufficient financial resources "to take the rough with the smooth", but excessive risk transference for small domestic contractors in developing countries may not really be in the national interest.

Thus there is a case for preparing simplified and more equitable contracts to suit projects that are likely to be

executed by small contractors. For example, in the field of road maintenance contracts, which share the characteristics of being generally of medium or small size, scattered geographically, with a scarcity of resources for preparation and supervision, the World Bank has suggested that the adoption of standard documents and simplified procedures can enhance the efficiency of highway authorities.⁷ However, it is important to take care in establishing forms of contract that provide a positive incentive to the contractor. (See box for lessons from World Bank experience in the establishment of simplified road maintenance contracts).

In shelter projects there is also considerable scope for experimentation with simpler forms of contract documentation. More than twenty years ago a World Bank team⁸ concluded that: the single most important means of promoting the development of the domestic construction industry is through the adoption of efficient and equitable contracting systems and procedures. The contractor should have full responsibility for the labour, materials, workmanship, programming, management and all logistics of the construction operations. He or she should be paid promptly on portions of work done and measured according to specifications and terms of contract and should have access to mechanisms which allow prompt and fair settlement of disputes. In short, the contractor should be a full

Some lessons from World Bank experience

1. The cost-plus-fee contract has been used in Brazil for implementing road maintenance by contract. It was thought at the time that contractors would not accept any other type of contract because they were not familiar with the risks involved in road maintenance. As always with cost-plus, there was an incentive to inflate inputs and costs, so as to inflate profit. It took 15 years to shift to contracts based on unit prices, once it was realised that cost plus contracts are not much more efficient than direct labour (force account).
2. Grass cutting can easily be checked when the works are completed, but the contract must specify the number of cuts per year and the width of cut. Otherwise cuts will be rare and narrow if paid by lump sum or frequent and broad if paid per square metre (examples from Malaysia and Nigeria).
3. In Chile there are two unit prices per square metre for patching pot holes, one for pavement repairs and one for base and pavement repairs. The bidding documents contain an estimate of the number of pot holes and the area of affected surface, as a basis for the contractor to calculate average unit prices.
4. In Pakistan, the highway authority has a budget for emergency operations, and every year they select three contractors in each zone for these works. A standard format for the bill of quantities is prepared in advance. When an emergency occurs, quantities of itemised works are estimated by the highway engineer, and bids are sought from three contractors with immediate award and issuance of the order to proceed. Actual quantities are measured for payment.
5. Pot hole patching is contracted out on a lump sum basis in the Seychelles, so as to give contractors an incentive to intervene early and patch emerging holes before they grow bigger.
6. Three year contracts for maintenance attached to contracts for rehabilitation are being prepared in Zaire. Maintenance is easier to contract out once the road has been put back in good shape, and the continuing responsibility for maintenance is a positive incentive to the rehabilitation contractor.

Source: Lantran, J-M *Contracts for road maintenance works agreements for works by direct labor*. World Bank, Washington, 1991.

partner in the contract with clearly defined obligations, responsibilities and rights. Unless this basic requirement is met, efforts to develop a domestic industry as defined in this paper will not be effective.

This statement was reiterated in a later World Bank study in 1988⁹ which noted that for contractors in developing countries “it is the adverse environment that is perpetuating their underdevelopment”, citing the tendency for governments to prepare one-sided contract documents making the contractors responsible for all events, pushing contractors to reduce their prices even after competitive bids are received, masking their own inefficiencies by blaming the contractors for every setback, delaying payments with impunity and failing to compensate contractors for adverse physical conditions and other acts of government such as changes in exchange rates, interest structure and import and taxation policies. The study emphasised the “fundamental requirements” that contractors need protection against unfair treatment throughout the construction cycle including efficient prequalification procedures, equitable contract documents, fair criteria for the award of contracts, equitable administration of contracts and effective procedures for settling disputes.

*Foundations for change*¹⁰ discussed the possibility of establishing intermediary *Contractor Development Agencies* (CDAs) to modify the framework that governs the industry in a way that will deliberately encourage the emergence of capable and well motivated domestic construction businesses. We felt that the CDA should have sufficient autonomy to be in a position to gain the trust of both contractors and their ultimate clients (who are and are likely predominantly to remain in the public sector), and suggested that there are five main ways in which such an agency can assist contractors:

- negotiating a smooth flow of work;
- financial assistance;
- acquisition of plant and materials;
- training and enterprise development;
- fostering contractors’ associations to enable them to negotiate on their own behalf.

The World Bank and other influential donors/financing agencies have been attracted to channelling funds through autonomous agencies in recent years. Their primary goal has probably been to improve the prospects of efficient and effective project execution, but the creation of employment and construction industry development have been important associated goals. The model for these agencies is the AGETIP (Agence d’exécution des travaux d’intérêt public contre le sous-emploi), which work largely with and through the private sector including preparation of bidding documents and inspection in the broad sense of “owner’s delegate” (in French “mission de maîtrise d’ouvrage déléguée”).¹¹ The AGETIP in Sénégal arose in 1989 in the wake of concerns related to the social effects of the structural adjustment programme, and it was estab-

lished as a not-for-profit non-governmental organisation with the following objectives:¹²

- to create employment, particularly in urban areas;
- to provide vocational training, to improve the operational efficiency of the local construction industry and the effectiveness of public institutions;
- to demonstrate the scope for increased application of employment-intensive construction technologies, and
- to execute public works that are worthwhile in both economic and social terms.

The AGETIP approach depends for its success on bypassing cumbersome and bureaucratic government procedures, paying competitive salaries to a comparatively small number of well motivated national staff of high calibre and making extensive use of the private sector. The sustainability of the approach is yet to be proved, and there is a danger that the objectives of the organisation may become excessively diffuse and its independence may be compromised (essentially the problems which eventually overcame the now defunct Kenya National Construction Corporation, which had enjoyed considerable success in the 1960s and 1970s). Nevertheless, it is a positive response to the “feast and famine” nature of demand for construction which is a distinct constraint on poorly capitalised small enterprises, and it can also operate efficient payment procedures so that contractors can plan their work more effectively and gain a reputation for responsible financial management (see box below).

The measures for prompt settlement of certified payment due to contractors constitute a major benefit, and help to overcome the widespread demand by contractors for improved access to finance for short term working capital needs as well as longer term financing of physical assets. Direct financing of contractors is a risky business for agencies lacking real banking experience, and careful thought must be given to setting appropriate interest rates and collateral requirements.

Physical resource constraints could be tackled by operating a pool of plant for hire or by arranging for bulk purchase of key materials. A World Bank informal policy paper¹³ advocated the establishment of plant pools in the context of the privatization of road construction and maintenance, providing they have “the capacity of a private firm operating in a competitive environment.” In practice this is often difficult to achieve in the absence of effective competition, and the pool may be tempted to

The association AGETIP, in Senegal, has been given a mission of owner’s delegate for a program of small- and medium size labour-based public works and services. AGETIP contracts out all engineer’s duties for preparation and supervision to local consultants. Works and services are contracted out to artisans and small- and medium-size contractors. AGETIP carries out the whole management of the project, including inspection tasks. In 1990 AGETIP managed a program of about 130 contracts for works (average value US\$ 80,000) and the same number of contracts for consulting services. Standard and computer aided procedures allow AGETIP to pay for works and services within a week.

Source: Lantran, J-M, *op cit.*

exploit its monopoly position so that contractors are kept in a state of subservience. In principle it seems better for contractors to own their own equipment, but for a market to develop between them which allows for hire of specialist equipment surplus to immediate requirements (perhaps under the auspices of the local contractors' association). Nevertheless it must be recognised that equipment is an expensive item in infrastructure contracting (although less so in building), even for labour-intensive contractors. Where funds are used to finance the import of foreign equipment and the local currency is subject to frequent devaluation, contractors who are required to bear the exchange risk may find themselves paying very high effective interest rates. On the other hand, if the contractors are excused the exchange rate risk the scheme may attract speculators rather than serious contractors.

AGETIP-type agencies have been replicated in a number of countries (notably Benin, Burkina Faso, Mali, Mauretania and Niger), and are likely to continue to demonstrate success while they benefit from a significant flow of external resources. It is, however, difficult for a single organisation to combine development activities with project execution imperatives and conflicting pressures may emerge. If the objective is to enable firms to become self-reliant, it may be better to concentrate on training, enterprise development and fostering a corporate approach among the contractors themselves. These were the priorities mentioned by Kirmani and Blaxall in their 1988 World Bank Discussion Paper¹⁴, where they proposed the following areas for action in World Bank-financed projects:

- improving contracting and contract administration policies and practices;
- improving the business environment of the industry;
- improving the efficiency of contractors;
- developing the institutions of the construction industry; and
- research and development related to the construction industry.

Kirmani and Blaxall envisaged the establishment of an enabling, rather than an executive, institution entitled the *Construction Industry Development Board* which should be small, with a multi-disciplinary staff and an advisory board comprising representatives of contractors' associations, the consulting profession, chambers of commerce and concerned government ministries. Its main responsibilities would be monitoring and evaluating the activities of the industry, improving the effectiveness of policies and strategies, conducting case studies and monitoring performance indicators (value added, cost effectiveness, quality of work and project completion time).

The aim should be to devise modest, enabling interventions which will help the local contractors to help themselves. In developing countries most small contractors are practical people, who may have experienced trade or vocational training but have rarely been introduced to basic management and business training in a form that is

relevant to their practical needs. The result is that their businesses are fragile and frequently fail, resulting in a loss of scarce national resources and embarrassment for their clients. The construction industry development problem is thus predominantly a management development problem, since most of the difficulties which beset the industry could be overcome if managers within it could engender greater trust in their skills among clients and resource providers.

References

- ¹ INTERNATIONAL LABOUR OFFICE (1987). *Guidelines for the development of small-scale construction enterprises*. ILO, Geneva.
- ² EDMONDS, G.A. and MILES, D.W.J. (1984). *Foundations for change: Aspects of the construction industry in developing countries*. Intermediate Technology Publications, London.
- ³ UNCHS (HABITAT) (1984). *The construction industry in developing countries: Vol. 1. Contributions to socio-economic growth*. UNCHS, Nairobi.
- ⁴ HILLEBRANDT, PATRICIA M. (1985). *Economic theory and the construction industry (Second edition)*. MacMillan, London.
- ⁵ HARPER, MALCOLM (1984). *Small business in the third world*. John Wiley & Sons, Chichester.
- ⁶ EDMONDS and MILES, *op cit*.
- ⁷ LANTRAN, J-M. (1991). *Contracts for road maintenance works agreements for works by direct labour (Contracting out of road maintenance activities: Volume II)* World Bank Sub-Saharan Africa Policy Program, Washington.
- ⁸ WORLD BANK (1973). *Promotion of domestic construction industries in developing countries* Board paper No. R73-177. World Bank, Washington.
- ⁹ KIRMANI, SYED S. (1988). *The construction industry in development: Issues and options* World Bank Policy Planning and Research Staff Discussion Paper: Report INU 10, Washington.
- ¹⁰ EDMONDS and MILES, *op cit*.
- ¹¹ LANTRAN, J-M. *op cit*.
- ¹² EGGER, PHILLIPE (1992). *Travaux publics et emploi pour les jeunes travailleurs dans une économie sous ajustement: L'expérience de l'AGETIP au Sénégal* ILO Interdepartmental Project on Structural Adjustment: Occasional Paper 2, ILO, Geneva.
- ¹³ LANTRAN, J-M and LEBUSSY, R. (1991). *Setting up a plant pool: Contracting out road maintenance activities - Volume III* World Bank Sub-Saharan Africa Transport Policy Program, Washington.
- ¹⁴ KIRMANI, S. and BLAXALL, J. (1988). *The construction industry in development: A strategy for Bank Assistance* World Bank Policy and Planning Research Staff Discussion Paper, Washington.

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