The generation of productive employment opportunities for the unskilled: principles, potential and pitfalls of labour-intensive construction

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Introduction

The generation of productive employment opportunities will be affected by the skills profile of those seeking employment. In developing countries many of the unemployed are unskilled.

During the last quarter of the 20th century labour-intensive construction was investigated as a means of generating employment opportunities for the unskilled within the “existing” economy. By “existing” is meant public infrastructure, which would have been constructed using capital-intensive methods, would instead be constructed using labour-intensive methods. Per unit of expenditure, labour-intensive methods generate significantly more productive employment opportunities than conventional capital-intensive methods without compromising time, cost or quality.

This paper first outlines the concepts at the heart of labour-intensive construction and principles that govern its successful implementation. These have been derived from large-scale practice. It then sketches the various obstacles that have been encountered. This opens the floor for discussion as to the prospects for the future.

Definition

“Labour-intensive” is a term in economics to describe an operation in which proportionately more labour is used than other factors of production.

Labour-intensive construction may be defined as the economically efficient employment of as great a proportion of labour as is technically feasible, ideally throughout the construction process including the production of materials, to produce as high a standard of construction as demanded by the specification and allowed by the funding available; labour-intensive construction results in the generation of a significant increase in employment opportunities per unit of expenditure by comparison with conventional capital-intensive methods. There are several stages of implementation:

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1Greater background for this paper may be found in McCutcheon, 1995, McCutcheon and Marshall, 1996, McCutcheon and Marshall, 1998, McCutcheon and Marshall, 2001a and b. The most complete recent updated summary may be found in McCutcheon, 2003: 15-56.

2In South Africa conditions have been exacerbated by the pernicious effects of the “Educoicide” resulting from the 1951 “Job Reservation Act”, which forbade “blacks” from being artisans in “white” areas; and the 1953 “Bantu Education Act” which took mathematics and science out of secondary school education. For severity of poverty see Wilson and Ramphele, 1989.


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labour intensity depending upon the type of project and the parameters used to define economic efficiencies. The first stage of labour intensity is cost-competitive with conventional capital-intensive methods without compromising time or quality.

A corollary to this definition is what it is not: it is not the use of large numbers of people on relatively unplanned emergency or relief projects to construct something of ill-defined quality and value; that is labour-extensive.

The full definition arose over time, being derived from basic concepts and modified by experience. Large-scale, long-term programmes of labour-intensive construction and maintenance have been established through the creation of individual, community and institutional capacities.

In 1969 the International Labour Organisation set up its World Employment Programme, which was devoted to seeking ways of creating employment opportunities not only through economic growth but also in its absence. Research was carried out into the employment potential within the existing economy. One of the concepts explored seemed bizarre in the context of the late 20th Century: the reverse substitution of labour for equipment. A considerable body of conceptual and analytical work was carried out.

In 1971 the World Bank initiated a research programme: “Study of the Substitution of Labour for Equipment in Road Construction” later broadened to “…Civil Construction”. This research was formally completed fifteen years later in 1986: it led to the delineation of several basic concepts. Here we only mention two pertinent concepts that underpin the theory of labour-intensive construction: technical feasibility and economic efficiency.

The World Bank study was undertaken in three phases. In the Second Phase the following conclusion was reached:

*Labor-intensive methods are technically feasible for a wide range of construction activities and can generally produce the same quality of product as equipment-intensive methods.*

While the later phases of the World Bank study did take some account of the lower equipment productivities in developing countries, it was mainly concerned with the improvements that could be achieved by advanced labour-intensive methods over the inefficient traditional ones. One of the major conclusions from Phase Three was that with superior tools, high incentives and good management, labour productivity could be improved to the point that labour-intensive methods could be fully competitive with equipment-intensive methods at certain wages rates. Where the wage rates were less than US$2 per day, labour-intensive methods would be distinctly competitive. As importantly:

*Wherever the basic wage actually paid ... is less than ... about US$4 per day in 1982 prices, and labor is available in adequate quantities, the alternative of using labor-intensive techniques should be seriously considered.*

In 2003 the International Labour Organisation stated that US$ 10 had become the “break even” wage.

**From Theory to Practice**

Over the past 34 years labour-intensive road construction has progressed from being a hypothetical possibility to a practical reality. Most of the initial research and field studies were carried out in

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7 IBRD, 1974.
8 IBRD, 1986.
South East Asia. Several large-scale, long-term developments took place in sub-Saharan Africa. National programmes have been established in Kenya, Botswana, Ghana, Lesotho and Malawi; several pilot projects have been carried out in Ethiopia, The Gambia, Mozambique, Tanzania and Zambia. These projects and programmes have usually been initiated by governments as part of their policies for rural development, and have included the creation of employment opportunities, the provision of infrastructure and the fostering of agriculture. Below the author will deal in some detail with the programme in Kenya and to a lesser extent that in Botswana.

In 1986 the World Bank published its completion report on its section of the funding. It concluded:

> Considering the institution building requirement, the staffing and related training need, administration and supervision required for the size of the programme, this has been one of the most successful donor financed programmes in Kenya and one of the best organized labor-intensive road construction programmes anywhere.

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8 Coukis, 1983.
10 De Veen, 1983.
13 Edmonds et al., 1986.
15 Ethiopian…(Cahoon),1986
17 Boardman, 1986.
20 IBRD, 1986.
As mentioned above, labour-intensive programmes have also been established in Ghana, Lesotho and Malawi. Although there are significant differences between these programmes and those in Botswana and Kenya (in particular that in Ghana contracting companies were used for maintenance), the similarities are sufficient to conclude that within different institutional and organisational frameworks, a wide range of techniques of labour-intensive road construction and maintenance have been extensively tried and tested over the past 34 years. Local variations have resulted in experience under climatic conditions varying from arid to tropical; terrain conditions varying from flat to mountainous; traffic conditions varying from ten to several hundred a day; standards varying from spot-improvement to engineered gravel roads; and haulage varying from tipper truck to donkey cart - the latter in relation to a relatively high standard of construction. Institutional frameworks have varied from a Department of Roads within a Ministry of Transport to a Roads Unit within a District Council that was semi-autonomous from a paper-pushing Ministry of Local Government and Lands. Workers have been employed on individual monthly contract or by contractors. In the early phases emphasis was upon the creation of employment opportunities for unskilled labour. Over time it became clear that the productivities achieved by organised labour could not be considered the result of unskilled work. Equally, that to motivate labour to construct a sound product it is essential to train skilled supervisors who are technically and organisationally competent and that during training as much attention should be paid to character as technical competence.

In South Africa the principles have been applied to higher standards required for heavily trafficked urban roads.

**Principles of Labour-intensive Construction**

Investigation of the ILO and World Bank research combined with experience and analysis, has revealed that, to fulfill the definition, successful site implementation depended upon following a set of basic principles. In essence a suitable project must be treated as proper engineering, not emergency relief, with appropriate choice of product and associated contract documentation; and the work must be carried out on a task basis under the close supervision of well-trained “hands-on” site supervisors. The full list is as follows:

- The project must be treated as proper engineering (i.e. re-analysis of product and process of production) while giving serious consideration to carefully selected socio-economic objectives: employment generation, skills and targeting.
- Operations and activities in the project must be amenable to the use of labour-intensive methods (project choice).
- Detailed technical analysis must be carried out.
- Designs, specifications, documentation and tender procedures should be appropriate.
- The greater use of productive labour is the “design driver”.
- As far as possible the work must be based on individual and group tasks.
- During preparation work (preparation period/pilot or demonstration projects) method and work studies should be carried out, iteratively, to reveal:
  - the various operations and optimal sequencing of such operations;
  - the various activities within each operation;
  - the individual and group tasks appropriate to the different activities and operations;
  - the balancing of activities within an operation.\(^{24}\)

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\(^{21}\) McCutcheon, 1988.
\(^{22}\) McCutcheon, 1985.
\(^{24}\) This type of analytical work is not peculiar to labour-intensive work. It forms part of the standard procedure with regard to the use of equipment; for example, balancing the numbers of mechanical excavators, loaders and trucks.
the balancing of operations within a project;
- team-balancing must be incorporated into the design, tender and construction process.

- Conditions of employment must be appropriate: the majority of the physical work will be carried out by daily or monthly employed labour; contractual arrangements require close attention. And:
  - “A fair day’s wage for a fair day’s work”; and its corollary:
  - “A fair day’s work for a fair day’s wage;”
  - As far as possible where labour is concerned: no work, no pay;
- The labourers make their own way to work: transport to site is their responsibility.
- High quality appropriate tools and equipment must be specified, procured, and maintained.
- Training must be extensive and good at what it sets out to do: particular attention must be paid to “hands-on” site supervisors and multi-site supervisors (sites’ supervisors or managers).\(^{25}\) The training process should pay as much attention to character as technical competence (those trained have to be self-motivated to work all day, every day, without direct supervision).
- The labourers must accept instructions given by trained supervisors.
- There should be close liaison between site work and the local community: but liaison must not be the responsibility of the site supervisor who has to be on site all day every day.
- Sites must be well organized.
- Strong organizations are required with good management systems.

The last two do overlap with some of the factors influencing programme development. They are included here because of their importance for day-to-day site performance.

And the corollary: the subject must not be treated as emergency relief.

The above principles were derived from several sources: desktop studies; single-site work and method investigations; pilot projects; and large-scale programmes. The latter have repeatedly demonstrated the effectiveness and efficiency of the technology.

**Reasons for success and failure of large-scale programmes**

**Success**

Application of the above set of principles will result in a technically sound and economically efficient product. Despite this proven track record the establishment of a long-term programme is not straightforward. Success on a small scale should no longer be problematic. As long as the engineers are technically competent and reasonably aware of local socio-economic realities, it is not difficult to establish an individual labour-intensive project that is technically sound. However, not many pilot projects have subsequently been expanded into multi-site operations; even fewer into long-term, large-scale programmes.

Detailed evaluation of many projects and programmes in sub-Saharan Africa has revealed an array of factors that have contributed to the success or failure of large-scale endeavours. One of the major criteria for assessing success has been that effective and efficient operations were continuous on a large-scale over at least 15 years. Consideration of both positive and negative factors leads to guidelines for implementation. Below we will deal first with factors for success, then with failure.

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Drawing in particular on direct experience and analysis of the programmes in Kenya and Botswana, the prime reason for success was that they adopted a genuine long-term “programme” approach, as opposed to ad hoc projects. A “programme” means that a related series of projects were planned and implementation was directly linked to formal training. Expansion on a large scale did not take place at a greater pace than permitted by the production of properly trained personnel. The programme itself generated the human resources necessary to implement the projects. Within the programme the principles of labour-intensive construction were applied. And the corollary: “not emergency relief”. In addition, major policy and decision makers understood the basic need for the use of labour-intensive methods.

Thus, in the first place a framework has to be created in which the principles may be applied. Hundreds of thousands of years of productive employment had been generated through the adoption of principles in the framework of a programme approach outlined above.

Pitfalls

Unfortunately there have also been many failures. I wish to highlight these for future discussion.

In many cases it has not been possible to establish a framework. Even where a framework has been established it has often been faulty. I will deal first with the factors that have militated against embarking upon labour-intensive work because these have also had a detrimental effect upon endeavours that have actually been started. The factors, which have prevented the concept from being seriously undertaken, may be considered in three categories: policy; industry; community.

1. Policy

There is a general lack of understanding of labour-intensive construction. Outright rejection is common. As damaging in the long run, is acceptance in the context of short-term emergency relief.

In South Africa at national, provincial and local levels, many policymakers consider labour-intensive methods to be backward. The term slave labour is often used. Pick and shovel is a pejorative epithet. This did not apply to the same extent amongst policy makers in Kenya and Botswana. In South Africa this attitude has recent historical roots but it also reflects the dual economy. Within 100 km radius of Johannesburg, the economic hub of South Africa, 10% of the formal economy of Africa and 40% of the national economy is generated.

But even policy makers who are sympathetic towards labour-intensive construction are reluctant to face the reality of the need for a lead-in period. The World Bank has recommended that where no previous experience exists a start-up period of at least three years should be considered.26 Policy makers who are only concerned with jobs and have little interest in product have even less appreciation of the need for a start-up period. The inevitable result is an economic and technical mess.

A further complication is the fashion for small contractor development, which is an offshoot of free market policies. It makes sense that a small contractor should use labour-intensive methods because less start-up capital would be required. However, regardless of the construction methods employed, the complexity of contracting is rarely appreciated. The failure rate of small contractor developing programmes is very high. The supposed link to labour-intensive methods leads to misapprehension of the reasons for failure; even to demands for greater use of equipment. The

latter is fostered by the fact that there are more technicians, operators and foreman who know about using equipment. The continued insistence by certain officials, departments, ministries and agencies that everyone can become an entrepreneur\textsuperscript{27}, and that this is the only way to generate employment, is misleading at least.

2. Industry

The structure of the construction industry is highly capital intensive, as is the mindset of all those engaged in the production process from conception through design and contractual procedures to implementation and later maintenance.

The attitude of most engineers is far more negative than that of policy makers. And this is not confined to South Africa. Most engineers reject the concept of labour-intensive construction. Those engineers who are involved in public policy and decision-making play a crucial role. They advise the policymakers that labour-intensive methods cost more, take longer, are more difficult to manage and result in a very low quality of product.\textsuperscript{28} These are four “lies”. This attitude is partly the result of straight prejudice, partly the lack of understanding of the principles of labour-intensive construction (even more that there is even something worth trying to understand\textsuperscript{29}), partly laziness to re-engineer the process.

The most invidious cynical, self-serving attitude is that the project is merely relabeled labour-intensive with no increase in labour content because the engineer knows that a typical politician cannot tell the difference. Slightly less cynical but just as damaging, is to continue with “business as usual” while employing a few extra people to sit under a tree so that the employment figures are higher, and the requisite “box can be ticked”.\textsuperscript{30}

My understanding and experience of labour-intensive construction has led to my considering it as the sensible way to proceed. However, I have to accept the process of re-engineering the industry is far more complex than anticipated.\textsuperscript{31}

3. Community

Policy makers and their advisers often claim that the people in the community would not do this type of work. They assert that this view comes directly from the community. In my experience this means that they have not spoken to the actual people who stand to benefit from employment. Often it is the views of the community leaders who either have not understood what is at stake will have been led to believe that using labour-intensive methods will result in a low quality of product.

Targeting the intended beneficiary is extremely important. Again, in my experience wherever the work has been offered to the actual poor there has been an abundant oversupply of people willing to work.

The second set of factors was encountered when programmes or so-called programmes have been attempted: these are a combination of factors, which affect development programmes as a whole,

\textsuperscript{27} “Every butcher and teacher in Soweto can become a small contractor.”
\textsuperscript{28} McCutcheon et al, 2007.
\textsuperscript{29} Quote from early 1990s: The proposals contained in your letter are too outlandish and too irregular to even contemplate, much less to which favourable consideration may be given.” Procurement Officer, KwaZulu Tender Board, to Croswell Shepherd and Partners, Ref No TB 13/1: TB 12/2/3, 8th June, 1992.
\textsuperscript{30} LITEworks 2008.
\textsuperscript{31} McCutcheon, Croswell and Hattingh, 2006 and 2007.
exacerbated by not applying the principles of labour-intensive construction. Analysis of projects and large-scale endeavours that were discontinued revealed:

- Very little sustainable employment was created.
- The assets constructed were not cost-effective, of doubtful value and ill-maintained (the results have often disappeared).

These resulted from an array of factors, which included:

- too many ill-defined objectives that could not be independently, verifiably measured;
- confusion between short-term relief objectives and long-term developmental objectives;
- inappropriate institution responsible for implementation;
- “add-on” funding as opposed to the formal procedures normally followed for the provision of public infrastructure;
- *ad hoc* projects not linked to either a programme of construction or training;
- inappropriate choice of project;
- inadequate planning; in particular unrealistically short lead-in times between project conception and initiation of construction;
- inadequate and inappropriate contract documentation;
- lack of appropriate legislation, in particular employment legislation, to allow the principles of labour-intensive construction to be used.

And

- Little national, provincial and local institutional capacity-building took place. Furthermore, there was a lack of communication between the various levels and agencies of government.
- The expenditure on development failed to reach the target group (the poor) to the extent envisaged.
- Individual skills were not improved. Training, where present, was not particularly appropriate or focused and has not shown itself to be carried through into post-project employment.
- Internal planning, recording, reporting, monitoring, control and evaluation were severely lacking. Independent evaluation has been noticeable in its absence. Given the lack of systems for planning and monitoring, systematic evaluation (internal or independent) would have been extremely difficult anyway.

**In conclusion**

Hundreds of thousands of years of productive employment have been generated for the unskilled by incorporating labour-intensive methods of construction into large-scale programmes. Above I have listed the principles of labour-intensive construction and provided guidelines for large-scale programmes.

However, many endeavours have failed for the following set of reasons:

- The principles of labour-intensive construction have not been applied, which means that there has been inadequate re-engineering.
- Programmes have not been established. A set of related projects has not been integrally linked to the training which produces the human resources required for implementation.
- It has been difficult to incorporate small contractors into these schemes.
Although these programmes have failed, at least they were initiated. Other factors have militated against their even being started:

Labour-intensive methods offended “the ethos of the age: progress”. They are perceived as being backward and closely related to slave labour. Engineers are particularly vociferous in their antagonism towards labour-intensive methods.

A proper labour-intensive programme cannot take place in the context of emergency relief because it is virtually impossible to generate productive employment and skills, and construct sound, efficient public infrastructure with such a short-term focus. Development is a long-term process.

The successful programmes in Kenya, Botswana, Malawi and Lesotho were conceived when it was still acceptable to talk about infrastructure without maligning the public sector. It is ironic that one of the reasons for the initiation was dissatisfaction with the productivity levels in the public sector. During the 1980s and 1990s the donor agencies not only moved away from infrastructure and public sector that they strongly advocated the benefits of the free market. In relation to this type of work small contractor development became a prime focus.

Prior to this year’s dramatic events in the financial markets, the assumed benefits of the free market in relation to the provision of infrastructure had been challenged. Perhaps the improved understanding of the potential role of the public sector will lead to serious reconsideration of labour-intensive employment of the unskilled in the construction and maintenance of infrastructure.

In 1900 in The Early History of English Poor Relief, Elizabeth Leonard wrote: “But the question of poor relief was not settled by statutory enactment any more than by municipal regulations. Administration and not legislation has always been the difficulty in laws concerning the poor.”

References


32 Leonard, 1900: ix. From her text it is clear that by “administration” Leonard had “effective organization and implementation” in mind.


33 Winner of the James Hill Prize 2002, for the best paper published in the 2001 Municipal Engineer …awarded by the Institution of Civil Engineers

