



Mutual Aid 2: South Africa to Africa.

“Consulting Engineers and Socio-economic Development: their Potential Contribution to Sustainable Development in Africa: the Case of South African Public Works Programmes and Modern Labour-intensive Construction”

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Abstract

The Expanded Public Works Programme (EPWP) is a component of the South African government's response to the triple challenge of poverty, unemployment and inequality. The Infrastructure Sector comprises nearly 80% of expenditure on the EPWP. Conceptualisation of the EPWP was partly based on large-scale, long-term programmes established elsewhere in sub-Saharan Africa during the 1970s to 1990s. The extensive use of modern labour-intensive² methods lay at the core of those programmes. The Infrastructure Sector of the

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² Although this paper refers to “Construction”, it must be emphasised at the outset that once the road has been constructed “labour-intensively”, it may then be “Maintained” by even more highly labour-intensive methods. Furthermore, the term ‘labour-intensive construction’ implies that it is the use of the ‘modern’ labour-intensive methods developed through extensive research and development from the 1970s to date.



EPWP has failed to achieve the levels of labour-intensity anticipated in its formulation. This paper analyses the reasons for this failure. Particular attention is drawn to the decision to rely upon independent small contractors and therefore the reliance upon the contract. Consequently the public sector did not develop an 'in-house' capacity to implement policy. Furthermore, in contrast to the other African Programmes, it did not establish a programme of construction formally linked to training. In the future public sector authorities in South Africa should establish 'in-house' capacities. In particular they should set-up training programmes to produce large numbers of 'hands on' site supervisors, the more independently minded of whom could then become small contractors. Africa should re-learn lessons from its own successful past endeavours. South Africa has demonstrated that labour-intensive methods may be used for high-standard infrastructure. Engineers have a clear role with respect to the physical components of public infrastructure. They could play a much greater role in relation to 'secondary' socio-economic benefits of public expenditure; in this case skills development and employment creation. The existing 'socio-technical system' of the construction industry is based upon the use of fuel-powered, heavy equipment. In the face of this fact, engineers have to perform extensive *re-engineering* of product and process in order to achieve socio-economic objectives.

1 Introduction

At the national level public infrastructure and housing are high on the list of South Africa's priorities. Service delivery is at the core of current demands at local community level. Levels of unemployment are disturbing.³ Therefore, skills development and employment creation are also high on the list of national priorities and are certainly demanded by communities. Furthermore, these employment opportunities have to be created for large numbers of people who have little or no education and very few formal skills. Economic growth is widely postulated as the solution. In the absence of sufficient economic growth, what does one propose for skills development and employment creation in the face of the actual low-levels of education and skill?

Alternative approaches would augment the benefits of economic growth. Certainly, in South Africa public works programmes are acknowledged as having a role to play. The 2011 *National Development Plan* recommended that public employment programmes would form a component of employment strategy until 2030.⁴ Labour-intensive industries are encouraged. In the construction industry the proper use of labour-intensive methods would result a significant increase in the employment generated per unit of expenditure (at least 300%).

³ Narrow definition: 27%; broad definition, which includes those who have given up looking for work: 37%. 'Black' South Africans: 46% (all age groups); 68%: 15 to 35 age group (SA National Census 2011: Statistics South Africa).

⁴ In November 2011 the National Planning Commission published its National Development Plan. In Economy and Employment (Chapter 3) the following is stated: *Promoting employment in labour absorbing industries...Public employment programmes are an essential element of any employment strategy, taking on board lessons from successes and failures in our existing programmes. Up to 1 million opportunities will be created annually by 2015, mostly through community-based services. As market-based employment expands, so these opportunities can be reduced. However, they will be needed in large numbers over the entire period. (2011: p 93)*



It has been mooted that in the near future there will be major expenditure on public infrastructure and building. The Consulting Engineering Profession has a clearly defined role in relation to the provision of public infrastructure and building.

It should be possible to take advantage of this public expenditure to contribute to both skills development and employment creation. Indeed, most public tenders currently state that socio-economic objectives such as ‘skills development’, ‘women/youth empowerment’, ‘small contractor development’, ‘sustainability’ and ‘job creation’ be addressed during public expenditure on public goods.

However, the following cautionary tale will indicate that the achievement of these ‘secondary’ socio-economic benefits is problematic.

While the engineer’s role *vis-a-vis* the physical product is clearly defined, this is not the case regarding the contribution to the improvement of selected socio-economic factors; or the means for assessing the effectiveness of achieving these ‘secondary’ objectives. To achieve such objectives will require far more attention to be paid by the Consulting Engineering Profession to the whole project cycle from conception through to maintenance.

As for South Africa, throughout Africa there are demands for public infrastructure, housing, skills development and employment.

In a few countries in sub-Saharan Africa, labour-intensive methods of construction have been promoted on a large-scale over the long-term in order to generate skills and employment during the provision of public infrastructure. This has been achieved without compromising time, cost and quality. However, it has not been achieved by superficial tinkering. Large-scale, long-term programmes of labour-intensive construction and maintenance have been established: thousands of skilled ‘hands-on’ site supervisors have been trained, hundreds of thousands of years of employment have been generated and thousands of kilometres of rural infrastructure have been constructed and maintained.

In a related FIDIC GAMA Conference paper - ‘Mutual Aid 1: Africa to South’ – the author provided details regarding the definition, principles and practice of labour-intensive construction. Here, it is necessary to highlight a few crucial details.

Drawing in particular on direct experience and analysis of the programmes in Kenya and Botswana, between the early 1970s and the mid-1990s, the author reached several conclusions regarding success. In the first place, serious engineers *re-engineered* the process of construction from concept, through design, specification to construction and maintenance. This was crucial for single-site success.

As soon as many sites were required to be in operation at the same time another factor became crucial for large-scale, long-term implementation. Both Botswana and Kenya adopted a genuine long-term ‘*Programme*’ approach, as opposed to ad hoc projects. A ‘*Programme*’ consists of the planning and construction of a related series of projects; 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. There is therefore a direct link between essential skills development and productive



employment creation. Within the *Programme* the principles of labour-intensive construction were applied. But it was not considered as emergency relief and there was no “fast tracking”. In addition, major policy and decision makers understood the basic need for the use of labour-intensive methods. The author derived recommendations for future public works programmes.

Indeed, in 1994, the author played a role in the conceptualisation of South Africa’s National Public Works Programme (NPWP). In 2004 the NPWP morphed into the Expanded Public Works Programme (EPWP). The Expanded Public Works Programme (EPWP) is a component of the South African government’s *response to the triple challenge of poverty, unemployment and inequality*.⁵

Between 2004/05 and 2013/15 over R128 Billion (over \$10,5 Billion)⁶ has been spent upon the Infrastructure Sector of this EPWP; this amounted to nearly 80% of the total expenditure on the EPWP. Expenditure on the Infrastructure Sector was derived from funding formally allocated for public infrastructure. These were not social-welfare allocations. However, unlike much other expenditure on public building and infrastructure, the EPWP has very clearly defined socio-economic objectives (in addition to the physical product).

The greater use of labour-intensive methods lay at the core of policy and approach. As indicated earlier, it was mooted that a minimum of a 300% increase in labour-intensity (and concomitantly skills and employment) should be achieved using proper labour-intensive methods.

The extent to which the Infrastructure Sector of the EPWP has failed to meet its own targets may be judged by the following: labour-intensity has remained stubbornly around 10%, which is barely more than could be achieved using conventional equipment-intensive methods.

What went wrong?

What to do?

Following on from “Mutual Aid 1: Africa to South Africa”, this paper will start with an outline of the development of the use of modern labour-intensive methods in South Africa: the Framework Agreement, the NPWP and the EPWP. It will outline the ways in which the South African public works programmes differed in approach to those used elsewhere in Africa. The results of the first two phases of the Infrastructure Sector of the EPWP will be summarised. The paper will analyse the reasons for the failure of the EPWP to achieve its stated objectives. It will outline the lessons that have been learnt during the South African experience, which will be useful for future implementation in both South Africa and elsewhere in Africa.

While the analysis concentrated upon labour-intensity in the Infrastructure Sector, it also revealed that there is there is an enormous shortfall between the allocation recorded in the *EPWP Quarterly Reports* and expenditure. The serious inability of the public sector

⁵ Thulas Nxesi: Budget Vote Speech for 2013/14 Parliament May 2013. See also greater detail on references in NDP and State of Nation and Budget speeches.

⁶ The value of the Rand has fluctuated. For simplicity we have used \$1 as equal to R12.



authorities to spend the funds allocated to them impacts negatively upon employment and wages. The inability to spend allocated public funds has important implications beyond the question of labour-intensity: the need to improve the ‘in-house’ capacity of the public sector.

In the process of this cautionary tale the paper will emphasise the following: *The essential and critical role that the Consulting Engineering Profession would have to play during this process, in order to achieve both conventional physical objectives and the ‘new normal-expected’ socio-economic objectives.*

2 A summary of Labour-intensive Policy and Practice in SA

There are two sources for the origin of South African policy on labour-intensive construction policies. The one is the need for a large public works programme outlined in the ANC’s Reconstruction and Development Programme (1994).⁷ The other is the fact that the use of proper labour-intensive methods during construction can generate skills and a significant increase in employment per unit of construction.

Since 1991 the author has contributed to the formulation and implementation of public employment creation programmes in South Africa: first the *Framework Agreement* between COSATU and the SA Construction Industry; in 1994 this was incorporated into the *National Public Works Programme*; in turn, in 2004 this morphed into the *Expanded Public Works Programme* (EPWP).

The Framework Agreement and the National Public Works Programme⁸

A Framework Agreement was signed between COSATU and the construction industry in June 1993.⁹

Why is it necessary to consider the Framework Agreement?¹⁰ In the first place it is important to point out that the central concept - the use of labour-intensive methods - had been accepted by COSATU (and SANCO), under certain conditions. Secondly, the difficulties experienced in relation to labour legislation during the implementation of the NPWP led to the need to introduce amendments to labour legislation regarding Special Public Works Programmes.¹¹ Without this legislation the EPWP would not be able to operate. Thirdly, many essential elements of the current EPWP Guidelines (2014) were formulated for the Framework Agreement.¹²

⁷ ANC *Reconstruction and Development Programme* 1994.

⁸ The NPWP was the implementation of a component related to Public Works in the ANC’s *Reconstruction and Development Programme*

⁹ Please note: at this time the SA Government was not involved

¹⁰ Core members of the ‘team’ which formulated and drove the Framework Agreement: COSATU: Leonard Ramatlakhane, Dumisani Nthuli, Lisa Seftel; Construction Industry: Graham Power, James Croswell, William Vance; Academia: Robert McCutcheon, Sean Phillips. James Croswell was primarily responsible for all the detail regarding contract documentation, specifications and contract clauses.

¹¹ For more detail see McCutcheon, 2001a and 2001b and McCutcheon and Taylor Parkins 2003: “Chapter 14: Employment intensive methods and the use of contractors.”

¹² James Croswell was primarily responsible for all the detail regarding contract documentation, specifications and contract clauses.



During 1994 the National Economic Forum carried out a thorough investigation of a *National Employment Creation Programme for the Provision of Public Infrastructure Using Labour Intensive Methods*, which was abbreviated to a *National Public Works Programme*.¹³ Several focus group committees were established and reported back to the NEF. The author and Dr Sean Phillips were responsible for the Technical Focus Group.¹⁴

The new government located responsibility within the national Department of Public Works. Hon J Radebe was Minister of Public Works. Unfortunately, it was not realised that the Department of Public Works (DPW) was primarily responsible for *Public Buildings*. DPW had very little leeway related to public works (infrastructure). *Public Works* were the responsibility of ministries such as Water Affairs and Transport and various provincial departments.

In 1994 the National Public Works Programme was partly based upon lessons derived from large-scale, long-term experience elsewhere in sub-Saharan Africa. The public sector institution responsible for public works had established integrated Programmes of construction and maintenance. Long-term programmes of roads were planned for construction. There were formal links between training and construction. Engineers carried out the necessary re-engineering required for implementation using highly labour-intensive methods. Techniques and procedures were developed. Engineers and ‘hands-on’ site-supervisors were thoroughly trained. Thereafter, implementation was through the medium of *Instruction*. In essence an in-house capacity was established. The public sector institution employed most of the engineers and site supervisors. Most of the workers were employed on a casual contract basis.

These were the prime elements of the model used during the formulation of the NPWP in 1994.

However, during implementation the NPWP did not follow most of the essential elements of this model.

In particular:

Long-term plans were not drawn for the construction of specific roads or other infrastructure.

A formal training system was not established. Very little technical training was carried out. A system for technical training was not established. During negotiations with COSATU there had been a stated commitment to training. This did not take place. The lack of the type of systematic training used in Kenya, Lesotho and Botswana, bedevilled the NPWP.

¹³ The unfortunate implications of the shortening of the full title were not anticipated

¹⁴ McCutcheon and Phillips (1994)



Given the fact that there were no long-term construction plans and no training system, the consequence was that there was no formally integrated training and construction programme.

Thus: the NPWP was a *programme in name only*.

It was an *ad hoc* collection of projects.

The NPWP also differed from the model as follows: no ‘*in-house*’ capacity was set in place.

In addition to all these differences probably the most important was the decision that ‘*delivery*’ had to be through the use of *small contractors* (and therefore the *contract*), instead of through *Instruction*.

Legislation

A major stumbling block was also the fact that the necessary labour legislation was not in place. The Framework Agreement between COSATU and the construction industry expired on the 30th June 1994. Considerable efforts were made to renew the agreement but this time with the inclusion of government. Despite much lobbying it proved impossible to renew the agreement. The last revision was dated August 1996.

Despite the collapse of the Framework Agreement some negotiations eventually led to the necessary amendments to labour legislation.¹⁵

Two pieces of legislation provided the foundation for the introduction of the EPWP. The Amendments to the Basic Conditions of Employment Act 2002, and the Division of Revenue Act 2004.

Amendments to the Basic Conditions of Employment Act

On the 25th January 2002 the Government Gazette (No. 23045) of South Africa published the following:

No R63 Basic Conditions of Employment Act, 1997

Ministerial Determination: Special Public Works Programmes;

and

No R64 Basic Conditions of Employment Act, 1997

Code of Good Practice for Employment and Conditions of Work for Special Public Works Programmes.

The Amendments have been repeated since then, the most recent being issued in May 2012.¹⁶

¹⁵ Championed by Lisa Seftel and Jacqui Bouille.

¹⁶ Department of Labour. *Government Gazette No. 35310*. 4 May 2012.



Full original details may be found in the Gazette (RSA, 2002). Here we wish to highlight a few of the principal features.

In the Ministerial Determination (R63), *inter alia*, it was stated:

- *“Special public works programme” means a programme to provide public assets through a short-term, non-permanent, labour-intensive programme initiated by government and funded from public resources...*
- *“task” means a fixed quantity of work;*
- *“task-based work” means work in which a worker is paid a fixed rate for performing a task;*
- *Workers on a SPWP are employed on temporary basis.*
- *A worker may NOT be employed for longer than 24 months in any five-year cycle on a SPWP.¹⁷*
- *Employment on a SPWP does not qualify as employment as a contributor for the purposes of the Unemployment Insurance Act 30 of 1966.*
- *A task-rated worker will only be paid for tasks that have been completed.*
- *An employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the contractor having submitted an invoice to the employer.*

The Schedule “Code of Good Practice” (R64) included, *inter alia*:

- *Reducing unemployment is one of the greatest challenges facing South Africa. Government has undertaken a number of initiatives to address unemployment and poverty, including the promotion of labour-intensive Special Public Works Programme (SPWP). A SPWP is a short-term, non-permanent, labour-intensive programme initiated by government and funded either fully or partially,¹⁸ from public resources to create a public asset.*
- *On the task-based system, a worker is only paid for each task completed*
- *A “no work – no pay” rule must apply except in the following circumstances:*
.... Illness.... Injury
- *Training is regarded as a critical component of SPWP. Every SPWP must have a clear training programme that strives to:*
- *Ensure programme managers are aware of their training responsibilities*

¹⁷ The 2 year time restriction has since been removed.

¹⁸ Emphasis added.



-Ensure a minimum of 2 days training for every 22 days worked¹⁹

-Ensure a minimum of the equivalent of 2 % of the project budget is allocated to funding the training programme...

The training components were the *quid pro quo* demanded by COSATU to allow (1) payment to be made on a task basis (2) ‘no work, no pay’ and (3) relaxation regarding the definition of ‘temporary’ from 3 months to 24 months.

Division of Revenue Act and the EPWP Guidelines

Another crucial piece of legislation was enacted in 2004: the Division of Revenue Act, which has been updated annually. In 2004 the Division of Revenue Act made it **mandatory** to use labour-intensive methods for specific categories of infrastructure funded through the formal channels through which public infrastructure is funded: the Provincial Infrastructure Grant (PIG) and the Municipal Infrastructure Grants (MIG). It is important to stress that the funding allocated for the infrastructure component of the Expanded Public Works Programme formed part of normal government expenditure and, therefore, had to follow normal procedures as specified by National Treasury under the Division of Revenue Act. These procedures included an annual audit. Thus, the funding was not an “add-on” for emergency / poverty / drought relief. This marked a significant difference between the infrastructure component of the Expanded Public Works Programme and all previous programmes of this nature in South Africa. Thus, labour-intensive construction had been brought into the normal budgetary procedures and, at face value, was thus part of the major economy. The condition stipulated in DORA have been updated annually.²⁰

The specific categories for which it was mandatory for public bodies use labour-intensive methods were: low-volume roads, storm water drainage, sidewalks and trenches. Public bodies were **required** to implement these categories using the “*Guidelines for the Implementation of Labour-intensive Infrastructure Projects under the Expanded Public Works Programme*,” (DPW, 2004), which were specifically produced for the EPWP.²¹

As mentioned above, in 2004 the NPWP morphed into the EPWP. Before turning to a description and analysis of the EPWP itself, it is essential to discuss the technical research and field experience that showed that labour-intensive methods were valid for ‘high standard’ infrastructure.

¹⁹ Training removed.

²⁰ “EPWP conditions have been placed on the PIG and MIG via the 2004 Division of Revenue Act.” EPWP First Quarterly Report, Financial Year 2004/05, 1 April-30 September 2004, 9 September 2004. The Framework Agreement was incorporated into the National Public Works Programme, 1994 and formed the basis of the Ministerial Determination, Special Public Works Programmes and its Code of Good Practice (2002 updated 2012). The essential principles were negotiated with COSATU and SANCO and since then have been agreed at NEDLAC.

²¹ “EPWP conditions have been placed on the PIG and MIG via the 2004 Division of Revenue Act.” EPWP First Quarterly Report, Financial Year 2004/05, 1 April-30 September 2004, 9 September 2004.



3 Research and Development in Labour-intensive methods in South Africa 1988 to 2003

As mentioned above, elsewhere in Africa large-scale, long-term implementation took place in relation to the construction and maintenance of rural roads. The author's initial emphasis focussed solely upon the substitution of labour for (non-essential) equipment in a rural environment in South Africa.

However, starting in 1989 research and field implementation at, and in association with, the University of the Witwatersrand, was carried out upon three other avenues of increasing the generation of employment per unit of expenditure. The four avenues of investigation may be categorised as follows:

Substitution of labour for non-essential equipment.

Labour-intensive materials (and their related techniques and technologies) that have been used in the past but have been replaced (and thus obscured from professional view) by the use of materials that are more amenable to the use of capital-intensive methods. For example: Waterbound Macadam.

Modification of existing materials in such a way as to enable the use of labour-intensive methods and lower the need for imported equipment. For example: a bitumen with a modified chemistry.

New materials that would increase the proportion of labour and decrease that of imported equipment. For example: ionic stabilisers such as sulphonated petroleum products.²²

In all four approaches it is essential to understand that in order to generate significantly more employment per unit of expenditure, it is imperative that this objective is incorporated into the design and contract documentation, including conditions of contract, specifications and bill of quantities.²³ The labour-intensive technology thus becomes the “design driver”, requiring that the designers think through the processes long before site implementation. Labour-intensive methods cannot be effectively “tacked on” during the construction phase alone. In all four approaches to labour-intensive construction research and prototype development has been necessary.

This research and field implementation in South Africa demonstrated that the potential and scope encompasses far more than low-cost, low-volume roads. Research and practical implementation have re-confirmed the findings of the World Bank's study. It is, indeed,

²² McCutcheon,, 2001a. McCutcheon 2001, McCutcheon and Taylor Parkins, 2003.

²³Croswell and McCutcheon: “Employment- Intensive Construction Methods and the use of Contractors”, Chapter 14 in McCutcheon and Taylor Parkins (2003): 295-335.

Croswell and McCutcheon : “How to Activate the Power Inherent Within the Contract”, Chapter 15 in McCutcheon and Taylor Parkins (2003) op cit: 337-385.

Croswell and McCutcheon: “Group Tasks and Group Balancing”, Chapter 16 in McCutcheon and Taylor Parkins (2003) op cit: 387-413.



technically feasible across a wide range of civil construction and can result in the same quality of product. Under certain circumstances it can be economically efficient and even cost competitive with conventional construction. High standard, high cost civil construction can be provided using labour-intensive methods and contractors could play a greater role in implementation.

4 Progress and Potential in South Africa

Over the past 20 years in South Africa considerable progress has been made in relation to the creation of an enabling environment for labour-intensive construction. These include:

Policy: The National Public Works Programme was initiated in 1994 and modified, in 2004, to become the Expanded Public Works Programme, which entered its third five-year phase in April 2014.

Policy: The National Development Plan: the horizon is 2030.²⁴ There is a sufficient time-frame to do something sensible.

Policy: Public Employment Programmes are included in the National Development Plan. The EPWP is mentioned as an example of a Public Employment Programme.

In particular, the principle regarding the use of labour-intensive methods remains at the core of the formulation of EPWP's Infrastructure Sector.

The term "labour-intensive" is included in the goal of EPWP Phase Three, which therefore aligns it with legislation.

The wording of the Objective of Phase 3 is itself of critical importance.²⁵

Appropriate legislation and regulations have been put in place: in particular Amendments to the Basic Conditions of Employment Act were introduced in 2002, repeated in 2013 with and compulsory linkages to the Division of Revenue Act since 2004/05: the wording in the legislation is in accordance with that used in the EPWP documentation.

Considerable funding was allocated to the first two phases and has been budgeted for Phase Three.

There is an EPWP Unit in the National DPW, together with a framework for implementation. The institution is staffed at national, provincial and local municipality levels.

The importance of this Institutional establishment must not be underestimated.²⁶

²⁴ Please recall the World Bank 1981 conclusion and time frame: the NDP's timeframe is even longer.

²⁵ *To provide work opportunities and income support to poor and unemployed people through the delivery of labour intensive public and community assets and services, thereby contributing to development*



Considerable research and field experimentation has demonstrated that labour-intensive methods can be used for a wide range of high-standard infrastructure, as argued by the World Bank in the 1970s.

South Africa has demonstrated *in depth* that labour-intensive methods may be used for high-standard infrastructure.

Across a wide range of building and infrastructure categories there are guidelines and background material for the following: design, specification, contract documentation.

SANRAL is preparing new Specifications for labour-intensive construction. This is extremely important.

Appropriate curricula for training have been established. Accredited courses have been developed at NQF2, 4, 5 and 7 levels factors.

A linked small-scale construction and training programmes has been implemented.

Thus, there is a lot to be positive about in relation to the prospects for Phase Three: general and specific policy at national, provincial and local levels; legislation, regulation, the existence of the EPWP itself and the establishment of an institutional framework at national, provincial and local authority level.

In particular, the principle regarding the use of labour-intensive methods remains at the core of the formulation of EPWP's Infrastructure Sector.

We now turn to consideration of the EPWP in some detail.

5 Expanded Public Works Programme (EPWP): 2004/05 to 2018/19

As mentioned at the outset, South Africa has very high levels of unemployment and poverty. In 2004, as one of its strategic components for generating employment and alleviating poverty during the provision of public goods and services, government initiated the Expanded Public Works Programme (EPWP). The greater use of labour-intensive methods was at the intellectual core of the Programme.²⁷

The EPWP began in April 2004; the third five-year phase in April 2014.

Stated objectives of Phase Three:

²⁶ World Bank (1981): "No maintenance effort with which the Bank has been involved was foreseen and being of more than ten years duration. Yet none has taken less than ten years in practice."

²⁷ "Programme" is frequently used instead of EPWP, to emphasise that it should be a proper Programme, not just labelled one.



*To provide work opportunities and income support to poor and unemployed people through the delivery of labour intensive public and community assets and services, thereby contributing to development.*²⁸

The importance of the Programme may be judged by its inclusion as one of the Public Employment Programmes mentioned in the National Development Plan; since then the Minister of Public Works stated: “The Expanded Public Works programme (EPWP) remains an effective part of government’s response to the triple challenge of poverty, unemployment and inequality.”²⁹

Major objectives of Phase Three:

Work Opportunities: Total 5 951 124; Infrastructure: 2 386 000;

And:

Full Time Equivalents (FTEs)³⁰: Total 2 422 707; Infrastructure: 778 235 (A Full Time Equivalent is obtained by dividing the total number of recorded working days by 230).

The threat to achievement of the projections is particularly the case for the infrastructure sector, for which employment-projections have been based on a labour-intensity of about 26%, whereas the average achieved during the first two phases was only 10%.

Implementation during the first TEN YEARS has not yet resulted in anywhere near the amount of employment that should have been achieved if proper labour-intensive methods had been used. Various reasons will be provided for the inability to achieve the potential. But first we will summarise the results from the EPWP data.

It has been pointed out that this data is unreliable and that double-counting exists. That may be the case but this is the data officially recorded in the EPWP Quarterly Reports on the website: www.epwp.dpw.gov.za.

Summarised results of the first two phases

Between April 2004 and March 2014 R163 Billion (over \$13.5 Billion) was spent on the EPWP, of which R129 Billion (over \$10.5 Billion) was spent on its infrastructure component: nearly 80% of the total (Figure 1). From the scale of expenditure it may be seen that the EPWP is a mega project, albeit disguised by being spread over more than ten thousand smaller projects. It should be treated with the intensity to detail required for successful implementation of a mega project.

²⁸ EPWP Unit, 2013. EPWP Unit Nov2013: p 10. It is interesting that the original in Overview Version had added: “(This will scale up from 500,000 per year in 2009 to 1,5 million in 2013/14)”. EPWP Unit 9Jan2009: p6.

²⁹ Hon Thulas Nxesi: Budget Vote Speech for 3013/14 Parliament May 2013. See also greater detail on references in NDP and State of Nation and Budget speeches.

³⁰ ‘Full Time Equivalents’ (FTEs): an FTE equals the number of days worked divided by 230.



This paper focusses upon results in the Infrastructure Sector for three main reasons: it is the main sector in which it was originally planned that a significant increase in productive employment would be generated per unit of expenditure; it is the component of the Programme, which does *not require additional state* expenditure because the funding is *already earmarked/allocated* for expenditure on infrastructure; and, it has been the largest sector as far as both allocation and expenditure are concerned.

EPWP 2004/05 to 2013/14: Allocation, Expenditure, Full Time Equivalents and Wages: Total and Infrastructure Sector

EPWP	Total Allocation Bn	Total Expenditure Bn	%	Infrastructure Allocation Bn	Infrastructure Expenditure Bn	%
Phase 1 2004/05- 2008/09	99	49.7	50.2	70.7	41.8	59.1
Phase 2 2009/10- 2013/14	657	113.3	17.2	472.1	86.7	18.4
Total 2004/05- 2013/14	756	163	21.6	542.8	128.5	23.7
		163			128.5	78.8
EPWP		Total FTEs	Total Wages M		Infrastructure FTEs	Infrastructure Wages M
Phase 1 2004/05- 2008/09		550918	6726		312227	4507
Phase 2 2009/10- 2013/14		1147699	18000		469206	8500
Total 2004/05- 2013/14		1698617	24726		781433	13007

Allocations³¹

³¹ All data has been derived from the DPW EPWP Quarterly Reports and other official reports..



During a ten year period the whole of the EPWP was allocated R756 Billion. Only R163 Billion was spent. The proportion of expenditure to allocation decreased over time (Figure 2).

The Infrastructure Sector was allocated R542,8 Billion. Only R128,5Billion was actually spent (23,7%).

This indicates a difference between the South African economy and most of the countries in sub-Saharan Africa: the additional expenditure was generated internally without reliance upon donor funding. Furthermore, the actual 2004-09 budget allocations amounted to more than four times the original budget, or twice the actual expenditure. Although this indicates a severe inability to spend the allocated budget, it again indicates the scale of internal resources available to South Africa.

However, the discrepancy between the amount allocated and the actual expenditure shows a severe lack of capacity to deliver at national, provincial and local levels

Disaggregated Phase One and Two:

Phase One: Infrastructure Expenditure of R41,8 Billion amounted to 59,1% of the R70,7 Billion allocation.

Phase Two: Infrastructure Expenditure of R86,7 Billion amounted to 18,4% of the R472 Billion infrastructure allocation. This leaves much to be desired.³²

Employment created (Full Time Equivalents): 781 433.

Wages: R13 007 Million.

Labour-intensity

Labour-intensity was 10,1%. Labour-intensity actually *fell* from 10,8% during the First Phase to 9,8% during Phase Two. These percentages are far below both the minimum of 30% that should have been achieved and the 26% mooted for Phase Three.

In a nutshell, the labour-intensity in the infrastructure sectors reflects “business as usual” through the use of conventional construction (capital-intensive / heavy-equipment-intensive) construction.

The above numbers were achieved at the low levels of labour-intensity. Use of proper labour-intensive methods would have ratcheted numbers up significantly. The actual results amount to ‘opportunities foregone’.

Opportunities foregone disaggregated by Phase

Phase One

³²This is a serious decrease from the proportion in Phase One. The huge difference between allocation and expenditure in Infrastructure is one of the main reasons why considerable efforts are being made to classify a great deal more infrastructure as being not suitable to be addressed using Labour-intensive methods, instead of insisting that labour-intensive methods should be used properly. It is the major reason why there has been a move away from the potential towards a social welfare orientation of the whole EPWP, instead of insisting that engineers re-engineer the product and process. Various consultants (departmental advisors, without high standard knowledge and experience) have tried to downgrade the potential and reduce its provenance to rural roads.



At the labour-intensity of 10,8%, Full Time Equivalents amounted to 312 227 and wages to R4 507 million. As emphasised, for the categories of infrastructure, which form the focus of the EPWP, labour-intensity should be at least 30%.³³ Therefore, for the actual expenditure, FTEs and wages should have been of the order of 867 297 and R12 519 Million. If all the allocated expenditure had indeed been spent we would be looking at 1 467 508 FTEs ($867\,297/0.591=1467\,508$) and Wages of R21 182 Million ($R12\,519M/0.591 = R21\,182M$).

Phase Two

At a labour-intensity of 9,8%, ‘Full Time Equivalents’ amounted to 469 206 and wages to R8 500 Million.

If expenditure had matched allocation then, even at the low-level of labour-intensity, FTEs and wages could have risen to 2 550 033 and R46 200 Million respectively.

For the categories of infrastructure, which form the focus of the EPWP, labour-intensity should be at least 30%. Therefore for the *actual* expenditure, FTEs and wages should have been of the order of 1 436 345 and R26 020 million.

If labour-intensive methods had been used properly and expenditure had matched allocation, then FTEs and wages could have risen to 7 823 230 and R141 721 million.³⁴

One of the reasons for separating the data into Phase One and Two is to show that the labour-intensity continued decreasing as was shown in detail in an analysis of Phase One.³⁵

Opportunities Foregone: Aggregated Phase One and Two

If labour-intensity of 30% had been achieved for actual expenditure

Labour-intensity @ 30% instead of 10,1%:

Employment in FTEs: $2\,321\,888 \{(781\,433/10,1) \times 30 = 2\,321\,888\}$.

Wages: R38 634 Million $\{13\,007M/10,1\} \times 30 = 38\,634M\}$

If allocated expenditure had been spent at the existing low level of intensity

Actual Employment, in FTEs, at the existing low-level of labour-intensity: 781 433

Possible employment, at low-level of labour-intensity, if allocated expenditure had been achieved: $3\,300\,870 \text{ FTEs} \{781\,433 \times (542,8/128,5) = 3\,300\,870\}$.

Wages: R54 943Million $\{13\,007M \times (542,8/128,5) = 54\,943M\}$

If allocated expenditure had been spent labour-intensively:

³³See McCutcheon and Taylor Parkins 2012.

³⁴It is acknowledged that this would have required everything to be working regarding both expenditure and the proper use of labour-intensive methods. However, the difference between this potential and the reality is surely worth aiming for?

³⁵McCutcheon & Taylor Parkins 2012.



Possible Employment: 9 807 944 FTEs $\{(542,8/128,5) \times 2\,321\,888 = 9\,807\,944\}$

Wages: R162 472,5 Million $\{(542,8/128,5) \times 38\,463\text{M} = 162\,472,5\text{M}\}$.

Comment

Please note the huge increase in employment and therefore wages that could have been achieved. In the first place, by increasing the labour-intensity that should have been achieved. In the second place through the expenditure of the funds allocated, even if at low labour-intensities. Or, in the third place, but actually the first prize, if the allocated expenditure had been used labour-intensively.

Assets produced

The failure to collect any data on the type and quantity of Infrastructure constructed persisted in Phase Two.³⁶

It is extremely disturbing that no attempt has been made to obtain the total amounts of the different types assets produced during the expenditure of over 128,5 billion; especially given the amount of time and effort focused upon the recording of the details related to the number of work opportunities. In itself this indicates that the infrastructure component of the EPWP began to be viewed as relief or social welfare. It thus diverged from the original objective of serious engineering, which also addressed training, skills development and productive employment creation. Skills development is an essential component of employment creation.

This failure to collect any data on the type and quantity of Infrastructure has persisted in Phase Two but, to date, there has been no attempt to produce data as to the infrastructure constructed.

The above analysis was carried out in relation to the EPWP.

While it has revealed serious inadequacies with regard to labour-intensity, it also revealed something very important (perhaps more important): the serious inability of the current authorities to spend the funds allocated to them. Above the author has shown that in Phases One and Two the numbers employed were 781 433 (Full Time Equivalents) while Wages amounted to R13 007 Million. Using proper labour-intensive methods, there should have been 2 321 888 FTEs and Wages would have risen from R13 007M to R38 634M. If the funds allocated had been spent at even the low levels of labour-intensity, FTEs would have amounted to 3 300 870; Wages would have been R54 943M. If allocation had been spent using proper labour-intensive methods we could have seen of the order of 9 807 944 years of employment generated, which is of the order of one million FTEs for each year (Wages: R162 742M).

Also importantly, as we will see below, large numbers of matric-level '*hands on site supervisors*' would have been trained ('rule of Roman thumb': one trained supervisor is required to ensure the productive employment of ten unskilled workers).

³⁶ It has been stated that physical product will be recorded in Phase Three.



In conclusion:

The analysis investigated the effectiveness of the EPWP in relation to labour-intensity and the implications thereof for employment and wages. During the process it revealed the enormous shortfall between allocation and expenditure and the implications of this shortfall for skills development for matriculants, employment and wages.

6 Reasons for comparative failure

The reasons for the lack of success may be placed in three different categories:

Over-arching: Route adopted for implementation

External to the public works programme

Internal

Over-arching: Route Adopted for Implementation

As for the NPWP the EPWP did not follow most of the essential elements of the model derived from experience elsewhere in Africa: no long-term planned series of related infrastructure projects; no linkage to a training programme; little ‘in-house’ construction capacity was developed in any of the public sector authorities.

Thus, as for the NPWP, the EPWP is a programme in name only. Most of its projects derive their funding from the Municipal Infrastructure Grant (MIG) and are re-labelled EPWP.

Despite its title there is no actual Programme in the sense of overall planning, training, construction and maintenance (the ‘hallmarks’ of a proper Programme).

A note regarding training: in the EPWP, an improvement on the NPWP, was a stipulation for there to be 2 days training every 22 days worked. However, there was very little technical training (pertinent to the production of ‘hands-on’ site supervisors); where it took place, it was mostly a ‘life-skills’ type. In Phase Two this was amended by placing the onus on each project.

One may safely conclude that, as for the NPWP, no systematic training was carried out in the EPWP.

A major difference from the model is that as for the NPWP, delivery was through the medium of *small contractors* (and therefore the *contract*), instead of through ‘*Instruction*’.

Having chosen a fundamentally different route, there were also both external and internal reasons for the shortcomings.

External Reasons



The main external³⁷ reason is that the South African construction industry is fundamentally capital-intensive. Thus there already exists a *socio-technical system* that is based upon the use of fuel-powered, heavy-equipment.

This *socio-technical system* - including the associated ‘mind-set’ of all engaged in the construction industry - is oriented towards the use of heavy equipment: from concept, through design, contract documentation, tendering and implementation.

Orientation towards capital is exacerbated by prejudice regarding the use of supposedly backward and not modern methods. Most engineers reject the concept of labour-intensive construction.

This attitude is supported by general ignorance, on the part of all concerned, regarding the principles and practice of modern labour-intensive methods. Engineers do not know that the effective use of these methods is based on new information, techniques, training and organisation. Ignorance stems in part from the lack of understanding of the principles of labour-intensive construction. This ignorance is exacerbated by a prejudice that there is nothing worth understanding ‘prejudice’.³⁸ If there is some understanding, there is resistance to the necessary commitment in time and effort that is essential to re-engineer the process.

These opinions are supported by four ‘lies’: labour-intensive methods result in higher cost, longer time, much lower quality and are more difficult to manage. These ‘lies’ have important implications.

Engineers advise public sector policy / decision makers: they play a crucial role. They advise policymakers that labour-intensive methods cost more, take longer, are more difficult to manage and result in a very low quality of product.³⁹

In sum, most engineers reject the concept of labour-intensive construction. And this is not confined to South Africa. The attitude is detrimental to the achievement of ‘secondary’ socio-economic objectives during the construction and maintenance of physical infrastructure.

The prevalence of the existing socio-technical system (and its mind set) is not helped by the following:

There is a general lack of understanding on the part of public sector officials as to principles and potential of labour-intensive construction. Consequently there is little understanding of what has to be put in place to achieve the potential.

Internal Reasons

No Programme: although stated in ‘Over-arching...’ above, the fact that the EPWP did not establish a planned, long-term, integrated training and construction *Programme* needs to be

³⁷ ‘External’ to the EPWP.

³⁸Quote 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.

³⁹ McCutcheon et al, 2007.



included as an *internal reason* because it has important implications which cascade throughout the EPWP.

Drift back to Social-Welfare

At the Programme level there has been a drift to greater concern for social welfare at the expense of attention to technical detail.

This is epitomized by the fact that data has not been collected at project level as to the amount of building and infrastructure; consequently there is no aggregated data as to the amount of product produced during the expenditure in the Infrastructure Sector of over R128 Billion.

By contrast the ‘Monitoring and Evaluation System’ was set up in order to provide data based evidence for management decision. In the event, an immense amount of time and effort has been spent on collecting individual ID numbers and ‘days worked’.

Reliance on the use of the Contract and Small Contractors

Above it was shown that elsewhere in Africa large-scale, long-term programmes were established: expansion in the scale of construction was formally linked to, and dependent upon the training of engineers and ‘hands-on’ site supervisors.

South Africa decided to promote the use of contractors for implementation. The contract and contract documentation became critical. We have seen above that Conditions of Contract and Specifications were developed for the Framework Agreement (1993). They were oriented towards all the specified work being done by hand.⁴⁰ We have also seen that, unfortunately, the legislation was not yet in place to allow this to be fully implemented.

In 2005 *Guidelines* were produced for the EPWP that contained recommendations regarding both contractual details and specifications. Much of the content was derived directly from the Framework Agreement document. However, the wording of the 2005 *Guidelines* allowed for a weak interpretation of the extent to which labour-intensive methods should be employed. Furthermore, the contract documentation, required to ensure that labour-intensive methods were used, was not compiled properly (each section in the standard contract document requires specific modifications). In addition, neither the public authority nor the consultant enforced the contracts. The combination of the above led to tokenism and ‘business as usual’, which is exemplified by the extremely low level of labour-intensity over the ten years of 10%.

Although various guidelines exist, considerable time and effort is required to incorporate the recommendations into standard designs and documentation. This is *much more complex* than anticipated. For example, *in relation to the contract detailed attention is required to modify nearly every section in standard contract* documentation. Unless this is done there will not be a significant use of labour-intensive methods. Very few consultants have the knowledge, time and resources required to carry out a thorough revamp of their standard designs, documents and procedures. Therefore, they are unable to re-engineer the processes without incurring costs to company.

⁴⁰ And simple equipment



In addition there are too many “cop-out” clauses. For example: “use labour-intensive methods wherever feasible”. The engineers and managers simply say “these methods are not feasible for these categories of construction”. This is partly a reflection of their lack of knowledge; partly that they do not have the requisite “in-house” experience. Further to the time and cost implications of the re-engineering, it is easiest to reject the labour-intensive component from the outset. Neither the Municipal Manager nor the responsible official within local government has the experience to counter this advice. The result: ‘business as usual’, conventional construction using fuel-powered, heavy-equipment.

The EPWP issued revised *Guidelines* in 2014. These are still not up to the task.

In relation to the establishment of an alternative socio-technical system, the reliance upon the use of the use of **small contractors** has not resulted in a significant increase in employment created per unit of expenditure. This is exemplified by the extremely low level of labour-intensity over the ten years of 10%.

Furthermore the use of small contractors has been both cumbersome and ineffective. For contractors the immediate need is to run a successful business and this is much more important than skills development and employment creation (no matter how important the latter are to government).

One of the main reasons for advocating ‘labour-intensive methods’, is that it *lowers the barrier to entry*, because less up-front capital is required. Ironically, lack of understanding of the principles has led to demands for support to own and operate heavy-equipment. In the current climate this has further complicated matters.

There have been many Emerging Contractor programmes but the CIDB itself has reported that these have not been as successful as envisaged.⁴¹ On the plus side, some contractors have been trained. There are people out there who need to be found and utilized.

Overall, emphasis on Small Contractors did not achieve the results anticipated. The whole question of small contractor development is being investigated and analysed.⁴²

The failure to obey mandatory conditions contained in DORA.

In Section Two above it was noted that for the expenditure of MIG funds, The Division of Revenue Act made it **mandatory** for public bodies use labour-intensive methods were: low-volume roads, storm water drainage, sidewalks and trenches. These categories provide major opportunities for the substitution of labour for equipment.

These supposedly *mandatory* conditions were simply ignored.

Lack of Re-engineering of product and process

Datum for assessment:⁴³

⁴¹ “(t)he overall success of CDPs is somewhat questionable.” (CIDB, March 2009); and “Overall, most of the programmes have not performed as they envisaged in the development of contractors.” (CIDB, October 2011).

⁴² Research is currently being carried out at Wits into small contractor performance and the implications for policy..



Thorough incorporation of labour-intensive methods into individual projects can only be achieved by re-engineering the whole construction process including design, contract documentation and implementation.

- This is achieved by designing the project from the start to be built by hand.
- In formal project management language an objective such as this is referred to as the “design driver”.
- Having designed the project to be built by hand, the contract documentation must follow suit. The implications of the decision to make a greater use of productive labour must be rigorously incorporated into the contractual documentation. This includes modification of each section of whichever contract is used: the project specifications, the bills of quantities, the tender and evaluation process.
- Subsequent construction has to be in accordance with the contract.

In these terms, and in the light of the WITS research, insufficient re-engineering has been carried out by engineers.

We have seen above that difficulties have been experienced regarding contract documentation. Here we will list other South African experience from the perspective of required re-engineering:

Re-engineering would have been necessary to address the supposedly *mandatory* categories mentioned above. More generally, all earthworks operations provide major opportunities. Engineers did not take advantage of these opportunities. They did not re-engineer the projects: new designs were not prepared; the greater use of productive labour was not the “design driver”; appropriate specifications were not included in supposedly labour-intensive contracts.

Some of the contracts included clauses that indicated that labour-intensive methods would be used, but the clauses were ignored.

Contracts were awarded to small contractors who did not know how to use labour-intensive methods.

Projects were merely relabelled labour-intensive with no increase in labour content because the engineer knows that a typical politician cannot tell the difference. Projects were then implemented using conventional, capital-intensive methods: ‘business as usual’. People waving flags are carrying out an important for safety but they would be doing the same on a conventional project; they do not contribute to a significant increase in employment per unit of expenditure.

As cynical but just as damaging, was to continue with “business as usual” while employing a few extra people to sit under a tree, next to the site where the equipment was operating, so that the employment figures recorded were higher, and the requisite ‘box could be ticked’.⁴⁴ Usually, even this tokenism was not considered necessary.

⁴³ Details in McCutcheon2017a

⁴⁴ LITEworks 2008.



In closing this list, very importantly: to the best of the author's knowledge no enforcement of contractual clauses was made.

Lack of serious in-depth training

Datum for assessment derived from the model:⁴⁵

The different levels in a Programme require different types of orientation, education and training.

Orientation is required for policy makers and engineers: Policy makers have to understand the basics because new ways of doing often lead to contradictory interpretations. Engineers have to be orientated given the 'mind set' mentioned above. Engineers must understand the principles in order to take the subject seriously.

Education and training is required for engineers. They re-engineer the technical components of product and process to enable the use of efficient labour-intensive methods. They also play a crucial role to the establishment of the requisite integrated planning and implementation frameworks, including: institution, organisation and training.

Extensive training is required for single-site operations. Prior training of 'hands-on' site supervisors who are capable of the technical and organizational skills required for the productive employment of teams of workers.

Even more training is required for the organisation and control of multi-site operations.⁴⁶

It cannot be over-emphasised that emphasis upon training is far more important than either the amount of construction or the amount of employment to be created. The training programme must pay as much attention to character as technical competence. Upon completion of their training supervisors will work for much of their time in independently⁴⁷ of senior management.

And:

For-multi-site operations on a large-scale over the long-term, there must be a carefully formulated and planned *Programme*, which formally links the output of training to the roll-out of the approved long-term planned construction work. The human resources required to expand the programmes are produced within the *Programmes* itself.

With this datum in mind the following may be stated about training in relation to the EPWP.

Orientation, Education and Training of Policy Makers and Engineers

⁴⁵ See above and details in McCutcheon2017a.

⁴⁶ Here is an important link to the type of training which would be applicable to potential small contractors.

⁴⁷ Often in isolated environments



Specific training was given to over 1200 engineers and officials: NQF7 (Orientation at Policy and Senior Engineering level) and NQF5 (Engineering Site level).

While one might claim that the training was adequate in relation to senior-level orientation, it is clear that it was ineffective given the lack of improvement in labour-intensity.

The absence of a proper framework might be partly responsible. Probably more importantly, after a brief flurry of concern which motivated the industry during 2004 and 2005 (similar to that which had alarmed the industry immediately post 1994), the industry gradually began to realise that there was no enforcement and thus it could return to ‘business as usual’.

It was frequently reported during training sessions that the difficulties of actual implementation overcame any knowledge gained during the training. Furthermore, insufficient numbers of senior decision makers actually took part in either Orientation or Training sessions.

Single and Multi-Site Training

No *systematic training system* was established in either the NPWP or the first two phases of the EPWP.

As a result of the negotiations with COSATU during the formulation of the Framework Agreement there had been a stated commitment to training. In principle this formed part of the NPWP; but very little training took place. In the EPWP there was an actual stipulation of two days training for every 22 days worked. However, very little of any training was of the technical and organisational pertinent to the production of ‘hands-on’ site supervisors; where training took place it was generally in relation to “Life-skills”. In Phase Three this has been replaced by placing the onus on each project to train. Results have not been reported.

The lack of technical and organisational training was not for a lack of accredited training material.

Effective sites require a range of skilled site personnel. In particular *‘hands-on’ site supervisors*. In South Africa these are known as *Construction Processes Site Supervisors* (NQF level 4): considerable time and effort is required to produce a person who can organize and productively control the technical activities of groups of people.

During the early 2000s suitable accredited qualifications and courses were developed for two levels of site operations: site-supervisor and contractor.

All were made available on open source and accessible on the Web.

The Contractor Qualification was initially set at NQF level 2 (this has since been raised to NQF level 4).⁴⁸

⁴⁸ In itself this initial setting of the level at 2 displayed a ignorance of various aspects of running a contract.



In South Africa the ‘hands-on’ site supervisors are known as *Construction Processes Site Supervisors* (NQF level 4)⁴⁹: considerable time and effort is required to produce a person who can organize and productively control the technical activities of groups of people.

But, very little systematic training of Construction Processes Site Supervisors has taken place. However, starting in 1996 on the foundation provided by the Donaldson Fund a development programme was established at Mohlaletse in Greater Sekhukhune.⁵⁰ It was organised by the WORK Research Centre in the Department / School of Civil and Environmental Engineering, University of the Witwatersrand and the University of Twente students. between 2002 and 2005 two successful NQF4 courses were funded by the Umsobomvu Youth Fund at Mohlaletsi in Greater Sekhukhune. Trainees had to have a matric. The rigorous selection proces was followed by a one-month’s refined selection. Each 18 month course consisted of nine month’s alternating (weekly) class and site training, followed by nine month’s site training and mentored experience (not ideal but considerably better than nothing). Each course trained about 60 people to become NQF4 *Construction Processes Site Supervisors*. Several of the more enterprising trainees proceeded to further training as independent Contractors.

In a Mid-term Review of Free State EPWP (2007) one analyst - not known to the current author - carried out a review of the Free States EPWP. It was actually stated that the training in Sekhukhune should be the model for the national EPWP. The recommendation was not heeded.⁵¹

The above all leads to the following **major reason for failure** to achieve the objectives:

Lack of an integrated training and construction programme.

Above it was shown that elsewhere in Africa large-scale, long-term programmes were established: expansion in the scale of construction was formally linked to, and dependent upon the training of engineers and ‘hands-on’ site supervisors.

Nowhere in South Africa is there a formal programme that links the essential formal training required with an planned construction programme.

Specific training is required at all levels: engineers (site and design), and a range of skilled site personnel; of critical importance: ‘hands-on’ site supervisors.

The author will provide only one final snapshot regarding training: in the original June 2004 *Consolidated Programme Overview and Logical Framework* it was stated that a National Training Centre would be established. This had still not happened by the end of Phase Two, ten years after the commencement of the EPWP.

⁴⁹ The specifics have been defined in terms of class learning and mentored experience: in sum, about 18 training is required to achieve the NQF4 qualification.

⁵⁰ McCutcheon, et al 2005

⁵¹Free State Department of Public Works, Roads and Transport, “An Impact Study of the Implementation of Expanded Public Works Programme in the Free State; Mid Term Review Final Draft”, 05 May 2008; p38.



Lack of enforcement (Emphasis)

The lack of enforcement on the part of officials and consultants has allowed the default construction position: ‘business as usual’ (or worse: tokenism).

Lack of an ‘in-house’ capacity

Part of the reason for the failure to increase labour-intensity is that there is very little ‘in-house’ capacity or competence within most public bodies to assess technical matters. This is out sourced to consultants.⁵² Unless the consultants have been thoroughly trained, they cannot design labour-intensive projects, or prepare appropriate contract documentation. The same applies to the need for contractors and site-supervisors to be properly trained.

Furthermore, the lack of an ‘in-house’ capacity to implement labour-intensive construction from design through contract documentation to site work, means that there is no ‘in-house’ capacity to assess the quality of implementation. In turn, this is one of the reasons for the absence of ‘enforcement’ of the contractual conditions and specifications.

In the first place there has been a lack of the reengineering of both product and process required to establish an alternative labour-intensive construction industry. In relation to the product very little attention has been paid to reengineering design and specifications.

Formal linkages were not established between construction projects and technical, supervisory and contractual training.

In conclusion to this section

From the above analysis it may be understood why the author considers that this so-called *Programme* has not resulted in *anywhere near* the levels of skill development, employment creation and poverty alleviation that could have resulted if the original precepts had been understood and sensible procedures followed.

Mandatory conditions, stipulated by the Division of Revenue Act, for expenditure of MIG funds have been ignored and there has been no enforcement of the conditions.

Therefore, there has been a lack of the reengineering of both product and process required to establish an alternative labour-intensive construction industry. In relation to the product very little attention has been paid to reengineering design and specifications.

Formal linkages were not established between construction projects and technical, supervisory and contractual training.

The above shortcomings also threaten the achievement of the Objectives of Phase 3.

⁵² Both ‘outsourcing’ and ‘in-house’ capacity require detailed attention in their own right throughout the construction industry irrespective of ‘labour-intensive construction’.



7 Conclusions re EPWP: Phases One and Two 2004/05 to 2013/14

This paper focussed on the results in the Infrastructure Sector for three main reasons:

It is the sector for which a significant increase in employment can be created per unit of expenditure through the reverse substitution of labour for equipment;

It is the component of the Programme, which does not require additional state expenditure because the funding is already earmarked for expenditure on infrastructure; and,

It has been by far the largest sector in both allocation and expenditure.

There are some reasons for being positive about the Infrastructure Sector of future Public Works Programmes in South Africa. The following are in place: general and specific policy at national, provincial and local levels; appropriate legislation; guidelines and training material, the very existence of a national programme (however flawed); and a national, provincial and local framework for implementation.

In particular, at least in principle, the use of labour-intensive methods remains at the core of EPWP's Infrastructure Sector.

However, to date the Programme has not resulted in the envisaged skills development or a significant increase in employment per unit of expenditure.

The analysis investigated the effectiveness of the EPWP in relation to labour-intensity and the implications thereof for employment and wages. It revealed serious inadequacies with regard to labour-intensity: 10% instead of a minimum of 30%. The Full Time Equivalents amounted to 781 433 and Wages R13 007 Million. At 30% labour-intensity FTEs would have risen to 2 321 888 and Wages to R38 634M).

Therefore, there is scope for a considerable *increase in employment generated per unit of expenditure than has been achieved to date*.

Despite all the 'good things', to date the Infrastructure Sector of the EPWP has not been as effective as it should have been with regard to skills development and employment creation.

Why have the SA programmes not resulted in the results anticipated?

If the shortcomings are not addressed the objectives of the Third Phase will be seriously threatened.

The author's understanding and experience of labour-intensive construction has led him to consider it as the sensible way to proceed. However, one has to accept the process of re-engineering the industry is far more complex than anticipated.⁵³

⁵³ McCutcheon, Croswell and Hattingh, 2006 and 2007.



In sum:

The reasons for the lack of success may be placed in three different categories:

Over-arching: Route adopted for implementation

Reasons external to the public works programme

Internal reasons

Over-arching: Route adopted for Implementation

The route adopted for implementation differed seriously from the model derived from elsewhere in sub-Saharan Africa:

South Africa did not establish a long-term integrated ‘in house’ programme of construction and training.

It decided that delivery should be via *small contractors*.

Reasons external to the EPWP

The main external reason is the existence of construction industry based upon the use of fuel-powered, heavy-equipment. The associated ‘socio-technical system’ comprises the whole process of construction from conception to completion; this includes the ‘mind set’ of all those engaged in the industry: pro-equipment, anti-labour intensive.

Another important external reason is the general lack of understanding, in the public-sector authorities responsible for expenditure, of the principles and potential of labour-intensive construction. Consequently there is little understanding of what has to be put in place to achieve the potential.

Internal Reasons

No Programme

Despite its title there is no actual *Programme* in the sense of overall planning, training, construction and maintenance (the ‘hallmarks’ of a proper Programme).

Although stated in ‘Over-arching...’ above, the fact that the EPWP did not establish a planned, long-term, integrated training and construction Programme cascaded throughout the EPWP.

Drift to Social Welfare

At the national EPWP level there has been a drift to greater concern for social welfare at the expense of attention to technical detail. This is epitomized by the fact that data has not been collected at project level as to the amount of building and infrastructure; consequently there is no aggregated data as to the amount of product produced during the expenditure in the Infrastructure Sector of over R128 billion.

Absence of re-engineering



The Division of Revenue's **mandatory** conditions for expenditure of funds on specific categories of infrastructure were simply ignored for low-volume roads, stormwater drainage, sidewalks and trenches.

Lack of an effective contracting capacity: small contractors and contract itself

Overall, emphasis on Small Contractors did not achieve the results anticipated. The whole question of small contractor development is being investigated and analysed.⁵⁴

There has been a lack of the re-engineering of both product and process required to establish an alternative labour-intensive construction industry. In relation to the product very little attention has been paid to reengineering design and specifications.

Training

Formal linkages were not established between construction projects and technical, supervisory and contractual training.

Although both NQF5 and NQF7 training was carried out it was obviously ineffective given the lack of improvement in labour-intensity. It seems that the difficulties of actual implementation in overcame any knowledge gained during the training. In addition there was **probably insufficient orientation of senior decision makers**.

Very Important side result of this investigation into labour-intensity: Public Sector's inability to spend its allocations

The analysis investigated the effectiveness of the EPWP in relation to labour-intensity and the implications thereof for employment and wages.

During the process of this investigation it has revealed the enormous shortfall between allocation and expenditure and the implications of the shortfall for employment and wages.

While it has revealed serious inadequacies with regard to labour-intensity, it has revealed something very important: the serious inability of the current authorities to spend the funds allocated to them. Above the author has shown that the numbers employed were 781 433 (Full Time Equivalents) whereas they should have been 2 321 888; wages: from R13 007M to R38 634M). If the funds allocated had been spent at even the low levels of labour-intensity FTEs would have amounted to 3 300 870; wages R54 943M. If proper labour-intensive methods had been employed we could have seen of the order of 9 807 944 years of employment generated, which is of the order on one million FTEs for each year (wages: R162 742M). Also importantly, as we will see below, large numbers of matric-level '*hands on site supervisors*' would have been trained.

⁵⁴ "(t)he overall success of CDPs is somewhat questionable." (CIDB, March 2009); and "Overall, most of the programmes have not performed as they envisaged in the development of contractors." (CIDB, October 2011).



8 Recommendations I: South Africa to South Africa regarding future Public Works Programmes

At least in relation to the Infrastructure Sector we need to return to an original objective: the construction of much needed public sector infrastructure and building with a positive socio-economic spinoff in terms of skills development and employment creation using existing budgetary allocations (not add-ons). There must be a change of approach from an emphasis upon a purely social-welfare perspective, with its over emphasis upon collecting ID Numbers and Days Worked.⁵⁵

While the framework exists (policy, legislation and an institutional framework), the Public Sector client must be orientated to understand the principles and the potential (how much more could be achieved) and decide to implement government policy properly.

Regarding the main approach adopted.

The severe difficulties experienced to date regarding the use of small contractors suggests that both policies and procedures need to be changed. One cannot continue to blame the contractors who have failed to perform properly, when they should not have been selected and appointed in the first place. The whole question of small contractor development is being investigated and analysed.⁵⁶

Contractor Development programmes have not been as effective as anticipated. This is partly because current policy and procedures are deeply flawed. Until recently the emphasis has been upon the money. For tenders less than R200 000 no qualifications or construction experience are required, which means they are just labour-only sub-contractors, barely removed from labour-brokers. In the EPWP part of this approach stemmed from lowering the barrier to entry using labour-intensive. But then equipment and on-site training is demanded, which defeats the object of the exercise. Can this approach really be taken seriously?

Emphasis upon the use of small contractors is unlikely to diminish. Therefore serious attention needs to be paid to a proper Contractor Development programme with the type of thoroughness exemplified by Kenya, Botswana and Lesotho in relation to the rigorous training of site supervisors and multi-site supervisors.

The new approach should include two components: 'in-house' capacity and training.

Modelled on experience elsewhere in sub-Saharan Africa, public sector works' institutions (national, provincial and municipal) should establish an 'in-house' capacity in the agencies responsible for public building and infrastructure so that a component of the demand can be met by instruction rather than by contract (particularly until systems have been established). All of the major metropolitan municipalities could have such programmes. Smaller urban and rural municipalities could co-ordinate in relation to the production of the human resources required to implement this work. Linkages with FETs (now TVETs) should be established.

⁵⁵ There are over 60 data captureurs employed in this administrative 'activity'.

⁵⁶ "(t)he overall success of CDPs is somewhat questionable." (CIDB, March 2009); and "Overall, most of the programmes have not performed as they envisaged in the development of contractors." (CIDB, October 2011).



Although the focus here is upon labour-intensive work, the authors would recommend that this approach be used for the training and employment of all the artisanal skills required for building and infrastructure, including: bricklayers, plasterers, plumbers, electricians, tilers, painters, roofers, glaziers, concrete operatives and so forth. Each artisan generates around him or her employment for less skilled people.

They should set up proper long-term programmes, and implement by instruction rather than the cumbersome and ineffective intermediary action of contracts and contractors to whom the immediate need to run a successful (profitable) business is more important than skills development and employment creation (no matter how important the latter are to government).

As a start the model used in Greater Sekhukhune should be adopted. First train ‘hands-on’ site supervisors (NQF4) as outlined in Section 5 above: a minimum of 18 months of class and site training. Out of these select people who would benefit from training to become contractors. There is no ‘short-cut’. For goodness sake establish an integrally linked training and construction programme. These skills development and employment programmes will produce the human resources required to implement the programmes.

Mandatory conditions stipulated in DORA regarding specific categories of infrastructure should be enforced.

In sum:

The following are required to realize the potential: thorough re-engineering, in-depth training, systematic programmes linking training with construction and maintenance of public building and infrastructure. The establishment of such coordinated construction and training programmes should result in an ‘in-house’ capacity to implement projects and be able to monitor and evaluate outsourced contracts.

In the policy discussions, the author should have emphasised the essential skills development component. There is a direct link between skills development and employment creation. Speaking generally, any skilled artisan generates work opportunities around him/her for unskilled people, who, besides gaining an income will also be closer to opportunities to improve their skills. Focusing upon the potential within the construction industry for a ‘significant increase in employment per unit of expenditure’: this significant increase will only take place once the ‘hands-on site supervisors’ have been thoroughly trained. In Kenya and Botswana specific the relevant Ministries established specific training courses within their national training centres. The graduates were formally incorporated into the national construction and maintenance programmes.

9 Recommendations 2: South Africa to elsewhere in Africa regarding future Public Works Programmes

Engineers played a critical role in the development of ‘modern’, productive methods of labour-intensive construction. They must continue to do so if specific socio-economic benefits such as skills development and employment creation are to be achieved at the same time as the normal provision of public infrastructure. As indicated at the start of the paper it is



less easy to define and measure socio-economic parameters as it is to define time, cost and quality.

Research and field implementation in South Africa demonstrated that the potential and scope encompasses far more than low-cost, low-volume roads. Research and practical implementation have re-confirmed the findings of the World Bank's study. It is, indeed, technically feasible across a wide range of civil construction and can result in the same quality of product. Under certain circumstances it can be economically efficient and even cost competitive with conventional construction. High standard, high cost civil construction *can* be provided using labour-intensive methods and contractors *could* play a greater role in implementation.

The effective use of labour-intensive methods required considerable effort on the part of many engineers to *re-engineer* both the product and the process of achieving a high-quality product, without compromising time and efficiency. As far as the product is concerned great attention had to be paid to design and specifications. This included identification of the categories of work for which labour-intensive methods are particularly amenable: excavation, load, haul, unload and spread (ELHUS). In relation to the process of construction, considerable work was required regarding the daily organisation of individual sites. It was essential to know the amount of work in an eight-hour day which could be reasonably expected of a reasonable person: the 'task'. 'Group tasks' were also ascertained for various activities and operations. Efficiency required the 'balancing' of the number of people working on an activity that formed part of a larger operation, so that people were not meandering around on site while only a few people were busy. For example: dependent upon the hardness of the material, the ratios would be a variation upon the following: four people would be excavating, two loading and one spreading. The organisation of teams of people required specific skills that could only be achieved through training.

To date, implementation in South Africa and elsewhere in sub-Saharan Africa, has followed two main routes:

- Direct implementation through the establishment of an 'in-house' capacity within the public sector institution responsible for public infrastructure. The construction of the infrastructure has been formally linked to training. The mode of operation has been via *Instruction*.⁵⁷
- A public sector institution has been responsible for works/roads. Implementation has been through the medium of consultants, contractors and the *Contract*.

Large-scale implementation over the long term has only been achieved through the first option: direct implementation through the public sector without intermediary consultants and contractors: *Instruction*.

This is the approach which was successfully adopted in Kenya, Botswana and Lesotho. Therefore, the major recommendation for elsewhere in Africa is 'replicate what you have done in the past', with particular reference to Kenya, Botswana and Lesotho.

⁵⁷ Of course, With due recourse to the law.



The second route, Contract, has not been as successful for Construction.⁵⁸ There has been reported success in relation to Maintenance. But the foundation for the successful Maintenance Contractors has been based upon the thorough training and experience gained during the Construction phases.⁵⁹

In South Africa both the NPWP and the EPWP chose to adopt the second route.

Above we have argued and provided evidence for the argument that this route has not been as successful.

Hence my major recommendation: For large-scale, long-term implementation establish linked training and construction programmes. Where possible establish an in-house capacity within the public sector authority and operate through 'Instruction'.⁶⁰

Despite my confidence regarding this approach, it is expected that the 'push' to implement using contractors (and therefore the contract) will be as powerful elsewhere as it is in South Africa. Under these circumstances it is recommended that the following lessons should be learnt from the South African experience.

At project level:

Under current conditions the Consultant has to re-engineer product and process.

The Contractor must fulfil the demands of the contract (this is no different from any other civil engineering project). But this requires knowledge and experience on the part of client, consultant and contractor to ensure that the design and contract documentation is correct; and:

The stipulations of contract must be enforced; just as they would be in the conventional construction industry.

Please take note of all the difficulties encountered in Section 6 above.

Please take note of the author's recommendations above regarding the training of both 'hands-on' site supervisors and 'multi-site' supervisors. These should form a component of any policy for Contractor Development.

There is no immediate short-term solution (an income grant does not include skills development). However, there is a medium-term solution based upon the establishment of programmes of skills training formally linked to the construction and maintenance of much needed (and demanded) public building and infrastructure. In South Africa this is at on the front-line. Despite the appropriateness of labour-intensive construction it is very difficult to achieve the potential. It is not easy to change an existing socio-technical system.

⁵⁸ There was some progress in Ghana

⁵⁹. Recently it has been claimed that in Kenya it is now possible to use contractors effectively. But this has been clearly based upon the systems and training originally provided during the large-scale public sector programme. Andreas Beusch to Author, 23rd September 2014.

⁶⁰Perhaps it is necessary to state: the form of Instruction must be subject to the laws of the land regarding Conditions of Employment and Health and Welfare of the employees.



In policy and legislation obstacles have been surmounted: a framework exists, which includes policy, legislation and institutional components.

Various small scale projects have been implemented and a great deal of research and implementation has been carried out which have demonstrated that labour-intensive methods may be productively used for high-standard infrastructure and therefore could be used within the major economy and not be restricted to the periphery (in relation to both geography and amount of expenditure). However, despite all the ‘good things’, to date the Infrastructure Sector of the EPWP has not been as effective as it should have been with regard to skills development and employment creation. If the shortcomings are not addressed there will be little improvement in future public works programmes. The Public Sector client must be orientated to understand the principles and the potential (how much more could be achieved) and decide to implement government policy properly.

Public funding is being used for the construction and maintenance of public infrastructure. It is reasonable that government should set criteria for the use of public funding. Twenty years ago the author wrote: “a public works programme should be aimed at fundamentally changing the way in which publicly funded infrastructure is built so that employment and skills transfer are maximised for the unemployed.”⁶¹

The main reason way forward is the establishment of programmes which formally link construction to the training of ‘*the missing middle*’. Engineers must play a critical role throughout the provision of high-quality public infrastructure, together with concomitant socio-economic benefits of skills development and employment creation.

Where are there similar opportunities in the national economy to generate skills and employment opportunities for the poor and unskilled using money that has already been allocated for expenditure?

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⁶¹ McCutcheon 1995.



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Figure 1: EPWP Expenditure by Sector: 2004/05 to 2013/14

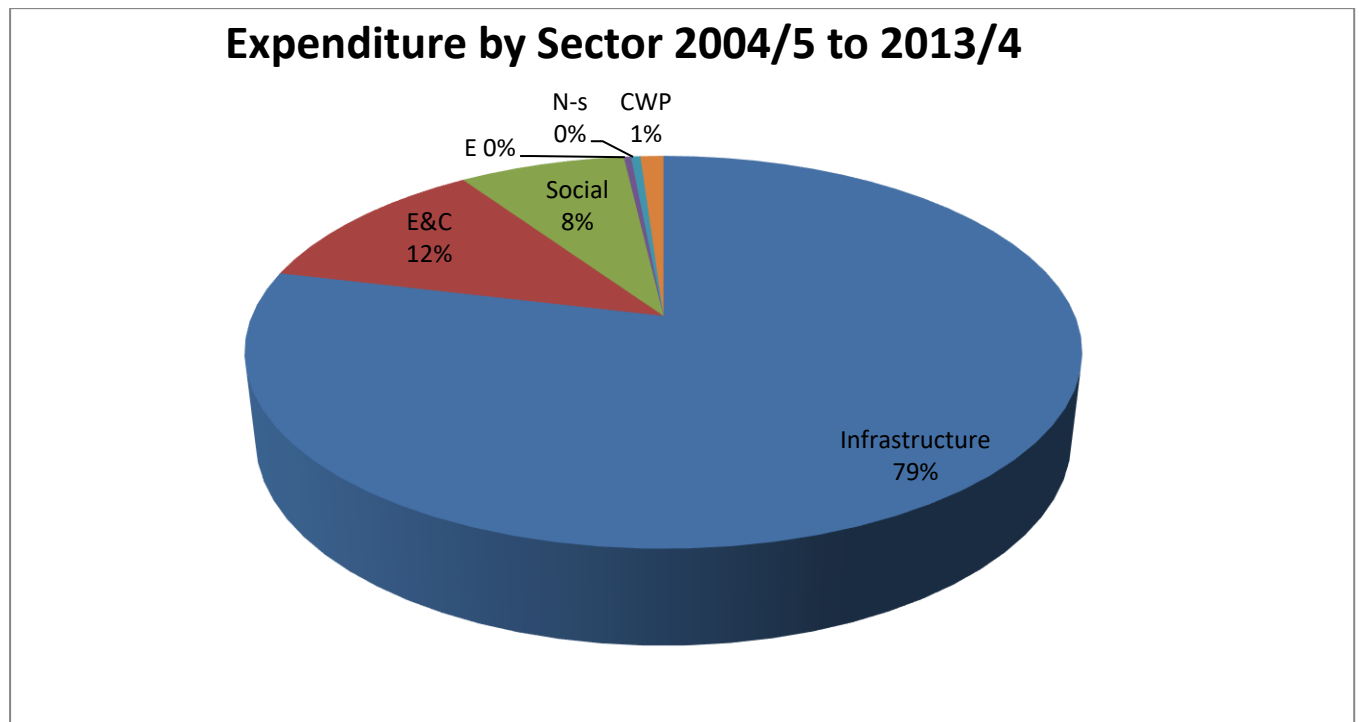


Figure 2: Total National Expenditure on EPWP vs Allocation: 2004/05 to 2013/14

