

Final Report

Process model for the learnership programme in Rustenburg

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Management summary

This report describes the research to a process model for the learnership programme in Rustenburg, South Africa. The reason for the research is formed through the problems of the learnership to attain the programme's main objective of delivering leaner contracting companies. The problem is two-folded:

- delays in the project provision
- lack of structure in the mentoring services

The provision of projects is necessary for the learners' practical experience in labour-intensive construction and for the mentor to give them the on-site support. A good mentoring schedule helps the mentor to give the best possible support. Out of this problem analysis the object of the research is formulated:

“Developing a process model from initiation to project completion to improve the quality of the learner contractors at the end of the Labour Intensive Construction Learnership Programme in Rustenburg by

- a) analysing the provision of the projects and by,
- b) analysing the process and the content of the mentoring services”

The research is executed at the mentoring company of the programme, LITEworks. The relevant data for the research is gathered by the method of participating observation. Through LITEworks the researchers have formed part of the learnership programme in Rustenburg bipartitely; as a mentor and as members of the management of this programme.

Two different models are developed: a linear phasing model for the provision of the projects and a mentoring model based on project management and experiential learning theory. Together they form a process model from initiation to project completion. This process model can contribute to improve the quality of the learners at the end of the learnership programme in Rustenburg.

The linear phasing model seems to be the most suitable method to use for the provision of learnership projects, because of the low level of complexity and uncertainty of learnership projects. The model is based on the linear phasing model for conventional construction projects and is adapted to labour-intensive construction projects. The implementation of this model is recommended because the current model of the RLM is too much focussed on conventional projects.

The analysis of the current mentoring services with the experiential learning theory shows that the focus of the learnership needs to be changed. The process needs to be a process of learning instead of a process to execute projects. The conclusion of the analysis to the content of mentoring is that the content needs to be extended and to be described in more detail. These time aspects can contribute to mentor in an efficient and effective manner.

The implementation of the process model requires a change in whole organization. It is primarily a mindset change. DPW has the responsibility to reorganize the learnership into process of learning and the RLM should be consciousness that labour-intensive construction projects have implications on many aspects and can't be handled in the same way as conventional construction projects.

Preface

This report is the final report of our internship for the Civil Engineering and Management study (University of Twente, The Netherlands). The internship has been carried out at the company LITEworks in South Africa. LITEworks is the provider of the mentorship services at the learnership programme in Rustenburg. On this programme for emerging contractors LITEworks mentors them on how to run their own labour-intensive construction companies. Our function was to mentor the learners in the learnership programme in Rustenburg and to analyse this programme. During the executing of the programme several things were not going as planned. This report presents our research on the learnership programme in Rustenburg.

As a part time mentor we have assisted the learners of the programme in successfully realizing their construction projects. Through this mentoring we have learned a lot about the influences of the history of South Africa on the current situation and about the culture of the black people. Solomon Radzilani, colleague mentor, has given us insight in the culture of the black community; we have learned some words of the language and the 'braai' is an aspect of the South African culture what we have appreciated. Solomon, we are most grateful to you.

To carry out this research a couple of people have supported us. First of all Mr. Sirp de Boer, he has helped us to come in touch with LITEworks. Secondly Mr. Andreas Hartmann has supported us as our supervisor of the University of Twente. Before our period in South Africa he assisted us with providing us with subjects to do research on and during our stay abroad and especially at our return in the Netherlands he assisted us with finalizing the report and provided a critical view on the academic part of the research.

In South Africa we were received with open arms by Filip Taylor Parkins. We will thank Micheal Laubscher for the discussions we have had about our research and the learnership programme and for the opportunity he has offered us to follow a course in labour-intensive construction. Besides of this, Craig advises us to discover the country of South Africa and Michael gives us the opportunities to make these trips. We appreciate both of them with helping us to settle down in South Africa because we have had a wonderful time over there.

Enschede (The Netherlands), June 29th 2007

Roy Spengelink

Harold Topper

Terminology and abbreviations

Bill of Quantities	= BOQ
Construction Education and Training Authority	= CETA
Department of Public Works	= DWP
Expanded Public Works Programme	= EPWP
Experiential Learning Theory	= ELT
Labour-Intensive Construction	= LIC
Learnership programme Rustenburg	= learnership programme
LITE Works Technical Training and Education (PTY) LTD	= LITEworks
Municipal Infrastructure Grant	= MIG
National Qualification Framework	= NQF
Provincial Infrastructure Grant	= PIG
Rustenburg Local Municipality	= RLM
Small to Medium-sized Enterprises	= SME

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1. Introduction

This chapter gives background information to the research, which has been executed for the labour-intensive contractor learnership programme in Rustenburg. The introduction starts with a description of South Africa, which focuses on unemployment and the Expanded Public Works Programme (section 1). This is followed by a brief description in section 2 about the learnership programme in Rustenburg and a brief problem analysis of this learnership. Section 4 to 6 describe the research; section 4 the research objective, section 5 the research model and section 6 the research strategy. The last section (section 7) sets out the structure of the report.

1.1 National context

South Africa is the economical driving force of the African continent (more information about South Africa in Appendix 1), but its economy isn't growing at a rate that is sufficient to generate enough jobs. South Africa has had jobless growth for the last 25 years, which means less employment is being generated per unit of expenditure. The South African economy has become more capital intensive. This resulted in an extremely high unemployment rate, which seems rather structural than cyclical. The unemployment rate has risen rapidly the last 25 years; from 7% in 1980, through 18% in 1991 to between 27% and 37% in 2001 (and it can be higher than 70% in the rural areas) depending on a narrow or broad definition of employment. A large proportion of these unemployed people has never worked before and is also largely unskilled. This is mostly because of the Apartheid legacy, which downgraded the education of the black people (about 80% of the inhabitants [CIA, 2006]).

'The Expanded Public Works Programme (EPWP)' is one of the government's short-to-medium term programmes that focus on this high unemployment rate, but not on the origin of it. The objective of the EPWP is to alleviate the unemployment with a minimum of one million people within the period of 2004 till 2009. The government needs to create work opportunities for at least one million unemployed, accompanied with training so that they increase their capacity of earning an income in the future to attain this objective. The EPWP involves all government layers and a reorientation of their budgets to increase the work opportunities created by government expenditures. The coordination of this programme has been appointed to the Department of Public Works (DPW). More information about unemployment and the EPWP can be found in Appendix 2.

For the implementing of the EPWP there have been opportunities identified in the following sectors: infrastructure, economical, social and environmental sector. The objectives of creating work opportunities in the four sectors are summarized in **Error! Reference source not found..** The emphasis in the infrastructure sector lies on creating extra work opportunities through the use of labour-intensive construction (LIC) methods

Sector	Work opportunities
Infrastructure	750,000
Environmental	200,000
Social	150,000
Economic	12,000
<i>TOTAL</i>	<i>1 million plus</i>

Table 1 Created work opportunities

(LIC is further described in Appendix 3). Approximately R15 billion will be invested in labour-intensive construction projects over the next five years, which is one third of the total infrastructure budget. Within the

infrastructure sector a labour-intensive contractor learnership programme for emerging contractors is started. The Skills Development Act of 1998 introduces learnership programmes in South Africa. It is a new way of acquiring a qualification that has been registered on the National Qualifications Framework (NQF). The NQF is a framework on which standards and qualifications are registered. So the NQF let the learners benefit from quality education provision of qualifications that have national recognition [SAQA, n.d.]. Learnerships do not equal to a qualification but structures the route to nationally recognised qualifications that relates to a specific occupation. Instead of apprenticeships in South Africa this can be any occupation. It is a work-based route and consists of structured learning components and practical work experience. These learnerships are an agreement between an employer, a learner and learner provider. [De Jager et al, 2002]

1.2 Learnership programme in Rustenburg

Labour-intensive contractor learnership programmes for emerging contractors are implemented by municipalities and provinces. The Rustenburg Local Municipality (RLM) is one of the municipalities that have a learnership programme running at the moment. The learnership programme aims to produce small contracting companies qualified to execute work accordance to the labour-intensive guidelines.

The learnership programme stretches over a period of two years and started in May 2005 with 22 learner contracting companies. It consists of a combination of three blocks of classroom training and three projects for the practical experience. The training and projects are provided sequentially and during the whole programme the learner contracting companies have a mentor available; this mentorship is meant to assist the learner contracting companies to successfully complete their projects. The 22 learner contracting companies each consist of a team of three people. The first person is the learner contractor, which is educated at the 'National Qualification Framework (NQF) level 2 contractor learnership'. The other two persons needs to be site supervisors, they are educated at 'NQF level 4 site supervisor'. These companies are provided with different facilities by the programme organization. The current relations between the companies within this organization are visualised in the organization chart below.

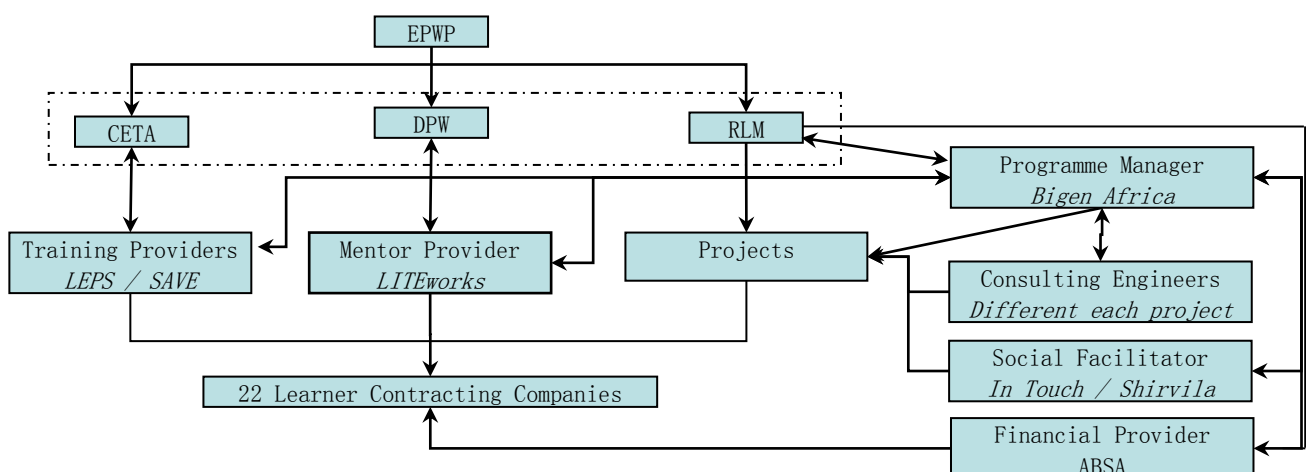


Figure 1 Organization chart

The mentoring services are delivered by LITEworks, where the internship has been carried out. The company LITEworks was founded at the end of 2003. The founding members responded to an observed need for

services in the area of specialist training needs for public infrastructure provision. LITEworks is providing services and support in a range of functions including: civil and building construction, construction and materials management, project management, mentoring and institutional capacity building, accredited training of SME contractors and labour-intensive construction. Already several hundreds of engineering consultants, technicians, construction professionals and public officials have been trained by LITEworks in the use of labour-intensive methods and management approaches. With this LITEworks contributes to the establishment of the government programme on labour-intensive construction.

1.3 Problem description

The learnership programme in Rustenburg is one of the learnerships that is executed under the Expanded Public Works Programme. This learnership programme has been started with 22 learner contracting companies (66 learners) and was planned according the normal format of learnerships within the EPWP programme, but this learnership programme is not executed according to these guidelines. Twenty of the 22 learner contracting companies have waited for 8-12 months where they should already have started with their third project (see

Figure 2).

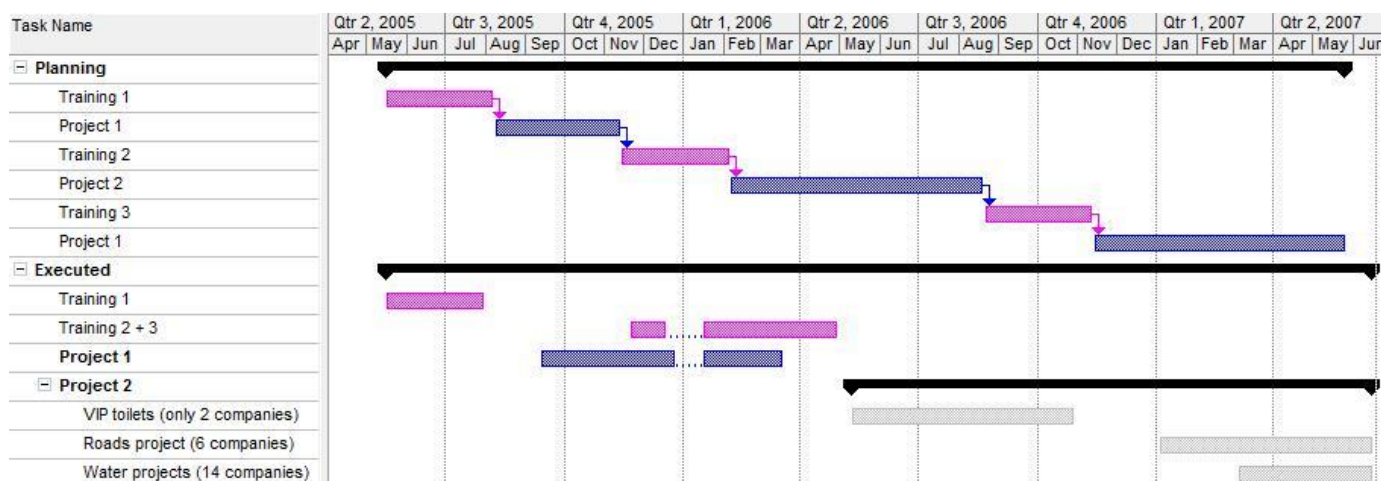


Figure 2 Planning of the learnership programme in Rustenburg (update until mid-June)

This learnership programme was initiated on districts level, but after selecting learners the district came to the conclusion that the district had no projects available and asked the municipalities within the district. Rustenburg was the only municipality within the district who had projects available (for the first phase) according to the EPWP guidelines. The district and the RLM agreed to do the learnership in Rustenburg, but they didn't make a plan for the provision of the projects for phase two and three; only two contractors have got their second project. For the development of small contractors it is important to prevent such a lack in contract continuity. Continuity in the projects is necessary to prevent a loss of competence of the learners and to prevent that they won't be available for the programme [Croswell, n.d.]. Learners start to search for other work to get a 'decent' life. The RLM doesn't seem capable to provide the right projects on time. A process model that focuses on the provision of the projects can reduce the lack of project continuity. A more extensive analysis is made in Appendix 4.

The mentor can start his job to assist the learner contracting companies in successfully finishing their projects when the correct documents are delivered. A complete problem analysis has been made in Appendix 5, which is here shortly described. This mentoring of the learners (who have projects) has a demand driven / problem solved approach. The mentors visit the projects to assist the learner contractor and his/her supervisors with problems that have occurred during the process. So the mentorship approach is based on the lessons that learners learn from their mistakes. The learners are making mistakes and are learned how to solve those mistakes. This demand driven / problem solved approach shows how to solve problems, but managing projects is all about controlling the risks in such a way that most of the problems can be foreseen and be prevented [Groote, 2001]. Another problem is the short-term vision of the learners. The learners are focused on earning money as soon as possible and not on the learning part of the programme. But teams (contractors and supervisors) increase their effectiveness and team members can develop team skills when a team intentionally focuses on learning [Kolb, 2005a]. A process model which focuses on the content and the process learning can help the mentors to mentor in a more effective manner.

Both the provision of the projects and a good mentoring schedule are vital elements to attain the programmes main objective to deliver learner contracting companies. The provision of projects is necessary for the learners' practical experience in labour-intensive construction and for the mentor to give them the on-site support. To give them the best possible support as a mentor there needs to be a good mentoring schedule. The combined model can contribute to impart the practical knowledge in an effective and efficient manner.

1.4 Objective of the research

“Developing a process model from initiation to project completion to improve the quality of the learner contractors at the end of the Labour-Intensive Construction Learnership Programme in Rustenburg by

- c) analysing the provision of the projects and by,
- d) analysing the process and the content of the mentoring services”

1.5 Research Model

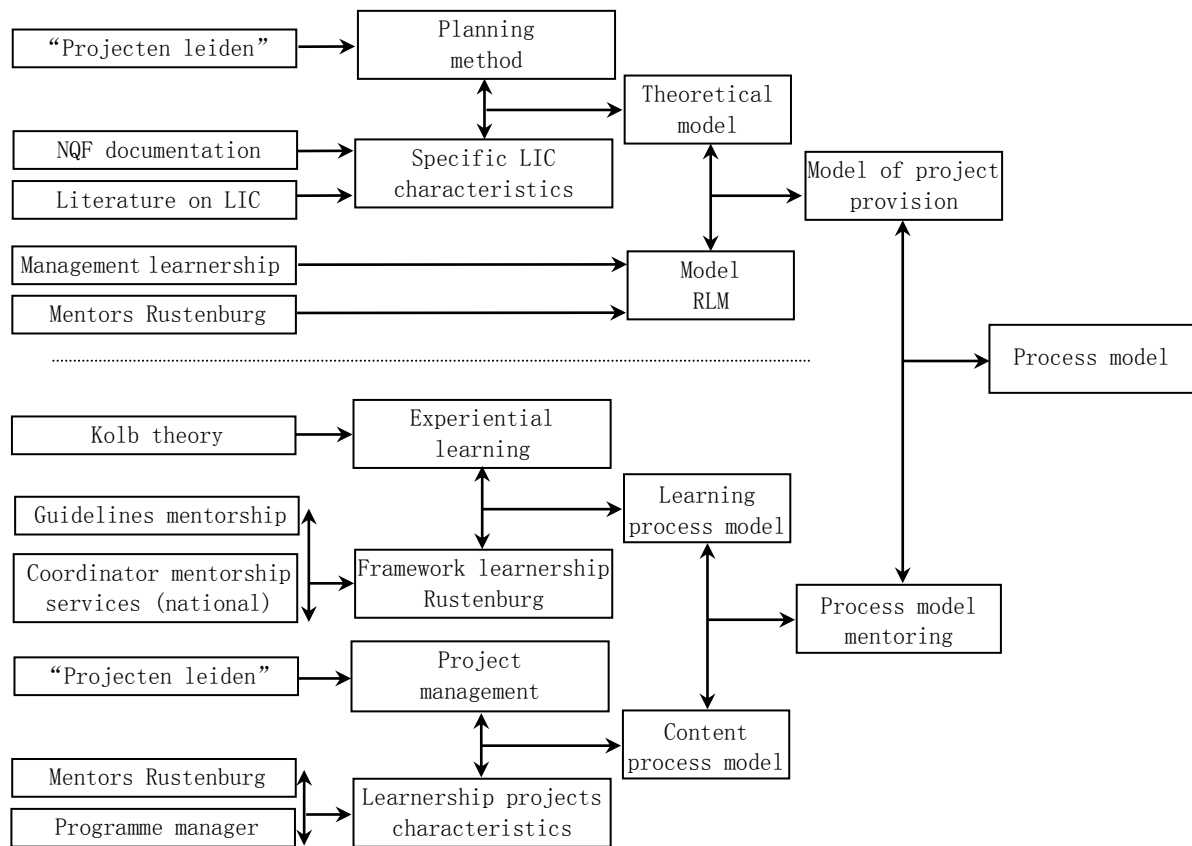


Figure 3 Research model

This model is a visualisation of the research that has been executed as part of the study civil engineering and management of University of Twente and what is presented in the report. To attain the objective of determining a process model the research has been split up into two individual researches. The upper part of the research model is an analysis of the provision of the projects and is executed by Harold Topper. The lower part of the model focuses on the process and the content of the mentoring services and is executed by Roy Spenkelink.

1.6 Research Strategy

To come to the information that is needed to reach the objective of the research the method participating observation has been used. This method uses observations while forming a part of the organisation that is subject of the research. During this internship the researchers have formed part of the learnership programme in Rustenburg bipartitely for 3.5 months; as a mentor and as members of the management of this programme. The major advantage of this form of gathering information is that it gives a good insight in the way of acting of the organization. This form of gathering information is a very intensive one, because the researches are insiders and outsiders at the same time. Besides the work within the organization the relevant information for the research needs to be selected at the same time. The researchers had an open way of acting; the organisation knew that the involvement had to do with a research to the programme.

The involvement of the researchers in the learnership programme makes direct observations possible. Direct observation increases the internal validity of this research because it reduces the gap between the research data and the reality. This strong involvement of the researchers has also two disadvantages on the internal validity. The organization can adjust their way of acting when they know that they are researched. This first one is called reactivity, but the effect decreases on the long term. The second disadvantage occurs in the long term and is called going native. The researchers become part of the community and the risk is that the researchers are going to think in line with the local organization and lose their interests in the theory. [t Hart, 2006]

The relative long period of gathering the information for the research minimizes the disadvantage of changing the way of acting of the organization. The second disadvantage is minimized unintentionally, because the main part of the research is written after gathering the information. This minimizes the inside focus during the writing process, but the data flow is quite small during this process of writing.

1.7 Report structure

The structure of the report has been based on the research model. To attain the objective of the research the research has been split into two parts: the provision of the projects and the mentorship services. Chapter two deals with the research to a process model for the provision of the projects. Chapter three analyses the content of the mentorship services and the process of mentoring and combines these to aspects to an advice how to change to mentorship services to attain the programme's objective in more effective way. The link between those parts of the models is the topic of chapter 4 and the final chapter – conclusion – gives the practical usefulness of the process model that has been developed.

2. Model project provision

The learners need to be onsite to impart the practical knowledge, but to be onsite the projects need to be provided correctly and on time. The provision of the projects is a major problem for the learnership programme in Rustenburg. There is no continuity in the provision of the projects which is causing huge delays to the learnership programme. Each learner contracting company in the programme has received his first project, but most contractors are now already waiting eight months for their second project. So question marks can be set by the method that the Rustenburg Local Municipality uses to plan the provision of the projects. Therefore this chapter focuses on a model for the provision of the projects for the learnership programme in Rustenburg. To come to this model it has to be clear which activities has to be executed from the start of a project till the moment the actual construction can be started. A method to control this process is phasing. A phasing model suitable for labour-intensive construction projects and the specific circumstances of the learnership in Rustenburg can contribute to reduce the delays with the provision of the projects.

A theoretical model will be set out to phase the provision of labour-intensive construction projects in section 1. This theoretical model is used to optimise the practice at Rustenburg. Section 2 analyses the phasing model of the RLM and the current provision of the projects. This results in strong and weak points of the current provision of the learnership projects. The last section (section 1.3) gives a final phasing model based on the theoretical model and the strong and weak points of the current project provision by the RLM.

2.1 Theoretical model

This section sets out the theoretical phasing model for the provision of labour-intensive construction projects. Subsection 1 determines the most appropriate phasing model for the development of the theoretical model. Subsection 2 describes the determined model. Subsection 3 describes specific characteristics of the planning of labour-intensive construction projects as described in the literature of LIC. In subsection 4 these characteristics of LIC-projects are combined with the earlier described linear phasing model to come to a theoretical model which is suitable for the provision of LIC-projects.

Determination of the phasing model

Before the determination of the phasing model the broader context of phasing is set out in subsection 1. Subsection 2 gives an overview of different types of phasing models. It is important to understand the context of the learnership programme in Rustenburg (subsection 3) for the determination of the phasing model. Based on the circumstances the most appropriate model is determined (subsection 4).

Context of phasing

The civil construction sector works project-based (this method is further explained in section 3.3). The Project Management Institute defines project management as [Hendrikson, 1998]: *“Project management is the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, quality and participation satisfaction.”*

Phasing (often referred to as the project life cycle) is one of the three elements of the project approach in project-based working. The other two elements are deciding and controlling. The development of a civil

object can be seen as a phased process of decision making in which unknown variables are concretised in multiple steps [Doree, 1996]. Phasing is used to create logical and natural groups of activities which have to be executed to reach the goal of the project and to control the process from start to finish. This gives the following effects [Groote, 2001]:

- Stepwise concretising the final result
- Reducing the risks to the units of work that can be influenced
- Stimulating decision making
- Improving the controllability of the work
- Motivating the project partners through the delivery of sub results

The building process of a civil object is a so called “producing process” in which the development of a civil object takes place. This process can roughly be separated into three main phases [Doree, 1996]:

1. Programming: description of the problem for which a solution is sought. In this phase there is also attention to the requirement of the client and the constraints that are in place.
2. Designing: translating the problem and the requirements into an executable solution.
3. Realising: the construction of the design.

In phasing a building process these three phases can be seen as the minimum that has to be taken into account. The total amount of phases can be chosen randomly and will depend on the kind of project. Important is that activities are organised in such way that it is possible to make a decision at the end of a phase.

Types of phasing models

There are different phasing models which are used in project-based working. The number of models in this report is limited to the three main groups that are described by Geert Groote et al [Groote, 2001]: linear phasing model, cyclic phasing and parallel phasing. A description of these models can be found in Appendix 6.

The different models can be classified by two different aspects: level of uncertainty and level complexity. The levels of these aspects are influenced by different elements as shown in Figure 4.

<u>Elements of the aspect uncertainty:</u> - Initial possible definition of the final result - The possibility to generate requirements and solutions - Influence of the environment - The possibilities of changes and their effects	<u>Elements of the aspect complexity:</u> - Technical complexity - The building methods/techniques - The organisational environment - The priority of the project - Availability of time, people and resources
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Figure 4 Level of uncertainty and level of complexity [Groote, 2001]

It is possible to visualise these different main groups of models in a figure with the level of uncertainty and the level of complexity on the axis. The result can be seen in Figure 5.

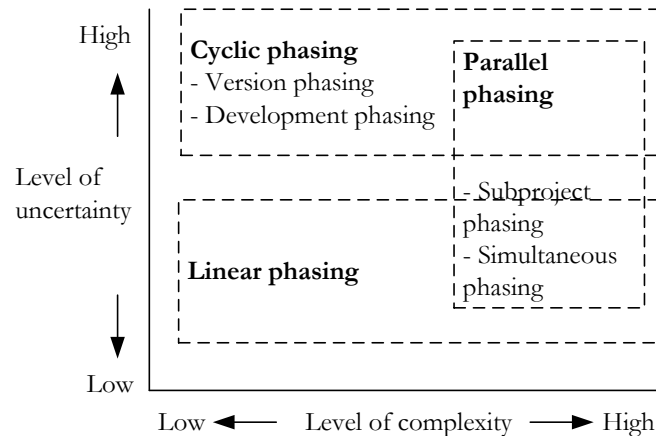


Figure 5 Methods of phasing [Groote, 2001]

So which model is the best to use depends on a projects uncertainty and complexity.

Learnership Rustenburg

The model needs to be suitable to implement in the learnership programme in Rustenburg, so it should take the circumstances in Rustenburg into account. To come to a model for the provision of the projects the most important circumstances are the project characteristics. Based on these characteristics a type of phasing can be chosen. Thereby it is important to bear in mind that the Rustenburg Local Municipality is the one who needs to implement the model. So the capabilities of the Rustenburg Local Municipality on providing LIC-projects form a boundary condition for the determination of the model.

- Project characteristics: Each learner contracting company receives three projects for the practical experience. The characteristics of the projects that need to be provided/executed for the learnership programme are given in section 3.2. The types of project that can be expected are [EPWP, 2004]: low volume roads, sidewalks, stormwater drainage, water reticulation and sanitation. It are very concrete projects of which the end-result can be well defined in a early stage of the project, which take away a lot of uncertainties. With each new project the contract value, duration and complexity increases. Though the projects are still relatively small. Work that is normally executed by one contractor is now divided over multiple learner contractors. The projects have a low level of complexity as well compared to conventional construction projects, because the projects have to be constructed with techniques that can be executed by hand.
- Capability of the RLM: The provision of labour-intensive construction projects is new for the RLM. Within the RLM there is not much knowledge available on how to provide this kind of projects. The concept of LIC and the implications it has on the project provision is still a learning issue for the management of the learnership programme. So the model should be easy to implement and simple to understand

Determination of the phasing model

The determination of the phasing model depends on the projects uncertainty and complexity. As described above the learnership projects can be characterised as projects with both a low level of uncertainty and complexity. According to Figure 5 the suitable phasing model for these kind of projects is the linear phasing

model. The linear model is the least complex model of three different groups of model. This makes it the easiest phasing model to understand and work. Thereby it meets the boundary condition that was set by the low capability of the RLM of providing LIC-projects. So for the development of a phasing model of the provision of the learnership projects in Rustenburg it is most appropriate to use a linear phasing model

Linear phasing model

The linear or sequential phasing model in conventional construction management is used for the development of the theoretical phasing model for LIC learnership projects. As a basis for the development of this model the standard linear model that is described by Groote et al (2001) which consist of six different phases is used. A visualisation of this standard linear model is shown in Figure 6. The characteristics of a linear model are that the phases follow each other sequentially and that every phase will be completely finished before moving to the next phase.

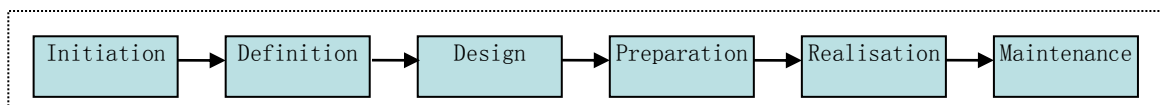


Figure 6 Standard linear model [Groote, 2001]

Each phase has its own range of activities which forms a complete whole. Thereby ends each phase with a concrete decision whereby it is examined if the outcome of that phase fits with earlier made decisions, besides an approach is made for the next phase and which activities still have to be executed. This gives insight if the project is still on track. The controllability of the project is enhanced by this approach.

Each phase has a unique assignment [Groote, 2001]:

- Initiation: the first ideas about the project now have to be concretised into a global description of the end-result. Thereby it is important to analyse the reasons why the project should be realised, which problems it solves, what goals it pursues and what the scope of the project is.
- Definition: during this phase the project is further defined. A thorough analysis of the problems and goals is made. Besides a description of the project requirements needs to be made: functional and non-functional requirements, preconditions, design limitations etcetera. This all comes together in the TOR (Terms of Reference) or the Project Charter which defines the project: what, who, how and when.
- Design: a number of design alternatives are developed bases on the TOR of the definition phase. After one of the design alternatives is chosen the final design is made up.
- Preparation: the realisation phase needs to be prepared to ascertain a smooth execution of the project. Construction methods and work instructions are detailed and the necessary equipment is ordered. When it is necessary permits has to be arranged as well.
- Realisation / Maintenance: after all the necessary preparations the project result will be realised after which it can be used by the client. After realisation the project result needs to be controlled and maintained.

Specific Characteristics of labour-intensive construction projects planning

The literature shows some specific characteristics of labour-intensive construction in which LIC differs from conventional construction projects. Some of these characteristics affect the described linear phasing model for conventional construction projects in the first subsection. The LIC documentation of NQF 5/7 (managing labour-intensive construction) from CETA describes these specific characteristics of labour-intensive construction projects. Three specific characteristics of labour-intensive construction are distinguished with regard to the planning of LIC-projects:

- Pre-feasibility analysis
- LIC suitable designs
- Task based working

This subsection describes each of these three characteristics.

Pre-feasibility analysis

Conventional construction projects are normally preceded with a feasibility analysis, which is normally executed during the definition phase. This is done to get insight in among other the scale, cost and time of the construction project, so that a client can make a decision if it is viable to actually start the project. In labour-intensive construction a second feasibility analysis is introduced. This analysis is called the pre-feasibility analysis.

A right project choice is absolutely essential for LIC-projects to be successful. The main aim of the pre-feasibility analysis is to gain insight and assess the suitability of the project itself with regard to labour-intensive construction methods. This analysis is executed to gain clarification on several critical issues even before there is started with designs to be able to make a decision to go on with the project. These critical issues are mostly aspects that are normally taken for granted during conventional construction projects. One example of aspects that need to be researched is the availability of sufficient labour in the area around the project that is willing to work. This kind of aspects makes or breaks a LIC-project. The pre-feasibility analysis is carried out on behalf of the client of the project by a consulting engineer. Only when there is a sufficient chance on success the client should be advised to proceed with the project.

The issues that should form the basis of the pre-feasibility report are set out in the “Interim Guidelines For Employment-intensive Construction Projects” from professor R.T McCutcheon.

- Client/public sector authority: it is important that the client has commitment to the greater use of labour per unit of expenditure and understand the implications of such a decision. The client should also be prepared to be flexible to face obstacles and not to handle any obstacles as “business as usual”. Therefore it is absolutely necessary that they understand the concepts of labour-intensive construction.
- Project: the most important thing that has to be assessed is the type of project. Not every project is suitable to execute by labour-intensive methods (see Appendix 3).
- Community / local authority: community participation is the involvement of the local people with the project. This participation aims to improve the project efficiency and effectiveness, empowerment and building beneficiary capacity. Community involvement has to be assessed

because they should be fully involved and multiple agreements with them have to be reached, like nature of the project, labour availability, payment rates and so on.

- Contractor: attention needs to be given on what the required contractors experience in LIC should be for the project execution and how they should be approached.
- Consultant: it is important that the consultant is familiar with LIC-techniques and can adopt the project approach to optimise the use of labour-intensive construction. He needs to be able to make an appropriate design. Because of the conflict of interest, the consulting engineer also performs the pre-feasibility analysis, it is logical to assess the competency of the consultant by an independent organisation.

LIC suitable designs

In the “Manual on the Planning of Labour-Intensive Construction” from Allal and Edmonds the conclusion is made that if one intends to increase the use of labour per unit of expenditure then the design has to be completely reappraised. But adjusting designs to make it appropriate to execute the project by labour-intensive methods is not an easy job. Designs that are used for conventional construction projects are primarily focussed on the use of equipment and thereby not usable.

It is important that the design itself is made suitable to be constructible by labour-intensive methods. Thereby it should be realised that not everything can be done by hand, but often much more than consulting engineers think. It takes a lot of creativity to come with suitable designs to optimise the use of labour. Besides the presentation of the design needs to be adjusted as well. The presentation should be simple and clearly to understand with a specific focus on “how” things need to be constructed. It has to be kept in mind that a lot of the labourers on these projects are not properly educated. An option for simplifying the presentation of the designs is the use of orthophoto's where the design has been laid over.

Task-based working

Labour that is working on LIC-project is getting paid based on task- or piecework and not on a daily work basis, because it increases the productivity of the labour significantly. A task is defined as “what an average person can do in an average day”. There are already standard task norms for a great variety of construction activities based on experience of LIC-projects, but the task norm always greatly depends on the on-site circumstances. To be able to set realistic task norms for a project there need to be done example sections on the actual project site.

Theoretical model for the provision of LIC-projects

To come to a complete theoretical model for the provision of labour-intensive construction projects it is necessary to implement the specific LIC-characteristic as described in section 1.1.2 into the in section 1.1.1 given linear phasing model for convention construction.

The first addition to the linear phasing model of conventional construction is the pre-feasibility analysis which is added as a separate phase. This analysis is executed right after the initiation of a project, to gain insight in several critical issues early in the project life cycle (see section 1.1.2). Secondly the design phase is adjusted to “LIC suitable design”, to make it clear that there are major implications to the designs when a project is executed by labour-intensive methods. Task-based working has implications for multiple phases. A

first assessment of the on-site circumstances is done during the pre-feasibility analysis and should be done again by the engineer during the design phase. This is necessary to be able to set realistic task norms and gain insight in the financial feasibility. In addition to the preparation activities of conventional projects a contractor needs to balance tasks to guarantee a good progress during the realisation of the projects. When these additions are implemented the theoretical model for the provision of LIC-projects looks as follows:

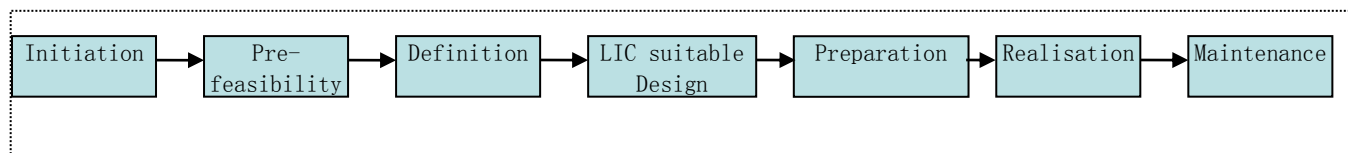


Figure 7 Theoretical model provision LIC-projects

2.2 Current provision of the projects in Rustenburg

This section describes the current provision of the projects for the learnership programme by the Rustenburg Local Municipality and is done according to the phasing model of the RLM. The description is based on the experiences working as a mentor at the programme in Rustenburg. Subsection 1 starts with an outline of the phasing model that is used by the RLM. Subsection 2 describes the execution of the different phases. Subsection 3 gives an overview of the strong and weak points of the current provision of the projects in Rustenburg.

Phasing model of the RLM

The phasing model that is used by the Rustenburg Local Municipality for the provision of the projects for the learnership programme is a linear phasing model. It consists of six different phases which follow each other sequentially. These phases are shown in Table 2 and are drawn by Mr. De Jager of the infrastructure department of the RLM.

Table 2 Phasing model of the RLM [De Jager, 2006]

Phase	Duration
Identification of a project	1 month
Prioritise projects	2 months
Appointment of consultants	1 month
Preliminary design	2 month
Tender stage	2 months
Construction	6 months
Total	14 months

The RLM uses this model for their conventional construction projects as well. So they haven't made any adjustments for the labour-intensive construction nature of the learnership projects.

Description current process provision of the projects by the RLM

This subsection gives a description on how the execution of the different phases takes place for the learnership projects. This research focuses on the provision of the projects so the construction phase will not be described. This description is based on experiences that are acquired by working as a mentor of the

learnership programme in Rustenburg, because this didn't give insight in the execution of all phases additional interviews are taken as well.

Identification of a project

The identification process is started by the order of the mayor of Rustenburg to start investigations in the communities to identify backlogs and problems. These investigations are the responsibility of the ward counsellors and their ward committees. When there is an overview of the problems within the communities then possible projects are identified. So the identification of the projects takes place within the communities itself. [De Jager, 2006]

With the identification of the projects there is taken into account that the greater part of the projects of the learnership are funded by the Municipal or Provincial Infrastructure Grant (MIG/PIG). The aim of this funding programme is to provide all South-Africans with a basic level of service by the year 2013 [MVULA, 2006]. Broadly speaking the projects consists of three types [De Jager, 2006]:

- Road
- Water and sanitation
- Electricity

Prioritising projects

The identified projects are handed over to the directorate of infrastructure development and management. They make a prioritisation of the projects, because there is not enough funding to execute them all at once. This prioritisation needs to be approved by the municipal council in which also all 35 ward counsellors take place [Rustenburg, 2006]. For the learnership projects this approval has taken more time. The obtainment of this council resolution is often delayed by the discussion of the counsellors on the proposal of the prioritisation [De Jager 2006].

After the council resolution the directorate of infrastructure development and management looks which projects can be selected to be done by labour-intensive construction under the EPWP. These are the projects that are executed by the learner contracting companies. The RLM doesn't always decide immediately after the prioritisation if a project is appointed as an EPWP-project. It occurs often that this is done in a later phase.

When the projects are selected there is started with the registration of the MIG or PIG for the funding of the projects. The RLM struggles a lot with these registrations which delays the process.

Appointment of consultants

The appointment of the consulting engineers takes place after the prioritisation of the projects and the determination of the projects for the learnership programme. The RLM selects and appoints the consulting engineers for projects and further contact with the consulting engineer goes through the programme manager (Bigen Africa). Most of the appointed consulting engineers don't have the appropriate qualifications for labour-intensive construction (NQF 7) which means that they aren't familiar with the concepts of LIC and its design implications. Some of the appointed consulting engineers on second phase learnership projects weren't even aware that they were working on EPWP projects.

Preliminary design

The designs are prepared by the consulting engineers. But in most of the designs for the learnership projects it isn't taken into account that the projects need to be executed by labour-intensive construction methods. This has two effects on the execution of the projects, which will be explained by an example:

- Designs can't be executed by hand: The content of one of the projects is pipe-laying to ensure the provision of water. According to the design the pipe should be laid in ground that consists of rock. This can only be done by blasting because rock is too hard to excavate by hand. It is notable that most of the designs are modifications of conventional designs.
- Designs don't maximise the labour content: A second phase project was the building of VIP-toilets. In the designs it is specified that these toilets must be built by pre-fabricated components. These kinds of decisions reduce the labour content of the learnership projects. These toilets could also be produced with bricks which in some circumstances even can be produced on-site. Another option would be to use in-situ cast concrete. Both options increase the labour content.

Thereby it comes to the attention that a lot of design changes are made in following phases. What is notable as well is that the designs are presented in the same way as conventional construction projects.

Tender stage

When the final design is approved by the RLM the consulting engineer compiles the contract documentation for the tendering. The tendering of the learnership projects is a closed tendering on a negotiated price basis. After completion of the contract documentation it is handed over to the learner contracting companies for tendering. During the completion of the tendering by the learner contractors the contract documentation is still undergoing lots of changes. A lot of design changes are implemented during this phase and with every design change the bill of quantities changes as well. Even projects are withdrawn by the RLM after the start of the tendering. The most important issues of the contract documentation are the drawings, project specifications and bill of quantities (BOQ). During the tender stage of second phase projects it became clear that the contract information most of the time was incomplete and consisted of lots of mistakes. Drawings and project specifications weren't attached, incorrect quantities in the BOQ and on-site information of the wrong areas.

During the tendering stage of the second phase projects most of the rate calculations to complete the tendering is done by the mentors instead of by the learners, because the tendering had to be completed very quickly. So the mentor sets up team balancing schedules and plans the work activities to be able to estimate good rates which causes that the learners don't learn to tender by themselves.

After completion of the tendering the contract to the learner contracting company is awarded by the director of the infrastructure directorate of the RLM. The construction cannot start before the contract is officially awarded. The learners don't start to prepare the projects as well.

Strong / weak points current provision of the projects by the RLM

This subsection gives strong and weak points of the current provision of the projects by the RLM through analysing the current process of which a description is given in the above section.

Strong point

The identification of projects: It's a strong point that the identification of the projects takes place within the communities. This stimulates community participation from the beginning of the process, because the communities have the possibility to make their ward counsellors aware of any backlogs and problems.

Weak points

Obtainment of council resolution: there is not enough time taken into account to obtain the council resolution which is necessary to approve the prioritisation of the identified projects. It happens often that the different counsellors differ on the view of which projects has the highest priorities. They all want the best for the community they serve. These discussions slow down the approval in the municipal council which only comes together once a month. So the total process of prioritisation of the project costs more time than the two months the RLM has estimated for it.

Changing the project type: the type of project (conventional or labour-intensive) is decided during the prioritisation of the project, but the RLM often changes the type of project later on in the process. It causes major delays when late in the process the project type is changed from conventional to labour-intensive, because they became aware that the project would be suitable to execute by LIC methods. This means that a lot of work has to be done again. Changes from learnership project to conventional happens as well, when becomes clear that a project is not suitable for execution by labour-intensive methods. This is because the suitability of the projects for LIC is not properly assessed before starting with the designs. Learnership projects are even withdrawn very late in the process.

Funding application: the RLM doesn't have a clear structure for completion of the MIG-registration for the learnership projects, which causes that funds are not available on time for the projects.

Appointment of consultants: the appointment of the consulting engineers for the learnership projects is one of the major weak points of the current provision. Currently the qualifications of the consulting engineers aren't controlled. Therefore most consulting engineers working on the learnership projects aren't compliant with the EPWP guidelines, which prescribed that they should have a NQF 7 qualification in labour-intensive construction. This is the main cause of the problems with the designs that aren't suitable for LIC-methods and don't maximise the labour content and the improper contract documentation.

Many design changes: currently the designs change a lot even after the design has been approved. This is caused by the fact that the engineers aren't aware of on-site circumstances and that there is hardly ever any communication with the client or community during the design phase. Communication with the client and the community then most of the time only took place after the final design was prepared. Implementing design adjustments demanded by the client and community at that stage takes a lot of time. Thereby the contract documentation needs to be adjusted every time as well.

Tendering: the contract documentation that the learner contractors receive is almost always incomplete. This is the responsibility of the consulting engineer, but incomplete contract documentation shouldn't be transferred to the learners at all, because they can't correctly complete their tender. Thereby puts the RLM so

much time pressure on the tendering that it is impossible for the learners to complete the tendering by themselves. This pressure is put on by the director of the infrastructure directorate, because DPW had pointed out to the RLM that they almost hadn't used their MIG-budget.

2.3 Model provision of the projects in Rustenburg

A linear phasing model suitable for labour-intensive construction projects and the specific circumstances of the learnership in Rustenburg could reduce the current delays with the provision of the projects. In subsection 1 the strong/weak points of the current provision of the learnership projects in Rustenburg is combined with the theoretical model for the provision of LIC-projects. Subsection 2 gives a linear phasing model to improve the provision of the learnership projects in Rustenburg.

Theoretical model combined with strong/weak points current provision

In this subsection the strong and weak points (see section 2.2) are combined with the theoretical model (see section 2.1). By combining this it becomes clear which adjustments need to be made to the theoretical model to come to a model for the provision of the learnership projects in Rustenburg. Hereby it is important to examine if the theoretical model offers a solution for the weak points and if the current strong points are incorporated in the theoretical model.

The only strong point is the identification of the projects. With this identification process early community participation is established which is an important aspect for LIC-projects. This phase of project identification replaces the project initiation of the theoretical model.

The obtainment of the council resolution causes delays, because of the discussions between the counsellors in the municipal council. The use of the theoretical model doesn't overcome this problem. Therefore it is advisable to extend the model with a separate phase for the obtainment of the council resolution, so the length of this process is taken into account.

The weak points of the changes of project type and the many design changes could be overcome when the project suitability with regard to labour-intensive construction is assessed in the beginning of the process and well defined. These problems are overcome in the theoretical model through the execution of a pre-feasibility analysis which is absent in the current model of the RLM and the project definition. This pre-feasibility analysis assesses the suitability of the project with regard to LIC which can overcome the many changes of project type and design changes. If this analysis gives a positive outcome on the projects suitability for LIC there would be no reason to switch from project type later on in the process. The many design changes can be overcome by the pre-feasibility analysis because it involves an assessment of the on-site circumstances and the community as well. The project definition defines the projects what, who, how and when and records this in the Terms Of Reference. Thereby many design changes could be prevented if there would be more communication with the client and the targeted community. This is not overcome in the theoretical model. It is advisable to separate the design phase into a preliminary and final design stage. Whereby the preliminary design is communicated with the client and the community to gain their input before the design is finalised.

The appointment of consulting engineers with the right qualifications for labour-intensive construction is vital for the learnership projects and is a very weak point in Rustenburg. It is important that the consulting engineer is familiar with LIC-techniques and can adopt the project approach to optimise the use of labour-intensive construction. He needs to be able to make an appropriate design. Therefore it is important that the competency of the consulting engineers is properly assessed. This forms part of the pre-feasibility analysis of the theoretical model. Because of the conflict of interest, the consulting engineer also performs the pre-feasibility analysis, it is logical to assess the competency of the consultant by an independent organisation like the RLM or Bigen Africa. .

The tendering of the learnership projects is a very weak point because incomplete contract documentation is transferred to the learner and heavy time pressure. The theoretical model doesn't give any solution for this. To overcome this weak point the contract documentation and the tendering can be separated in two phases. The prepared contract documentation of the consulting engineer should be examined by the programme manager to see if it is complete. If not, then there can't be moved on to the tendering phase.

The funding application of the learnerships projects lacks a clear structure. The funding of the learnership projects through MIG-funding is so specific for South Africa that the theoretical model doesn't overcome this lack of structure. To structure the application the activities which need to be executed to gain the MIG-funding should be made visible within the model. To gain MIG-funding the project needs to be registered early in the process and the application needs to be completed after the pre-feasibility analysis. [Matsotso, 2006] [DPLG, n.d.]

Model provision of the projects for the learnership programme Rustenburg

In this subsection the theoretical model is optimised for the practical situation in Rustenburg based on the proposed adjustments given in the last section. This model for the provision of the projects for the learnership programme is shown in Figure 8. This linear phasing model consists of ten phases before the construction can start. Right of the main model an overview of the activities of each phase is given. On the far right of the model a cumulative time line is given. This time line gives a rough indication of the length of the process and has been set up together with the Mr. Laubscher, director of LITEworks. To the left of the main model the process for financing the project by the Municipal Infrastructure Grant is made explicit.

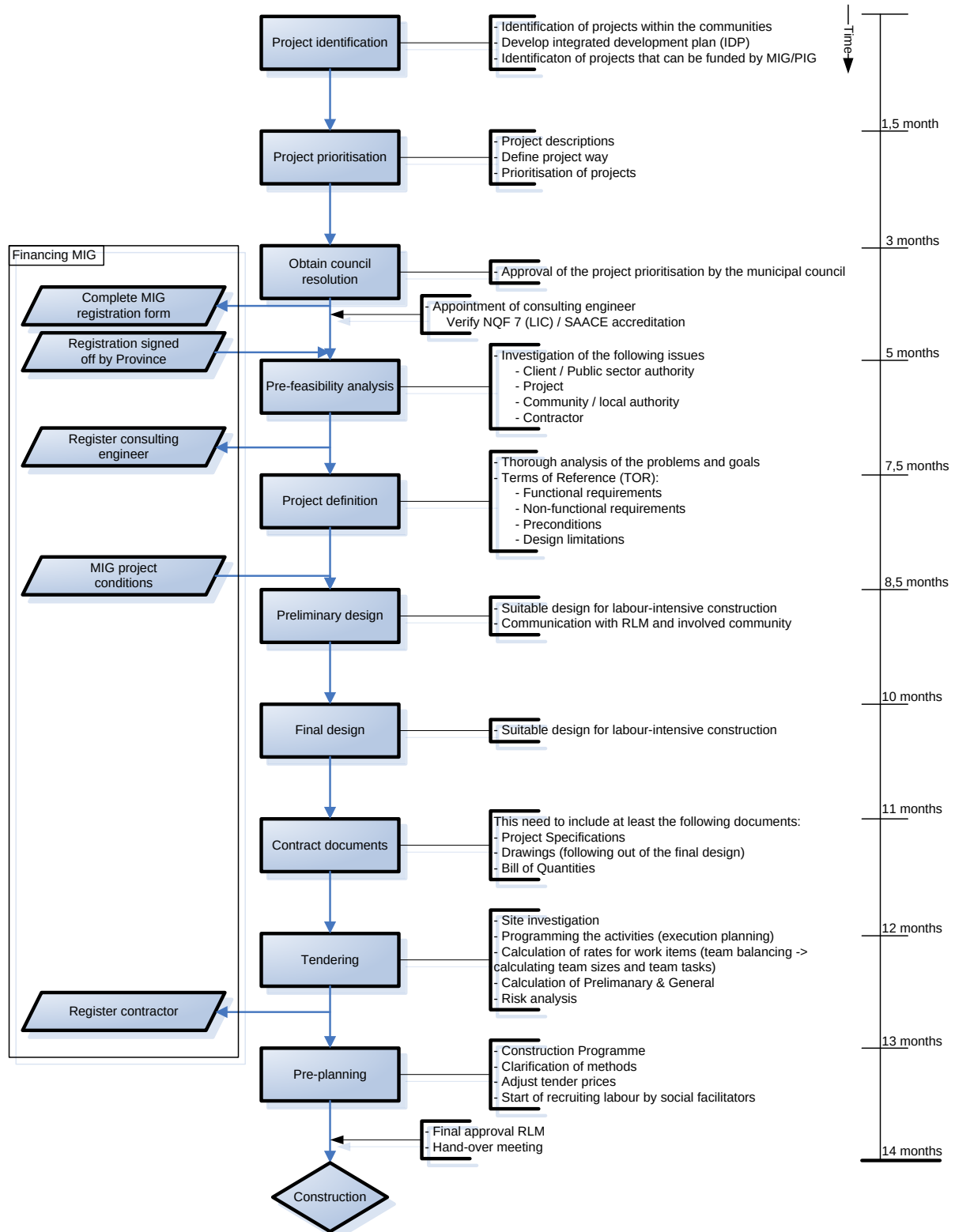


Figure 8 Model provision of the projects for the learnership programme in Rustenburg

2.4 Conclusion

The provision of the projects is vital for the learners to gain their practical experience. Before the projects of the learnership programme can be provided by the RLM a lot of activities have to be executed. This process can be structured and controlled through the use of phasing which is used to create logical groups of activities that has to be executed to reach the goal of the project. For the provision of learnership projects the linear phasing model is the most appropriate, because of its suitability for projects with a low level of uncertainty and complexity.

By analysing the specific characteristics of labour-intensive construction with regard to planning aspects it can be concluded that there should be two adjustments to the standard linear phasing model of conventional construction projects: the addition of pre-feasibility analysis in which the suitability of a project with regard to LIC-methods is assessed and that designs need to be made suitable for LIC.

The Rustenburg Local Municipality uses their linear phasing model for conventional projects also for the provision of the learnership projects. The current process of the provision of projects has a lot of weak points: change of project type, many design changes, incomplete contract documentation, non-qualified consulting engineers etcetera. These are all causes that the current project provision has major delays.

By combining these points with the theoretical model an improved linear phasing model for the project provision in Rustenburg is made (Figure 8) which can reduce the current delays. For a structured process it is important that all activities within a phase are executed before moving to the next phase. By doing so all vital decisions for the provision of the projects are done in the correct order. To provide good projects to the learners it is also important to appoint consulting engineers with the proper qualification in LIC which can adapt the project approach to optimise the use of labour-intensive construction and is able to make an appropriate design.

3. Process model mentoring

The process model for the mentoring services is developed in this chapter. The model consists of two parts: the content of mentoring and the process of mentoring. These two aspects occupies centre stage in this chapter, each chapter is divided in these two parts. Before the developing the model can really start the causes of the current lack of structure needs to be find out. Section one analyses the current problem of the lack of structure through an analysis of the context of the mentorship services in Rustenburg. The model needs to be satisfactory to the requirements of DWP and needs to be suitable to the characteristics of the programme in Rustenburg. These points are described in section two before the theory is explained in section three. The theory forms the basis for the new process model that needs to be implemented in the current situation of mentoring (section four). Section five describes the results of the confrontation of the theory with the objectives and the local circumstances. Finally the results of the content of the model and the process of mentoring are unified.

3.1 Problem analysis

The mentoring services are currently delivered with a lack of structure and with a focus on project completion instead of on the learning process of the learners (see Appendix 5), but the cause of this problem is not clear yet. In this section the framework of the mentorship services is analysed to find the causes of this problem. First the relation with DPW is analysed in subsection 1 and 2. Subsection 3 pays attention to the organizational situation of the Rustenburg learnership and subsection four describes the situation within the company of LITEworks. Finally some conclusions out of these analyses are drawn.

Mentoring objectives

The Department of Public Works has to appoint and to control the mentoring teams of the learnerships. DPW has made a document with the specifications of the mentorship services within the EPWP Learnership Programme. This document tells the mentoring team in seven pages the content of their work. In this subsection the content of this document will be discussed.

The main objective of the EPWP learnership programmes is to create job opportunities. The mentor is the person who should, together with the trainers, impart the competences that are necessary to become a full-fledged labour-intensive contracting company. But the objectives for the mentoring services according to DPW focus on a supporting role for the mentor: [EPWP, 2004]

- Minimize the Public Body's risk of the projects not being constructed to stated requirements, within budget and on time;
- Provide access to project and commercial expertise that learner contracting companies may lack during the execution of the three projects which form an integral part of the EPWP contractor learnership programme;
- Capacitate learner contracting companies to successfully complete their contracts with the Public Body and to work independently and profitably;
- Identify learners who do not satisfy the requirements of the EPWP Learnership Programme and as such should be removed from the programme.

The mentor has to minimize the financial risks for the ABSA Bank and has to guarantee the quality of the projects; otherwise the learnership cannot be financed and be executed. Especially the Department of Public with its supporting and controlling role of the mentor should focus their objectives of mentoring on the learning process of the learner and not focus the objectives on the managing tasks of the mentor. The primary role of the mentor should be assisting and supporting the learner contracting companies to become full-fledged labour-intensive construction companies. The learners have to have enough knowledge at the end of the programme to reach this main objective of the learnership. Besides the trainer, the mentor is the only person who can impart this knowledge.

Mentoring control

The focus of the mentoring reports to DPW is on the progress of the projects of the learner contracting companies. The learner contracting companies need to have certain competences at the end of the programme to be an independent construction company and the learnership is the process to reach this objective. DPW should control the mentor to reach this objective. The main question is: are the learners still on track to reach this objective or does the mentor has to change the mentoring approach to a specific learner or learner contracting company? According to the documents the mentor should test the learners' competences at the start and at the end of every project or every 3 months by form E.1a (Learner Contractor Competency Evaluation) [Watermeyer, 2006], but this form doesn't correspond with the unit standards of the NQF qualifications and this form is 'testing' the skills of the learners only. The level of competence is defined as: *'the ability to apply knowledge, understanding and skills in performing to the standards required in employment'* [Beaumont, 1996]. So the learner must have the skills, but also needs to understand the line of thought of the skill (knowledge). Furthermore the mentor fills in the form, so the outcome depends on the interpretation of the mentor and DPW doesn't control this evaluation. The outcomes of the forms are not used to optimize the mentoring services.

Organizations within the learnership in Rustenburg

The mentor has to assist and support the learners in their experiential way of learning and with the realisation of their projects. The Programme Manager is together with the Public Body and the Consulting Engineers responsible for the provision of the projects for the learning contracting companies. They should provide the learner contractors with correct (labour-intensive) documents and drawings. According to the documents (EPWP guidelines) the role of the mentor within the organization can be visualised as shown in Figure 9.

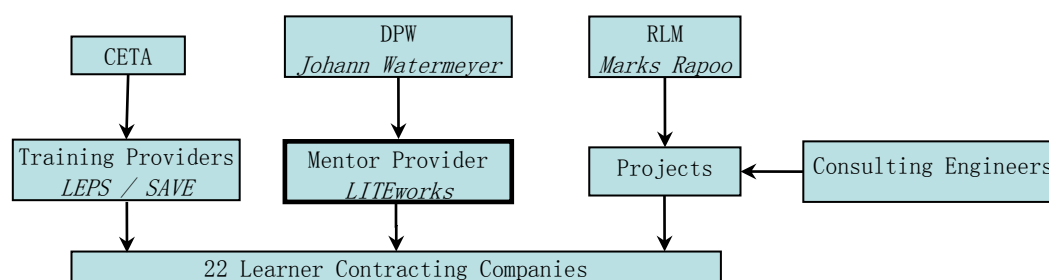


Figure 9 The structure of the learnership according to the EPWP guidelines [DPW, 2005]

The figure shows that the mentor should not be involved in providing the projects, but has to focus on the learner. The organisations in Rustenburg, who should provide the project documentation, don't have the knowledge and the qualifications to provide the labour-intensive construction documents. The mentoring company is the only organization with the right knowledge to prepare those documents correct, so the mentoring team has been asked to assist them in preparing those documents. A consequence of this strong involvement of the mentor in the organization is that the communication to the learners goes along the mentor instead of straight from the programme manager (representative of the public body) to the learner. So the mentor is besides a mentor to the learners also part of the management of the organization, thereby making mentoring of the learners not their primary focus.

LITEworks

In this subsection an internal analysis is made to find out the internal organization of LITEworks. The mentoring to the learners is mainly executed by three inexperienced site mentors with a NQF 5 qualification. These mentors are assisted by two experienced mentors. The site mentors are able to assist the learners on a daily basis, but are not able to create a structured plan to impart knowledge and skills to the learners. The experienced mentors have to focus their work on the management tasks and the site mentors don't have enough guidelines on how to mentor in a structured way on the long term. This structure of the mentoring company can fulfil the mentoring tasks as formulated by DPW, but a guideline for the site mentors is needed to impart the knowledge in structured, efficient and effective way.

Conclusion

The mentor should have a primary focus on imparting the practical competences to the learner contracting company to become a full-fledged labour-intensive construction company. The mentor can only fulfil his job when his primary focus is on mentoring and not on assisting the organization of the learnership with preparing these documents; the mentor is now more a representative of the learners instead of someone who is assisting and supporting them. A second aspect is DPW's general objectives of mentoring. The mentoring organisation within LITEworks has been organised to reach these DPW's general objectives. So LITEworks is fulfilling his mentoring tasks but not the EPWP overall objectives in an effective way. The focus of (controlling) the mentor is not on the *learning* process of the learner contracting company individually, but on their ability to finish the project successfully. The mentoring approach can almost be completely determined by the mentor itself because DPW's requirements for the mentorship services are quite minimal. This applies for the content as well as for the process of the mentoring services. This framework of the content of mentoring and the process of mentoring are explained in the following section.

3.2 Framework of mentoring

The model, which is developed in this chapter, needs to be satisfactory in the requirements of DPW and needs to be suitable to characteristics of the programme. These framework aspects for the content and for the process of the mentoring services are set out in this section. First the framework of the content is described and afterwards the framework of the process of mentoring.

Content of mentoring

The theory has to be implemented in the current organization and according to the current rules and requirements. The first subsection pays attention to the mentoring requirements for the aspects that need to be imparted to the learners. These aspects need to be learned during the execution of LIC projects. The characteristics of these projects (subsection 2) give background information to the theory, so can be seen on what kind of projects the theory has to be implemented.

Mentoring requirements

The required aspects that need to be imparted to the learners are defined in the EPWP documents. These documents only mention the areas in which the mentor should impart knowledge. As formulated in the Learner Guide: 'the mentor provides a wide range of support and advice functions, including but not limited to: finance and dealing with banks, business management, commercial management, technical and engineering' and some more. This description shows a very broad definition of the aspects with respect to the content. The documents give only this very broad definition and not a more detailed one. So the requirements give enough space to the mentor to point out the knowledge and skills that needs to be imparted to the learners.

Project framework

The theory of project management has to be applied in the learnership projects of Rustenburg. The project characteristics are needed to implement the theory, because realization of a huge and complicated project (like an Olympic stadium) needs another project management approach than realization of a small project (like a cabin in your backyard to store your wood for the fireplace). This subsection describes the specific project characteristics of the projects in the learnership, the characteristics of LIC are described in Appendix 3.

The projects are executed by hand, so the projects are not complicated technically (see Table 3). These projects in the learnership are executed by the community (under the minimum wage), for the community and in the community. So a good relation with the community is very important.

Table 3 Project characteristics

Project Attribute	Project number		
	1 (Training / pilot project)	2	3
Duration	3-4 months	6-12 months	6-12 months
Total Contract Value	R250 000 to R 500 000	R500 000 to R 2 000 000	R1 000 000 to R 5 000 000
Typical scope of work	Low volume roads (max 100 vehicles per day), sidewalks, stormwater drainage, water reticulation, sanitation	Low volume roads (max 500 vehicle per day) , sidewalks, stormwater drainage, water reticulation, sanitation	Low volume roads (max 500 vehicles per day) , sidewalks, stormwater drainage, water reticulation, sanitation
Typical Activities	Trenching, earthworks, gravelling, compaction, culverts, drainage, stone pitching, kerbing and paving [concrete block]	Trenching, earthworks, gravelling, compaction, culverts, drainage, stone pitching, seals, gabions, small reinforced concrete structures, rock excavation and blasting, pipelaying	Trenching, earthworks, gravelling, compaction, culverts, drainage, stone pitching, seals, gabions, small reinforced concrete structures, rock excavation and blasting, pipelaying, small bridges, large retaining walls, deep excavation

Process of mentoring

The ‘Specification for the mentorship services within the EPWP Learnership Programme’ pays little attention to the way of mentoring. The requirements for the mentoring approach are very general and don’t pay any attention to the process of learning. The tendencies of the requirements about the process of mentoring the learners are:

- To advise, coach, counsel, guide, teach, instruct and tutor the learner contracting company, in the execution of his duties;
- To assess the strengths and weaknesses of a learner contracting company during each phase of the learnership agreement and focus on the development of the identified areas of weakness;
- To visit the site as frequently as deemed necessary to control the works.

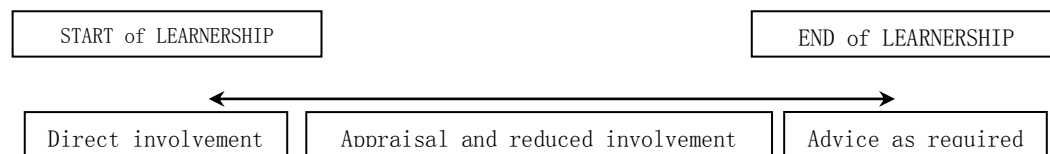


Figure 10 Progression of the EPWP mentorship [EPWP, 2005b]

These mentorship services should start with a direct involvement of the mentor and gradually go to a role as a trusted and respected advisor (see Figure 10). The delivery of the mentorship services excludes the performance of essential daily contracting functions on behalf of the mentored contractor. So the mentor is not restricted in the way of mentoring and can develop their mentorship approach. According to the national coordinator of mentorship services Johann Watermeyer: ‘a plan for the contractors and the supervisors should be made on how to assist them. So it is important to test their capabilities before the start of projects’ [Watermeyer, 2006], but according to the official documents the learners need to be tested only.

3.3 Theory

A theory is developed out of an analysis. A theory gains insight into the situation. In this section theories are described for the content and the process of mentoring.

Content of mentoring

The aspects that need to be mentored are those capacities that are needed to execute a project successfully. The contractor is responsible for realizing the construction; during this process the most important thing that the contractor has to do is controlling this execution. Project based working looks after a strategic way of working to realise a (construction) project. Project based working consist of three important aspects: phasing the project, decide and control [Groote, 2001]. The control cycle defines how to control the construction. This subsection elaborates the theory of the control cycle, but first the general aspects of project management are described.

Project control

The civil engineering industry works project-based. A project can be characterized as result-orientated. The project results are already defined at the beginning of the construction phase, but the way to these results is

not clear in the beginning of the project (especially for the learners). The way to these results is controllable, when using a systematic method → project based working. The principles for project-based working are:

- Plan before acting
- Think through the project forwards and backwards
- Work from rough to fine

These principles are for the process as a whole (from initiating until maintenance; see chapter 2), but can also be used for a phase like the construction phase itself.

The principle of plan before acting needs a plan that has certain focuses which are important in project-based working. Time, cost, quality, information and organisation are the five aspects that need to be controlled to realize the project. These aspects need continuous attention during the whole process of realizing the project. With an example of the aspect this will be explained. A time planning must be made before the construction phase starts, but this planning must be checked regularly to look if the project is still on track during the construction. If this is not the case the planning needs to be adjusted to finish the project on time. These five aspects can help to focus the plan, so it will be a specific plan which tells you how to realize the project.

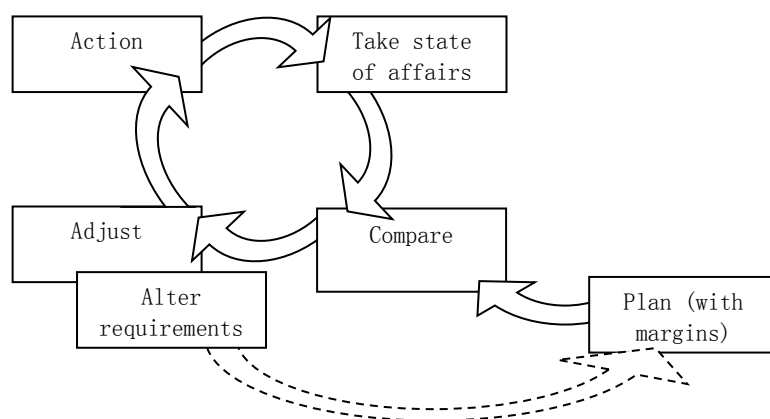


Figure 11 Control cycle [Groote, 2001]

This control process can be clarified with the control cycle (see Figure 11). The 'Action' block regards the execution of some construction works. The block next to it is to 'Take state of affairs'. What is the actual status of the aspect that is controlled? After measuring the actual situation the information needs to be compared with the planned situation. This is necessary to adjust the situation or to change the plan.

Process of learning

This learnership with an experiential way of learning has been developed to become a contracting entity. The analysis of the current mentorship services (Appendix 5) shows that the mentorship services are delivered to learners without a primarily focus on learning. Different theories on learning have been developed, but most of them are focusing on learning in general. The Kolb's experiential learning theory is especially developed for an experiential way of learning and has defined the process of experiential learning as 'the process whereby knowledge is created through the transformation of experience' [Kolb, 1984]. This definition reflects the role of a mentor, so this theory can help to structure the way of mentoring and to change the focus from earning money to a learning process.

This section is the basis of process part of the mentoring model and explains the theory of experiential learning. This explanation is given through a short description of the origins and the characteristics in subsection 1 and a setting out of the model (subsection 2).

Framework of the ELT model

The ELT was developed in beginning of the 80's through the increasing of experiential learning in especially higher education at that time; internships, field placements etcetera. Experiential learning has become a method of learning or a personal development for non-traditional students; minorities, poor and mature adults. According to the Experiential Learning Theory (ELT) experience plays a central role in the learning process, so ELT defines learning as 'the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming of experience'. [Kolb, 1984]

Viewed from the experiential perspective this definition of learning shows some aspects that are characteristically for experiential learning. The first one is the emphasis on the *process* of adaptation and learning in stead of on the content or the outcomes. Second is that knowledge is a continuous transformation process, not an independent entity in which the knowledge will be acquired or transmitted. Finally learning transforms experience in both its objective and subjective forms.

The Kolb's experiential learning theory sets out four learning styles which are based on a four-stage learning cycle (which can also be interpreted as a 'training cycle'). This offers a way to understand individual people's different learning styles and gives an explanation of a cycle of experiential learning that applies to us all. [Businessballs, 2007]

Furthermore the experiential learning links education, work and personal development. The model of experiential learning offers a system of competencies for describing job demands and corresponding educational objectives and emphasizes the critical linkages that can be developed between the classroom and the real world [Kolb, 1984 page 4].

Model

Kolb has defined the human learning process into four stages. Immediate concrete experiences are the basis for observation and reflections. The theory (formation of abstract concept and generalizations) is developed out of the observations. New experiences can be obtained from tests of the new theory in new situations. To be able to be effective the learner must have four abilities: concrete experience (CE), reflective observation (RO),

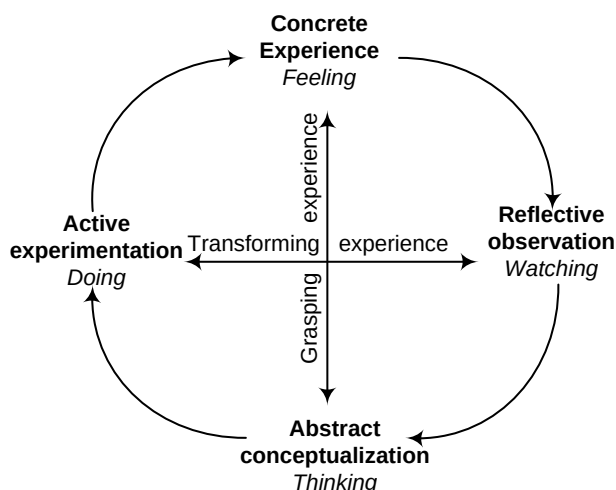


Figure 12 Kolb's Experiential Learning Cycle
[Businessballs, 2007]

abstract conceptualization (AC) and active experimentation (AE).

The cycle should be a continuous process without a specific starting point. The model shows two so called 'dialectically related modes' of grasping experience (CE and AC) and two 'dialectically related modes' of transforming experience (AE and RO). Kolb meant by this that both can not be done at the same time. It is for example not possible to drive (feeling) and to analyze the driver's manual about the car's functioning (thinking) at the same time. This conflict is resolved by choosing. The person has to decide whether he wishes to do or watch and at the same to think or feel. The result of these two decisions gives the preferred learning style (see the two-by-two matrix below).

Table 4 Kolb's learning styles [Businessballs, 2007]

	Doing (Active Experimentation)	Watching (Reflective Observation)
Feeling (Concrete Experience)	accommodating	diverging
Thinking (Abstract Conceptualization)	converging	assimilating

A person who prefers the accommodating learning style prefers to learn to use other people's analysis and take a practical experiential approach out of it. Most people have a preference learning style and are not able to use a different one. So a person with accommodating learning is likely to become frustrated when he/she gets a lot of instructions and rules and are not getting the hands on experience. The four learning styles are explained in Appendix 7.

Effective experiential learning programme

CSA Europe characterises an experiential learning programme by activity, variety and direction. More specifically eight qualities are defined which set it apart from other programmes. The following qualities are most relevant for the EPWP learnership programme in Rustenburg.

Lean curriculum	The knowledge that has to be imparted has to be lean and only focus on those elements that provide the essential basis. When the content level is moderate, the mentor has time to design activities that introduce, present, apply and reflect upon what is learned.
Group participations	Involving the participants experiences can be shared and helps to focus the learnership on learning. This creates opportunities to learn from each other.
The situation after the learnership	The success of an experiential learning programme is measured by the understanding of the learners what to do after the learnership. The mentor should continuous link the learnership situation with real world. The tendering of the projects in the learnership is for example a closed tendering on a negotiated price basis. The learners know that they can execute the project, but after the learnership that is not the case. The mentor should give advices to the learners on how to tender in the real situation.

3.4 Current situation

The model needs to fit in the current environment and situation. The current situation of mentoring gives the necessary information about the situation in which the model needs to be implemented. Both situations of the mentoring services (content and process) are described in this section.

Content of mentoring

Managing a project during the learnership consists of using management tools at the moments when the environment asks for it. The contracting companies are waiting for a problem and then look for a solution. A financial and quality issue will explain this problem.

A financial plan is made at the beginning of the project because the contracting companies need money from the bank. The required financial plan is currently made as minimal as possible and the plan is not controlled during the construction process. When the contractors have to order material during the process of execution the contractors are not looking at their bank account if there is enough cash available and they don't have any clue what the consequences are when ordering a bit more or ordering earlier. This can result in conflicts with the supplier.

The second project for the learnership in Rustenburg was the construction of VIP toilets. The doors were not all correct; some had their lock system not at the right height (see Figure 13). The contractor is identifying this at the first door, but is still going to install the doors until an engineer or mentor is coming to say that those are not correct. He has to pay the labourers to install the doors and the result is useless.



Figure 13 A wrong door

Process of mentoring

The learners want hands on-site as soon as possible. They are actually not planning their work, but are confronted with certain obstacles during the execution of the project. The mentor is assisting the learners in their job to successfully complete the projects when they have a problem. The strategy to learn is to execute a project, but there is no attention to the process of learning. In the preconstruction phase the learners are assisted as a group and during the construction the mentor is visiting the site on a regular basis. The mentor speaks with the learning contractor and supervisors about the progress of the project and helps the learners with their difficulties. Besides the mentor is checking the site and the different files and gives advice to the learners when the mentor determines some non optimal situations.

3.5 Analysis

This section describes the results of the confrontation of the theory with the objectives and the local circumstances. The first subsection pays attention to the control aspects in the learnership and the second subsection puts Kolb's learning cycle in perspective of the learnership in Rustenburg.

Control aspects in the learnership programme

The five control aspects have usually not the same importance [leren.nl, 2007]. Time and quality are for example very important issues for realizing the stadiums for the world soccer tournament in South Africa in

2010, because without good stadiums no soccer in 2010; especially for some of them because the construction did not start on time. In this subsection the five aspects will be discussed for the learnership projects.

Time

A learnership project needs to finish in a certain time span. The length of the project is most of the time not the most important issue when there is extensive communication with the Local Public Body about the date of completion. A planning has to be made at the beginning of the construction and when certain things are not going according to the plan the Local Public Body has to be informed correctly of the new completion date or some changes have to be made in the planning.

Cost

This aspect is very important for the learner contracting companies, because these starting companies don't have money to start construction. The ABSA Bank provides the learner contracting companies with loans that are needed to complete the projects. The contracting company needs to make a financial plan (cash flow scheme) to get the loan. This has to be made accurately and controlled regularly to minimize the interest costs and to be sure that enough cash is in their account during the whole process.

Quality

The relationship between the contractor and the construction engineer is real traditional. The construction engineer makes the drawings, the method specification and the Bill of Quantities and is responsible for the quality control. The contractor has to work according to these specifications. So the construction engineer is responsible for the working method and the quantities and the contractor is responsible for the execution of the working method. According to the guidelines the contractor and the engineer (together with the supervisors, the Community Liaison Officer, the social facilitator, the client and the mentor) should have site meetings on a regular basis.

An example should clarify the relationship between the engineer and the contractor. Two learner contracting companies had to construct VIP (Ventilated Improved Pit) toilets for their second phase project. According to the method specifications the sand around the toilet should not be compacted, but after a heavy rainfall the ground has been collapsed. This mistake of the working method is the responsibility of the consulting engineer. So the contractor should get compensation to repair those toilets.

Information

The plans and their control need to be recorded accurately to make strategic change(s) in the plan, what can lead to more profit, an earlier completion date etc. Record keeping during LIC projects in a learnership is not complicated, but a lot of things need to be recorded. On LIC projects for example there is worked task-based, what results in a lot of workers executing different tasks. Their work need to be controlled and recorded because they get paid based on these figures. When working punctual in recording the records, decisions can be made precisely and based on accurate figures. Records of materials (in, out, stock, use, broken and stolen) and the records of cash flows are two other important items, but there are a lot more aspects.

Organization

A lot of labour is needed to execute LIC projects. The labourers are from the community where the project is executed. So the companies don't have their own labour force, which has the experience to work for the company and knows how it works. The social facilitator is responsible for the communication with the community and for the selection of the right labour force. But an important issue for the contractor is to give the social facilitator accurate information quickly, to inform the labourers about their work and to pay the salary of the workers on time.

The 'Specification for mentorship services within the EPWP Learnership Programme' [EPWP, 2004 p. 5] defines one of the mentor requirements as: *'advise, coach, counsel, guide teach, instruct and tutor the learner contracting company, in the execution of his duties associated with a Project with particular reference to the three absolutes of project management, namely cost, time and quality [...]'*. The analysis of the five control aspects shows that the aspect of information and organization are important as well. So those five aspects need to have attention during the mentoring of the learners. But the understanding of the line of thought is needed to use the tools effectively and efficiently.

Currently the learners are making a plan but are not controlling this plan. This needs to be done continuously and all the steps of the control cycle needs to be done.

Process of learning

The learners in Rustenburg can be characterized as accommodating learners, because they want to start the projects as soon as possible and don't like theoretical background. So it is advisable to start the first project with executing the project (AE) and the mentor is only assisting them when they struggle with certain things. The mentor needs of course to be sure that the quality of the end product is sufficient enough and there are no financial risks. After the first phase the experiences has to be pointed out (CE) and the mentor has to confront the learners individually with the consequences of his way of acting their acting (RO). Then lessons can be drawn out of the execution of the first project and a plan can be made on how to execute the second one (AC).

3.6 Conclusion

To complete a construction project a lot things need to be done and the learners need to be competent at all those aspects. The critical ones are the five important control aspects (time, quality, cost, information and organization). These aspects need to be planned and continuously controlled during the whole execution of the project. Out of project management those five aspects need to be examined during the learning progress (instead of the 3 in the EPWP documents). Furthermore the technical issues of the execution of the projects are important, but the intention is to execute different kind of projects in every phase and not to execute a technical more difficult project. So the learning process of the technical issues is not a continuous one, but independent at every project.

The learnership is a programme to develop contracting companies. Currently there is no attention to process of learning, this process needs to be planned, executed, pointed out the experience and evaluated to make a

new plan. So the learnership is more organized as a process of learning. The focus of the learners will now be more on learning, because the organization of the learnership will now be more practical learning process.

The learners can be classified as accommodating learners. The persons with this ability learn primarily by hand on experience. They want to carry out plans and involving themselves in new and challenging experiences. They want to act on 'gut' feelings and not a logical analysis. This means that learners want to execute the project and not to make a lot of analysis on how to execute the project.

The projects need to have a certain quality and financial risks need to be minimized. During the first project these aspects need mainly be controlled by the mentor. Because of the accommodating learning it is advisable that the learners execute the project to feel project execution. During the execution of the project the mentor has to point out the consequences of the way of acting of the learners and to reflect their way acting. A plan for the second project can be made after the execution of the first project.

The most important conclusion of this chapter is that the aspects of project management have to be put in a learner process / environment.

4. Process model

To improve the quality of the learner contracting companies at the end of the learnership programme there should be an overall process model (objective of the research). The model of provision of the projects and the mentoring model are developed in the two previous chapters; therefore this chapter focuses on the link between those two models.

One of the inputs for the mentoring process is the projects for the learner contracting companies. These projects need to have a certain quality to mentor in an efficient and effective manner. Currently the mentors of LITEworks play a large role in the management of the learnership programme which isn't their responsibility and restrain them to provide the highest quality support to the learners which should be their core business. It has to be said that the knowledge and expertise of the mentors is vital for the progress of the programme. Therefore it is advisable for the learnership programmes that this role is formalised, whereby the source of information (e.g. LITEworks) is hired separately to bring in the necessary expertise for the execution of the programme. Through this the core business of the mentors wouldn't be affected. This section focuses on the mentoring tasks and not on the mentor as a source of information.

Communication is the key principle for a successful transfer of the provided projects to the start of the mentoring. For the mentors of LITEworks to be able to start with the support of the learners in Rustenburg it is important to know which learner contractor receives which project and on what time. Therefore it is necessary that Bigen Africa, appointed by the Rustenburg Local Municipality as the programme manager, informs the mentors of the progress of the provision of the projects. This makes it possible for the mentor to make the necessary preparations. From the perspective of the learner to be a full-fledged contractor it is also important that he receives his information through the programme manager and not through the mentor to simulate a real tendering process. Afterwards the learner can ask the mentor to assist him.

It is advisable as well that the consulting engineer communicates with the mentors about the upcoming projects. When the consulting engineer informs the mentors of the bottlenecks which could arise during the execution of the projects the mentor can take this into account. With this knowledge the mentor will be able to further customise support to the learner.

Besides the communication of the programme management to the mentor, it is advisable that the mentor gives input to the provision of the projects. This provision of the projects takes at least 12 months (model), so the provision of the projects need to start before the programme is even started and the mentor is not appointed. The guidelines of the EPWP need to give enough information for the RLM to provide good labour intensive projects for the learnership because the time is too limited for an early involvement of the mentor in the provision of the projects for the first phase.

To optimize the mentoring of the individual contracting companies the projects need to be suitable to impart the lack of knowledge of that company, because every person in the learnership has a different kind of experience. For the second and the third is it another story. The decision of the partition of the projects is

made during the phase of preparing the contract documents. The mentor can measure the level of knowledge in phase one for the first time. So the mentor knows the competences and the lack of knowledge and skills of the learners when the decision of partition is made. The programme manager together with the consulting engineer and the mentor should make a decision about the partition of the projects and just before the tendering about the distribution of the projects. These decisions should be based on the lack of knowledge of the learner contracting companies. The projects need to be suitable to train and practise the weak points so that the company understands all the aspects to be a full-fledged contracting company at the end of the programme.

5. Conclusion

The creation of full-fledged labour-intensive contracting companies in a two-year EPWP learnership programme needs to have suitable projects on time and the learners need to be mentored personally during the execution of the projects. A process model has been developed to assist the RLM in providing labour-intensive projects for the learnership on time. This model is based on the linear phasing model of the conventional construction industry. An analysis of the LIC theory and to the strong and weak points of the current project provision has resulted in an addition of multiple phases. This model should help the RLM to provide the projects on time.

The execution of the projects helps the learner contracting company to develop their practical competences, but the whole organization needs to have a focus on the learning process of the learning to fulfil the objective of the learnership in an effective manner. The experiential learning theory helps to organize the learning process. Besides the learning process the content of learning is important as well. According to the EPWP guidelines only the aspects time, cost and quality need to be controlled, but an analysis of the control aspects according of Groote has shown that the aspects of information and organization need to be controlled as well.

Both aspects can only be executed effectively if the actors of both aspects help each other to develop a good learnership programme. The mentor needs to be involved in the partition and the distribution of the projects. This helps to create the correct circumstances for the learners to impart the lacking knowledge and skills. But a clear communication of the programme and the consulting engineer to the learners and the mentor about the projects is important as well.

The developed process model will not be executed automatically; first the right circumstances needs to be created. The RLM is responsible for the provision of the projects. This organization doesn't have the competences to provide the projects for the learnership efficiently so it is advisable to engage a process manager to structure the process of providing the projects. For the suitability of the project it is important that consulting engineers with an NQF 7 qualification are appointed. But the most important role to realize the process model is for DPW. The coordinator of the learnership needs to create the right framework for the local organizations to manage the programme in an effective and efficient manner. This means that the guidelines for the mentorship services need to be more detailed and a focus on the mentor's facilitating role of the learning process of the learners.

The process model has been developed for the learnership programme in Rustenburg because only those circumstances are taken into account. The circumstances and problems in Rustenburg are not unique for South African learnerships. This can be concluded out of the interviews and conversations with among others the national coordinator of mentoring services and with the learnership coordinator of DPW. So the process model can possibly be used at other South African learnership programmes as well.

6. Recommendations

This chapter gives recommendations to further research and to the framework of the process model.

Project provision

The research to the provision of the projects didn't focus on the implementation of the model within the Rustenburg Local Municipality. Additional research needs to be done to find out how the model of the provision of the projects could be implemented. The developed model is for a single project. But the learnership programme consists of multiple projects so when the implementation is further researched there should be a focus on the planning on programme level.

It is recommended to do further research to the influence of LIC on phasing and to the activities and their duration that needs to be executed. In this research limited literature resources were available to study the influences of LIC on conventional project planning. Doing a broader literature study and validate the model with different experts are needed to generate a more valid model. Thereby there should be focused on the duration of the phases as well, because this is currently based on only one expert opinion.

Mentoring

The research has been executed with limited resources. The validity is on a higher level if some aspects are investigated in more detail.

- The learning style of the learners has been determined out of short analysis. This learning style has research in more detail to be sure that the learners have an accommodating learning style
- The research has developed a new mentoring approach, but the model has to be worked out in more detail to make is suitable to implement.

The objective of the learnership is to create full-fledged labour-intensive construction companies in a two year learnership of classroom training and the execution of projects. The research has developed a new mentoring approach to reach this objective, but only the use this model is not enough. The framework in which this model will be used needs to be optimized to reach the objective effectively and efficiently.

- DPW needs to focus their control on the progress of learning instead of on the progress of the execution of the projects
- The competences of the learners at the end of the programme need to be described in more detail. Those are currently quit general.
- The competences need to be imparted during the training and during the execution of the projects. Those two ways of learning need to be geared to one another. That is currently not the case.
- The mentor needs to measure the level of competence of the learners. The E.1a form measures only the skills of the learners and not the knowledge, so the test needs to be adjusted.

General

The organizational structure of the EPWP's learnerships separates training, mentoring and project provision, but being part of the learnership management shows that a more integrated organizational structure is advisable. An example is the communication between trainer and mentor to fine-tune the theoretical and the practical part. So it is recommended to do research to the organizational structure of the learnership.

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Appendices

Process model for the learnership programme in Rustenburg

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Appendix 1 Country analysis

In this chapter the country of South Africa will be reviewed. This short analysis of South Africa will focus on the following factors: geography, history, politics, economy, socio-cultural and the building and civil engineering sector.

1.1 Geography

South Africa is located at the southern point of the African continent. It has a surface of 1,219,912 km², which is about 30 times bigger than The Netherlands. South Africa has an estimated population of about 46.9 million inhabitants (mid 2005 est.). **Error! Reference source not found.**1 shows a map of South Africa. This maps shows that South Africa is bordering the countries of Namibia, Botswana, Zimbabwe, Mozambique and Swaziland and that country of Lesotho lies within the borders of South Africa. The country has a large coastline of 2800 kilometres and crosses the Atlantic and the Indian Ocean. South Africa is divided into nine provinces and has total of 52 districts. [CIA, 2006]



Figure 14 Map of South Africa [CIA, 2006]

South Africa has three different capital cities: Pretoria (Administrative), Cape Town (legislative) and Bloemfontein (Judicial). These cities are together with Johannesburg, Durban, and Port Elizabeth the biggest cities of the country.

South Africa is located at the Southern Hemisphere so the summer starts in December and the winter in June. This is in contrast with The Netherlands, which is located at the Northern Hemisphere. The climate is classified as semi-arid, but because of the size of the country there is considerable variation in the climate. Because of the size of the country there are also many different geological regions. The main natural hazard South Africa has to cope with is drought. The use of water outruns the supply of water. South Africa doesn't have big rivers or major lakes so there is need for extreme measures for water conservation. [Wikipedia, 2006]

The city of Rustenburg is situated in the North West province and lies 150 kilometres from Johannesburg. It has a population of about 130.000 citizens. Rustenburg is known for its platinum mines. The two biggest

platinum mines in the world are located near Rustenburg. Other natural resources that are mined in this region are: chrome, palladium, nickel, copper and granite. Besides mining also the agricultural sector is getting bigger in this region. These activities have led to an increase of the population and in the last years Rustenburg has one of the fastest urbanisation rates in the country. This urbanisation could have a negative impact on the resources and the capacity of the city. On the other hand could it be a good development for the local economy when everything is properly managed. [NW, n.d.]

1.2 History

The written history of South Africa begins on the 6th of April 1652 when Jan van Riebeeck started a mainland base on behalf of the Dutch East Indian Company. The Dutch settlement expanded in the 17th and 18th century. The Dutch also brought in many slaves from other countries to cope with the labour shortages in the cape region.

The first British came in 1775 but they definitive took control over the Cape of Good Hope area in 1806. When the British abolished the slavery in 1835 there were a lot of disagreements over the compensation of this abolishing. Eventually many of the Boers who were unhappy with the British went to the interior of the country. This is also known under the Great Trek. The Boers formed the republics Transvaal and the Orange Free State in the interiors.

For a while everything was stable but in 1869 the first diamonds were discovered. This led to new colonists to the republics. Also it led to further oppression of the local citizens. The British then started the First Boer War to claim the country of the Boers in which the diamond-mines were. They lost this first war but came back in the Second Boer War with greater numbers. This was ended in 1902 when the Treaty of Vereeniging was signed. This treaty specified full British sovereignty of the republics.

Then eight years later in 1910 the Union of South Africa was created. The political power was in the hands of the white minority and the position of the non-whites was getting worse in this period.

After the Second World War the National Party was elected and they implanted a series of laws that are known all over the world under the name of “Apartheid”. The black and coloured people were getting fewer rights than the white people. The Apartheid led to sanctions from other countries in the world and to unrest in South Africa self.

In 1990 the National Party stopped the ban on the African National Congress (ANC) and released Nelson Mandela after 27 years. This led to the first multi-racial elections in 1994. The ANC won these elections with a great majority and Nelson Mandela became the first black president. Economical sanctions were lifted and South Africa also joined international organizations like the UN. ANC has been in power ever since. But South Africa still has to cope with the effects of the Apartheid regime. [Wikipedia, 2006]

1.3 Politics

South Africa is a federal republic with a parliamentary democracy. The president of South Africa is head of the government and is chosen by the parliament. The current president of South Africa is Thabo Mbeki. The parliament has two different chambers. First there is the National Council of Provinces (NCP), which has 90 members and is also known as the upper house. There are 10 seats for each of the nine provinces. The election of the NCP is indirect. The people can vote for the provincial legislatures. The provincial legislatures then nominate a delegation for the National Council of Provinces. Second there is the National Assembly with 400 members, also called the lower house. The National Assembly is elected by the people. Elections for both chambers are held every five years. During the last election in 2004 there was a victory for the African National Congress (ANC). It received 69.7% of the votes. The main opposition party is the Democratic Alliance (DA) which got 12.4% of the votes. [EVD, 2006]

After the government there are three other layers of government. The second layer is the provincial government. Each provincial government has a premier, an executive council of ten ministers and a legislature consisting between 30 and 80 members. They can create laws within its responsibilities that are set out in the constitution. The third layer is the district municipalities and consists of several local municipalities, which are subdivisions of the district. The fourth and last layer is the local municipality. [Wikipedia, 2006]

The government of South Africa is still busy with the transformation of the country after the ending of the apartheid. They are working on programmes, which will give essential social services to the majority of the population. Millions of people in South Africa are still living in extreme poverty. There are many imbalances in health, welfare and education. So this is a major issue for the government. Another big issue on the moment is the major AIDS-epidemic.

Rustenburg is situated in the North West Province. The North West Province was formed after the abolishing of the apartheid. It consists of 4 district municipalities and 21 local municipalities. Rustenburg is within the Rustenburg local municipality, which falls under the Bojanala Platinum District Municipality. This district has a population according to the 2001 census of 1,185,325 million inhabitants. Of this population the majority is black (92.23%). The African National Congress (ANC) has a great majority in the North West Province of 80.71% which gives it 27 of the available 33 seats. Also in the Bojanala Platinum District the ANC has a majority of 83.62%. [STATSSA, 2005]

1.4 Economy

South Africa is a developing country, but by the UN classification South Africa is a middle-income country with abundant supply of resources, well-developed financial, legal, communications, and energy and transport sectors. According to the Economist Intelligence Unit (EIU) was South Africa the third country (after Botswana and Mauritius) in the continent of Africa in 2004; this with the high gross domestic product per person. This economic situation is significantly localised around 4 areas, namely: Cape Town, Port Elizabeth, Durban and Pretoria-Johannesburg. Johannesburg is for example a city that has been built at the end of the 19th century just because of the discovery of gold in 1886 and it became the largest city in South Africa by 1889 [Lonely Planet, 2006]. Another important resource of South Africa is platinum; in Rustenburg is the

largest platinum mine of the world. Beside these developing areas there are areas with poverty and percentages of unemployment as high as 70% [CETA, n.d.]. President Mbeki tries to solve these problems, to gain economic growth and foreign investments, by liberalizing the laws for labour, quicken the privatisation process and decreasing the government expenses. So the government started a Reconstruction and Development Program (RDP) in 1994 to guide in transforming South Africa from a divided society to one that provides equal opportunities for all citizens. To realize the RDP the government introduced Gear (Growth, Employment and Redistribution) in 1996. Since the introduction of Gear, this government has introduced some taxes that has influences to the people that make profit (like a capital gains tax and broadened the tax net to cover the global earnings of companies and individuals) and at the same time they reduced the taxes on medical aid and provided considerable income tax relief to low and middle income earners and to small businesses. The government is also supporting a larger number of people, which receive income directly from the government (3 million in 1994 and 10 million in 2006) [Manuel, 2006]. This is the way in which the government tries to realize a stable economy.

To give an idea about South Africa's economy some numbers will be set out and compared with The Netherlands.

	South Africa	The Netherlands
GDP	533.2 billion dollar	499.8 billion dollar
Rank order	23	26
GDP growth	4.9%	1.1%
GDP per person	12,000 dollar	30,500 dollar
Rank order	78	23
Unemployment	26.6%	6.6%
Rank order	164	61
Gini index (1995)	59.3	30.9 (2005)

Table 1 Economic comparison between South Africa and The Netherlands [CIA, 2006]

1.5 Socio-cultural

This part of the description of South Africa will exist of three parts: demographics, education and human development.

Demographics

South Africa is a nation with over 46 million people of diverse origins, cultures, languages and beliefs. According to the Statistics South Africa Census there are five racial categories: black at 79.4%, white at 9.3%, coloured at 8.8% and Indian/Asian at 2.5%. So the major racial category is black, but within this category there are many different ethnic groups. There are nine main ethnic groups and some are unique for South Africa (Zulu, Xhosa, Bapedi and Venda). Because of the fact that there is that much different kind of people in the country there are also a lot of languages. With 11 official languages, South Africa is the second in the world after India. Because of the diversity of different people South Africa has no single culture. There is also a large variety in the South African kitchen, but the real South African kitchen is meat-based and the main example of this is the so called "braai" (BBQ), which is not only eating but also a social activity. Beside of this

South Africa is famous about his wine, especially in the areas around Stellenbosch, Franschhoek, Paarl and Barrydale, which is also one of South Africa's major export product. [Wikipedia, 2006]

Crime

In South Africa crime is also one of the major problems. According to the United Nations survey for the period 1998 – 2000 South Africa was ranked second in the world list of number murders per capita. Beside of this the country also has a bad record for car hijackings. These different forms of crime had a bad effect on the society: many wealthier South African people moved into secured communities and many emigrants say that crime is a reason to leave the country of South Africa. The biggest of problems of crime are in the capital city Johannesburg. The government tries to tackle this problem by a gun amnesty programme to recall the many weapons. In addition, it adopted the National Crime Prevention Strategy in 1996, which is aimed to prevent crime through reinforcing community structures and helping individuals back into work. But in spite of this programme the rape rate is not decreasing. On the other hand murder and robberies have decreased in recent years by respectively 4.6% and 5.3%. [Wikipedia, 2006]

Education

South Africa has 12 million learners, 366,000 teachers and around 28,000 schools. Of all the schools, 6,000 are high schools and the rest are primary schools. A school 'career' consists of a thirteen years (12 grades) lifespan of which the primary schools educate grade 1 to 6. The first year of education (grade 0 or "reception year") is offered by the primary school as well but this year may also be completed at a nursery school. High school offer grade 7 to 12. The last three years (grade 10, 11 and 12 or "matric") are not compulsory. For an entrance to a university grade 12 is required, but some universities set additional requirements as well. The schools and universities in South Africa vary greatly in terms of quality, financial resources, ethos and size. Schools and universities of high quality can be found in the state and the private sector.

The yearly budget of education is 20% of the total budget (R59.5 billion in 2006). The central government provides a national framework for education and the nine provinces can decide within this framework how to spend their education budgets. The reason that the investments in education are so high is that the consequences of many years of apartheid education are enormously. The illiteracy rates are around 30% of the adults over 15 years old (this means 6-8 million adults), teachers in townships schools are poorly trained and the matric pass rate is low (68.9% in 2002). [Garson, 2006]

1.6 Civil and building industry

South Africa was spending 82.2 billion rand (11.26 billion euro), which is 7 percent of the GDP, into the building and civil engineering sector in 2004. These total investments in this industry have increased with 16.2% compared with the year 2003. The enormous growth of this industry in the recent years is because of the decreasing of the rates of interest, the increasing demand of housing and the ambitious plans of the government. The house prices had an annual growth of 21.9% over the year 2004 for example. The government tries to solve the enormous rate of unemployment, the bad road infrastructure and the poorhouse infrastructure, by investing a lot in these sectors. In addition, the world soccer championships will be in South Africa in the year 2010. Because of this event the government will invest an extra 33.3 billion US dollars in infrastructure in the coming five years.

The government has started a 'Reconstruction and Development Program' (RDP) in 1994 (see the Economy section). In the RDP the government gives priority to build hospitals, jails, schools and low cost housing. Since 1994 the government has spend 34.4 billion rand (4.7 billion euro) to build 1.8 million low cost houses. This to solve the problem of a shortage of 1.5 million houses in 1994 and the shortage is now increased to about 2.5 million houses. In the civil engineering sector the government is investing in roads to townships and one of the biggest projects for the government for the coming years is the investing in the improvements of three harbours (about 5 billion rand in four years).

The government wants that the projects are build by construction companies from South Africa. But there are only a couple of big construction companies (25% of the total revenues), which have not enough capacity to build all the infrastructure projects. To realize these projects the construction companies have a lot of joint ventures with foreign companies. Another programme that the government is developing is the Expanded Public Works Programme (EPWP). This programme has the objective to solve the enormous number of unemployment and unskilled people and the need of infrastructure. This programme also launches a specific learnership initiative with deals with labour-intensive technologies and construction methods. During this learnership programme people with no skills will be educated and mentored to manage their own civil engineering construction company.

Appendix 2 Expanded Public Works Programme

One of the major challenges for the government in South Africa is the extremely high unemployment rate in the country. ‘The Expanded Public Works Programme (EPWP)’ is one of the government’s programmes that focuses on this high unemployment rate. President Mbeki formally announced this programme in February 2003 and it was adopted by the cabinet in November 2003. The President finally launched the programme in May 2004. It is a short-to-medium term programme, which aims to alleviate and reduce the unemployment. The EPWP wants to achieve this through the provision of work opportunities with training. [EPWP, 2006a]

The first section of this appendix gives a description of the unemployment in South Africa, which is the reason the government started the EPWP. The second section explains the content of the EPWP.

2.1 Unemployment in South Africa

South Africa has an extremely high unemployment rate and it seems a rather structural problem than cyclical problem. The unemployment rate has risen rapidly the last 25 years; from 7% in 1980, through 18% in 1991 to between 27% and 37% in 2001 depending on the definition of unemployment. The narrow definition of unemployment includes only those who have sought work in the past 4 weeks and the broader definition includes also those who are no longer seeking employment [CETA 2, n.d.]. According to figures of 2003 there are 4.6 million people unemployed by terms of the narrow definition and 8.3 million people in terms of the broader definition. The unemployment also varies geographically. It can be higher than 70% in the rural areas of South Africa. A large proportion of these unemployed people have never worked before; 70% in the 16-34 age group and 59% of all unemployed people. [EPWP, 2006a]

One of the causes of this is that the economy of South Africa is not growing at a rate that is sufficient to generate enough jobs. The South African economy has also become increasingly more capital intensive during the last 25 years. So less employment is being generated per unit of expenditure. This is also called in South Africa “jobless growth” [CETA 2, n.d.]. The economy of South Africa should not only be expanded to generate enough employment, but also a restructuring of the current activities to create more employment per unit of expenditure is needed.

The unemployed people in South Africa are largely unskilled people. This is mostly because of the Apartheid legacy, which was the cause of racial segregation in South Africa from 1948 till 1994. Legislation during the years of the apartheid downgraded the education of the black people on subjects like mathematics and science. This kind of legislations had major impacts on the skills of the black community as a whole. In 1990 only 1 of 10,000 black school entrants was able to study engineering or medicine at an university [McCutcheon, 1995]. At the time of 2000 25% of the people over the age of 25 didn’t had formal education at all [CETA 2, n.d.]. So the black community is disadvantaged in technical terms and skills in general during the legacy of the apartheid. Special efforts are required to enable the unemployed people to get jobs, because there is no place in modern economies for unskilled unemployed. By contrast they are the largest group of unemployed.

2.2 Content of the EPWP

The EPWP runs initially from 2004 till 2009. The EPWP runs parallel to the medium-to-long term programmes until these are successful in reducing unemployment in South Africa. The medium-to long term programmes include plans to increase the economic growth so that that the number of jobs that are created exceed the number of new entrants into the labour market. Secondly improving the education system in such a way that the skills' level of the people improves and they can fulfil the largely skilled work opportunities, which will be generated by the economic growth. The EPWP is one of the strategies that have been put in place to contribute to this.

The objective of the EPWP is to alleviate the unemployment for a minimum of one million people within the period of 2004 to 2009. At least 40% of this one million people must be women, 30% youth and 2% disabled. The government needs to create temporary work opportunities and income for at least one million people to attain this objective. For this the provision of needed public goods and services need to be done labour-intensively. The Government also wants to increase the potential of participants to earn a future income by providing work experience, training and information related to local work opportunities, further education and training, and small, medium and micro enterprise (SMME) development.

The EPWP is a national programme in which all layers of the government and state-owned enterprises are involved. It aims to get the unemployed into productive work accompanied with training so that they increase their capacity of earning an income. The programme involves the reorientation of budgets so that the expenditures of the government results in more work opportunities, particularly for unskilled labour. The EPWP should thereby not displace permanent existing jobs and the jobs that are created must be based on a real demand for services. In addition to this the EPWP is not developed as a policy instrument to address the origin of unemployment in South Africa. It is just one element within a broader government strategy to reduce poverty through the reduction of unemployment. [EPWP, 2006a]

The Department of Public Works (DPW) is appointed to be the overall coordinator of the EPWP. The EPWP as a whole is highly decentralised. All public bodies in South Africa are expected by the government to implement EPWP projects and to contribute to the alleviation of unemployment. Because of this decentralisation of the programme DPW does not fund or implement projects. The projects of the EPWP are funded through the budgets of the involved public bodies itself. So the function of DPW is restricted to a purely coordinating role. In this role DPW tries to coordinate the activities of the different public bodies and facilitate transfer of knowledge between the public bodies, monitor/evaluate the EPWP, create a supportive environment for the implementation of EPWP projects and assist with the identification of opportunities to implement EPWP projects. [DPW, 2004]

For employment under the EPWP there are some special conditions to facilitate greater employment on Public Works Programmes [EPWP, 2006a], namely:

- Employers may set rates of pay locally at self-targeting rates to avoid attracting workers away from more permanent employment;

- Reduced obligations for employers, e.g. no Unemployment Insurance Fund (UIF) insurance payments;
- Task-based payment for labour-intensive works.

This is regulated through the “Code of Good Practice for Special Public Works Programmes” which was gazetted by the Minister of Labour. With the introduction of this programme it became legal to pay wages on a task base. The above-mentioned conditions apply on the condition that workers receive training. Also employment under these special conditions is only allowed for a maximum of 2 years within a five year cycle. Therefore the training also focuses on possibilities for the workers after this period.

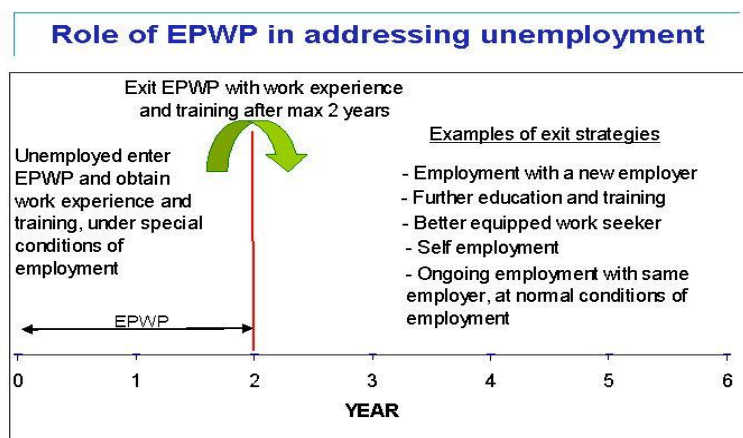


Figure 15 Role of EPWP in addressing unemployment [EPWP, 2006]

For the implementing of the EPWP there have been opportunities identified in the following sectors: infrastructure, economical, social and environmental sector. The work opportunities that are created in these four sectors can be summarized as follows:

Sector	Work opportunities	Person-years of work
Infrastructure	750,000 (4-month average duration)	250,000
Environmental	200,000 (1-year average duration)	200,000
Social	150,000 (12-18 month average duration)	200,000+
Economic	12,000 (18-month average duration)	18,000
<i>TOTAL</i>	<i>1 million plus</i>	<i>650,000+</i>

Table 5 Overview of the created work opportunities [EPWP, 2006a]

The emphasis in the infrastructure sector lies on creating extra work opportunities through the use of labour-intensive construction (LIC) methods. The government has decided that the following projects must be done labour-intensively: low-volume roads, sidewalks, storm water drains and trenches [DPW, 2005].

Descriptions of the programmes per sector are given in the “Consolidated Programme Overview and Logical Framework” of the EPWP. Approximately R15 billion will be invested in labour-intensive construction projects over the next five years, which is one third of the total infrastructure budget. This also includes maintenance projects. During this period approximately 37,000 km of roads, 31,000 km of pipelines, 1,500

km of stormwater drains and 150 km of urban sidewalks will be constructed labour-intensively. The construction of these projects will create about 750,000 work opportunities, because an average project lasts four months this converts into 250,000 person-years of employment. All the workers employed on these EPWP projects will receive training. There also starts a learnership programme for emerging contractors. This is a mean to increase the capacity in the LIC-sector. The aim of this programme is to produce small contractors qualified to execute work in accordance to the labour-intensive guidelines. To achieve this the learner contracting companies receive training to gain the necessary skills to run a construction company according to the labour-intensive methods. The learners will also receive mentorship services and get access to loans to finance their projects. The EPWP programme targets at 500 learner contracting companies.

Within the economical sector there is going to start a micro-enterprise venture learnership project. The target that has been set for the upcoming five years is 3000 venture learnerships. These venture learnerships will consists of multiple persons. In the social sector immediate work and training opportunities within the areas of Home/Community Based Care for Aids sufferers and Early Childhood Development are identified. The creation of job opportunities within the environmental sector will mostly be through the expansion of already established programmes. In addition to the already existing programmes there are going to be new programmes established in the field of waste management and recycling.

Appendix 3 Labour-intensive construction

The objective of the learnership programme in Rustenburg is to create sustainable contracting companies who are able to use labour-intensive construction methods. Realizing civil works by labour-intensive construction is nowadays not a conventional method anymore. This appendix gives a brief description of the concept of labour-intensive construction.

The method of labour-intensive construction is still developing and to understand these developments the history will be described in the first section. In section two a definition of labour-intensive construction is given which is used nowadays. The last section will focus on the use of labour-intensive construction in South Africa.

3.1 History

A lot of equipment has been developed in the western countries during the industrial development. These advanced machines were perceived to have productivities, costs and performances that were predictable. A disadvantage of these machines is that they need knowledge and the Third World countries have not the transfer of such knowledge, so they have to import it. Such heavy costs might be unavoidable for high technology projects, but smaller and technically less demanding rural projects can also be realized with the use of local resources [Coukis, 1983]. Secondly the development of equipment has led to an capital-intensive nature of the construction industry. Because of this development an increase in expenditure has generally resulted in the generation of less employment per unit of expenditure [CETA 2, n.d.][McCutcheon, 1995]. This is not a favourable development if you take into account that the unemployment rates and the poverty are really bad in the rural areas of the Third World countries. These people are even poorer than the urban poor, because they are for example not integrated into the national life of their countries, they are undernourished, illiterate and ill housed.

At the end of the 1960s a few policy makers in developing countries thought that the replacement of machines by labour could improve the situation. So they started some experiments. Their objective was to improve the standard of living in rural areas through [Coukis, 1983]:

- upgrading of the infrastructure,
- the generation of employment for the rural unskilled poor, and
- the conservation of scarce foreign exchange.

Besides of this initiative the World Bank started in 1969 with the World Employment Programme which tried to find ways to create employment opportunities not only by economic growth but also in its absence. One of the ideas that was explored in this programme was the reverse substitution of labour for equipment. This idea was received with great scepticism. It was concluded that this reversed substitution was mainly promising in product-centred industries and from this view the civil-construction industry sounded promising. As a continuation to this programme the World Bank initiated a research in 1971. The research was called “Study of the Substitution of Labour for Equipment in Road Construction”. This research was formally completed 15 years later in 1986 and comprised three main phases. The conclusion of the first and the second phase was that labour-based methods could be technically feasible and economically justifiable for many activities and

tasks in civil construction (but not all). These researches showed also that a significant increase in the amount of labour could be realised (three- to seven-fold increase in employment). The applicability depends on technical, economic, social and institutional factors. [McCutcheon, 1995]

The third phase of the World Bank's research began with further investigation of improved labour-intensive methods in single projects and then expanded into considerations of programmes. It was aimed to develop and demonstrate cost-effective, labour-intensive construction technologies in a number of countries [CETA 2, n.d]. One of the programmes (started in 1975) that have been executed is together with the Ministry of Works (later called "Transport and Communications") of Kenya. During this programme, which was called Rural Access Roads Programme (RARP) and ended in 1986, 8,000 kilometres of roads has been constructed. At its peak over 15,000 people were employed and to obtain the necessary level of skilled personnel a fully integrated training programme has been developed. In 1986 the World Bank published its completion report on this project and concluded that it has been one of the most successful donor financed programmes in Kenya and one of the best organized labour-intensive road construction programmes anywhere. This conclusion was based on the facts that 69% of the investment had remained inside Kenya, proportion of programme costs devoted to wages was 56% and since 1980 this has varied from 60 to 71%. The overhead costs on the contrary have reduced enormously, 84% during the first three years to 16% over the life of the programme. [McCutcheon, 1995]

In the final report of the World Bank (1985) was concluded that labour-intensive construction could financially compete with conventional construction (equipment-intensive) for certain construction activities. But this depended on the wage rate of the labour. Were wage rates were less than 2 \$ it would be explicitly competitive and with rate less than 4 \$ labour-intensive methods should be considered. In 2003 this rates lies between 5 \$ and 10 \$ because of inflation.

3.2 Definition

Employment-based, employment-intensive, labour-intensive and labour-based are four terms, which have almost the same objective. For consistency reasons in this research the term labour-intensive is used, but as said other authors will use the other terms as well. The definition of labour-intensive construction that will be used in this research is the one that is used by the Construction Education and Training Authority (CETA) of South Africa [CETA 2, n.d]:

"Labour-intensive construction is the economically efficient employment of as great a proportion of labour as is technically feasible throughout the construction process to achieve the standard demanded by the specification; the result being a significant increase in employment being generated per unit of expenditure by comparison with conventional equipment-intensive methods."

This definition tells that it aims to *optimise* the labour content of the project. Labour-intensive works will be undertaken by an appropriate mix of labour and equipment with possibly some animal support. The methods must be cost-effective and the quality of the end product must be fully adequate.

No project is fully based on labour or equipment only as visualised in **Error! Reference source not found.**. Labour-intensive construction methods try to optimise the amount of labour, to create immediate employment and income for the local poor. Other objectives of labour-intensive construction are creating the basis for longer-term employment by transfer of skills by training, producing a general shift within the construction sector for using more labour-intensive and less equipment-intensive methods and giving training to educated people how to work with labour-intensive construction.

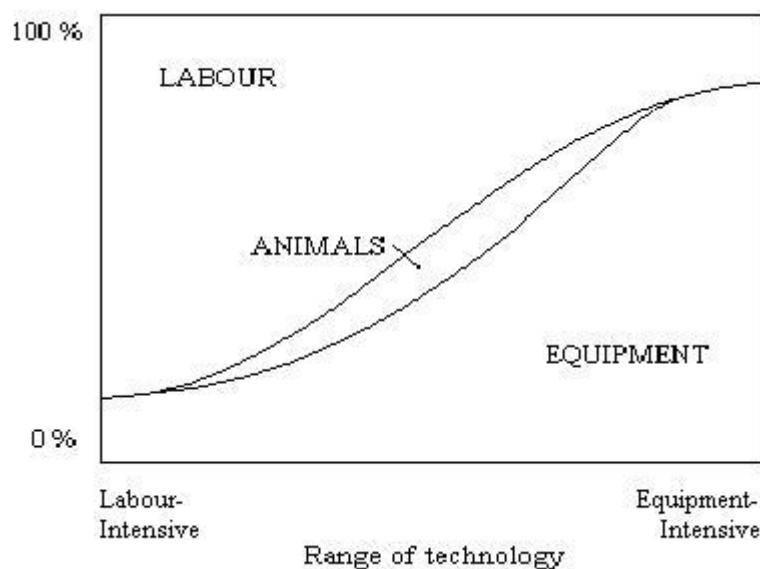


Figure 16 Construction technologies [CETA 2, n.d]

Not all civil works can be realized by labour; for some works it is not technically or economically feasible. Heavy compaction of earth layers in dams and roads and transportation of materials over long distances cannot be carried out effectively by labour-intensive methods. Broadly speaking, earthworks (excavate, load, haul, unload and spread), masonry, paving, fencing, landscaping and planting, concreting, pipe-laying and building work are suitable to do by hand. Projects that are suitable to create by hand are for example:

- gravel and earth roads
- water supply schemes
- small and medium-scale irrigation schemes;
- high standard base courses for heavily trafficked streets and national roads;
- soil and water conservation works, including small dams

Labour-intensive construction is a method that has been designed to stimulate the local economy by realizing infrastructure and creating employment. But to stimulate the local economy in the most efficient way it is important to use materials, skills and facilities from the area the work is done. The money must be invested in the local economy as much as possible.

3.3 South Africa

The South African context gives three main reasons to use labour-intensive construction nowadays instead of working with equipment-intensive methods:

- High unemployment rates (see Appendix 2)
- Explicit demands for housing and public Works
 - Estimated housing demand up to 333.000 units per annum which also needs municipal works like water supply, sewerage, streets, electricity and so on.
- Low individual community capacities in technical and institutional terms (see Appendix 2)

So labour-intensive construction came forward out of the need to generate greater employment opportunities per unit of expenditure, construct and maintain housing and public works and foster individual skills and institutional capacities.

The labour-intensive construction projects in South Africa were started in the early to mid 1980s, with low-volume rural road projects in Kwazulu and Transkei. Furthermore, water mains have been upgraded in Soweto in 1987, and a wide range of municipal public works in Ilingsburg has been executed by labour-intensive methods. These projects have demonstrated that labour-intensive construction can be used for a wide range of civil constructions in South Africa.

The main weakness of these projects is that they were based on single projects; there were no long-term programmes (learning curve, training, reducing overheads). The first long-term programme that has been launched in South Africa was the Special Employment Creation Programme (SECP) in 1985. The primary objective of this programme was to provide temporary relief to the unemployed. The government spend 719 million rand on the programme from April 1985 to June 1990 and 423 million rand on allied training programme. The evaluation of this programme was not really positive. Another programme that the government started in 1991 with the funds from the strategic oil reserves had the objective “to achieve the greatest possible degree of involvement, employment creation, meeting needs and stability through the most cost effective allocation of funds possible”. The problem with this programme was that a great amount of the funds was still spending on conventional construction. These programmes show that a great amount of money has been spent unsystematic and didn't use it well to promote labour-intensive construction. [McCutcheon, 1995]

For the government of South Africa it is important to take in account that the expansion of labour-intensive construction is limited because of a lack of a long-term perspective, national planning and institutional development. Therefore the government started new large-scale initiatives to overcome these problems. One of these initiatives is the Expanded Public Works Programme (see Appendix 2) where the learnership programme in Rustenburg is part of.

Appendix 4 Clarification of the research on the provision of projects

This appendix clarifies the object of the research on the provision of the projects. Section 1 focuses on the learnership programme in Rustenburg. This learnership programme is a form of small contract development which is described in section 2. The final section (section 3) describes the objective of the research.

4.1 Learnership programme Rustenburg

The Rustenburg Local Municipality is one of the municipalities that currently execute a labour-intensive contractor learnership programme. These programmes are an initiative under the EPWP. During the two-year period of the learnership each learner contracting company receives three projects for the practical experience in addition to the classroom training. The execution of the learnership programme in Rustenburg is unfortunately not going as planned. One of the major problems in Rustenburg is the provision of these projects. This is the result of initiating a programme on district level and shifting the programme to the municipality of Rustenburg, because the district hadn't any projects available. Rustenburg was the only municipality within the district who had projects available (for the first phase) according to the EPWP guidelines. So each learner contracting company in the programme has received his first project, but most contractors have waited even up to 12 months for their second project. The district and the RLM agreed to do the learnership in Rustenburg, but they didn't make a plan for the provision of the projects for phase two and three. This lack of continuity in the provision of the projects is causing huge delays to the learnership programme.

4.2 Theory on small contractor development

The learnership programme in Rustenburg is an example of small contractor development. Small contractor development in the southern Africa construction industry has been done since the late 1970s. One of the major difficulties that the small contractors faced was the lack of continuity of projects. Since the 1990s small contractor development started to focus on the labour-intensive construction sector as well. Several attempts have been made in countries like Kenya, Lesotho and Ghana to establish small contractors in the LIC-sector, but the initiatives to develop small contractors were constrained by similar problems like the ones in the conventional construction sector twenty years earlier: [Crosswell, n.d.]

- Lack of contract continuity
- Delay of awards
- Funding

Besides problems occurred with the right selection of the projects, what resulted in poor project planning and programming. [Thwala, 2006]

The public sector is not obliged to ensure work for individual contractors. It is up to the contractors to arrange work themselves, but not having continuity in their work has major consequences for the development of small contractors [Crosswell, n.d.]:

1. The contractor will go out of business;
2. Will not be available for the type of work required;
3. Lose competence to lack of practice.

Knowledge received through training by the small contractors is lost if one of the above consequences occurs which means that the public money that is used to finance the trainings is spent very insufficient.

Attention need to be given to the experienced problems in former programmes when new small contractor development programmes starts. As a solution to these problems the adoption of a (long-term) programme approach instead of an ad hoc approach is proposed, whereby a comprehensive training programme must be linked with a construction programme. This prevents the consequences for small contractors when they don't have continuity in their work.

4.3 Conclusion/objective of the research

The learnership programme as executed in Rustenburg is an example of a long-term programme approach which consists of a combination of training and practical experience by construction projects. In the theory about small contractor development (see previous section) this is seen as a solution to resolve problems with project continuity as experienced during programmes in the 1990s. However the same kind of problems still occurs during the learnership programme in Rustenburg. At the moment the Rustenburg Local Municipality doesn't seem capable to provide the right projects on time. Lack of contract continuity can be overcome by a learnership programme which has a long-term approach and consists of multiple projects, but contract continuity will still depends on a good planning of the projects itself. The RLM didn't plan the provision of the phase two and three projects. Planning of LIC-projects is new for the RLM and they don't seem familiar with implications this on a conventional project planning.

The three projects of the learnership are vital for the learners to gain their practical experience. They are vital for the mentors as well to impart the learners with the necessary knowledge. So it is important that the projects are provided on time (when formal training ends) and that projects suitable for labour-intensive construction are selected, because it influences the quality of the learner contracting companies at the end of the learnership programme. A process model could form a solution for this problem. By the development of such a process model for the learnership programme in Rustenburg there should be a focus on the provision of the projects:

Developing a process model from initiation till start of construction to improve the quality of the contracting entity at the end of the Labour-Intensive Construction Learnership Programme in Rustenburg by analysing the provision of the projects

Appendix 5 Current situation execution mentorship services

A research has a reason, also this one. The main report has not enough space to analyse the reason and the background of the research, so this appendix (and Appendix 4) describe this reason and background extensively. This appendix focuses on the mentoring services of the learnership. To come to an (sub)objective for this part of the research the programme of the learnership is set out first. The second section of this appendix describes the framework of the mentoring services and third section analysis the current mentoring services. These analyses lead to the conclusion of the current mentoring services and an (sub)objective of the research.

5.1 Learnership programme Rustenburg

The learnership programme in Rustenburg is one of the learnerships that are executed under the Public Works Programme. This learnership programme has been started with 22 learner contracting companies (66 learners) and was planned according the normal format of learnerships within the programme. But this learnership programme is not executed according to these guidelines. Twenty learner contracting companies have already waited for 8-12 months and are still waiting to start with second project where they should already have started with their third project (see Figure 17

Figure 2).

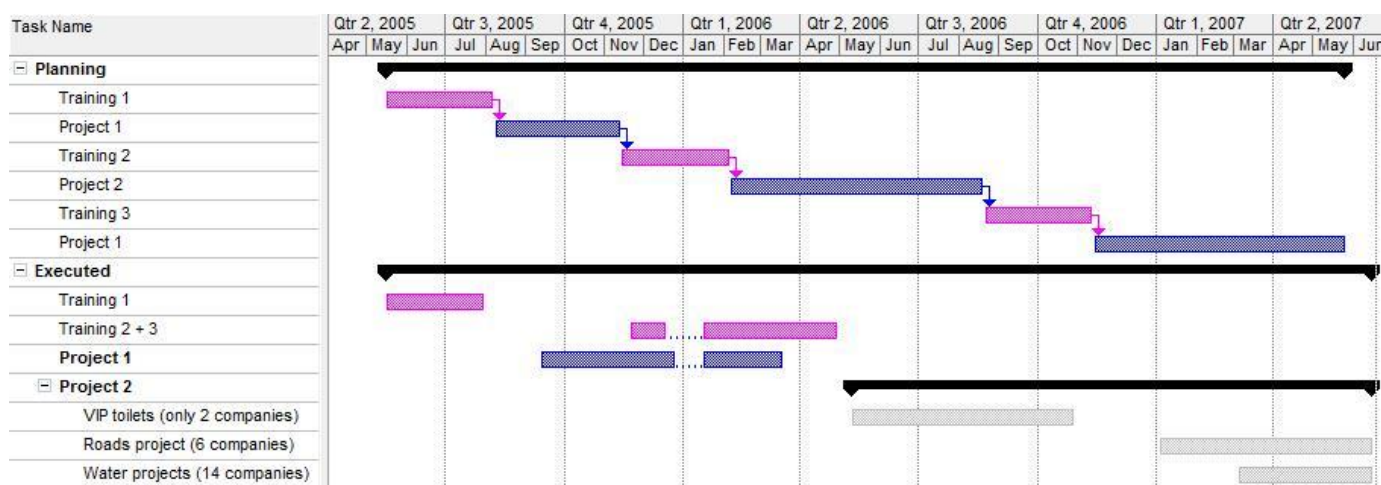


Figure 17 Planning of the learnership programme in Rustenburg (update until mid-June)

This learnership programme was initiated on districts level, but after selecting learners district came to the conclusion that they had no projects and they asked their municipalities. Rustenburg was the only municipality within the district who had projects available (for the first phase) according to the EPWP guidelines. The district and the RLM agreed to do the learnership in Rustenburg, but they didn't make a plan for the provision of the projects for phase two and three. Only two contractors have got their second project, VIP (Ventilated Improved Pit) toilets, but these toilets are not executed real labour intensively. The only thing that the contractors had to do was to build toilets out of pre-manufactured material, which were delivered by the client (the RLM). The details of the provision of the projects and the details of the VIP toilets will be worked out in chapter 2. The learners do not get the competences they should get.

According to the national coordinator of the mentorship services, Johann Watermeyer, this is not a normal situation in the execution of a learnership programme. But from this learnership a lot of lessons can be learned.

5.2 Framework mentoring

The Department of Public Works has initiated the construction learnership programmes to create sustainable, empowered and independent labour-intensive construction companies. The work-based route of learning during this learnership consists of three phases of classroom training and project-based learning. The projects have an increasing construction value and duration (Table 6) and mentors assist the learners during the execution of these projects.

Table 6 Profile of typical projects allocated to Learner Contracting Companies [LITEworks, 2005]

Project Attribute	Project number		
	1 (training /pilot project)		
Duration	3-4 months	6-12 months	6-12 months
Total contract	R250 000 to R500 000	R500 000 to R2 000 000	R1 000 000 to R5 000 000

This section is about the objectives and the framework of mentoring according to the EPWP. The mentorship services shall be provided in accordance with ‘Specifications of the mentorship services within the EPWP Learnership Programme’. This document shortly describes in 7 pages the general requirements of the mentorship services. The framework will be set out of a lot of documents to give a complete description. The objectives and responsibilities will be set out in the first subsection. The team that has to deliver these mentorship services will be described in the second subsection and the third subsection is about the mentorship approach.

Objectives and responsibilities

A mentor is appointed to support the learner contractors and supervisors and to impart practical knowledge for the entire period of the learnership. The other function of the mentor is to reduce the risks for the other role players, like the financial provider and the client. The EPWP has defined that the mentor has the responsibility to use his skills and knowledge to [EPWP, 2006b]:

- ensure the learner has an operating business system which is auditable and profitable;
- to develop the learners skills in technical, managerial, administrative, contractual and commercial/business areas;
- to oversee that the works comply to specification and are undertaken effectively in accordance with good practice;
- to co-sign cheques made out by the learner in terms of the learners agreement with the bank.

Mentorship team

The mentorship services have to be executed by a mentoring team. The ‘Specification for the mentorship services within the EPWP Learnership Programme’ does not specify this mentoring team, but the ‘Investigation into the optimisation of the mentorship services’ shows the preferred model.

This preferred model shows that there should be one mentoring team per 10 learner contracting companies. This team consists of one highly qualified Project Mentor and at least two Site Technicians with practical experience. Additional Site Technicians has to be added if the Senior Technicians cannot visit the sites at least once a day. In addition to the visits of the different projects there should be a helpdesk. This helpdesk gives the learners the ability to ask advice on technical and managerial issues and has to control and plan the mentoring teams. The staff of this helpdesk / office should consist of a Principal Mentor and 1 or 2 high level engineering (labour-intensive qualified) persons. The organization chart of the preferred mentorship team can be seen in Figure 18.

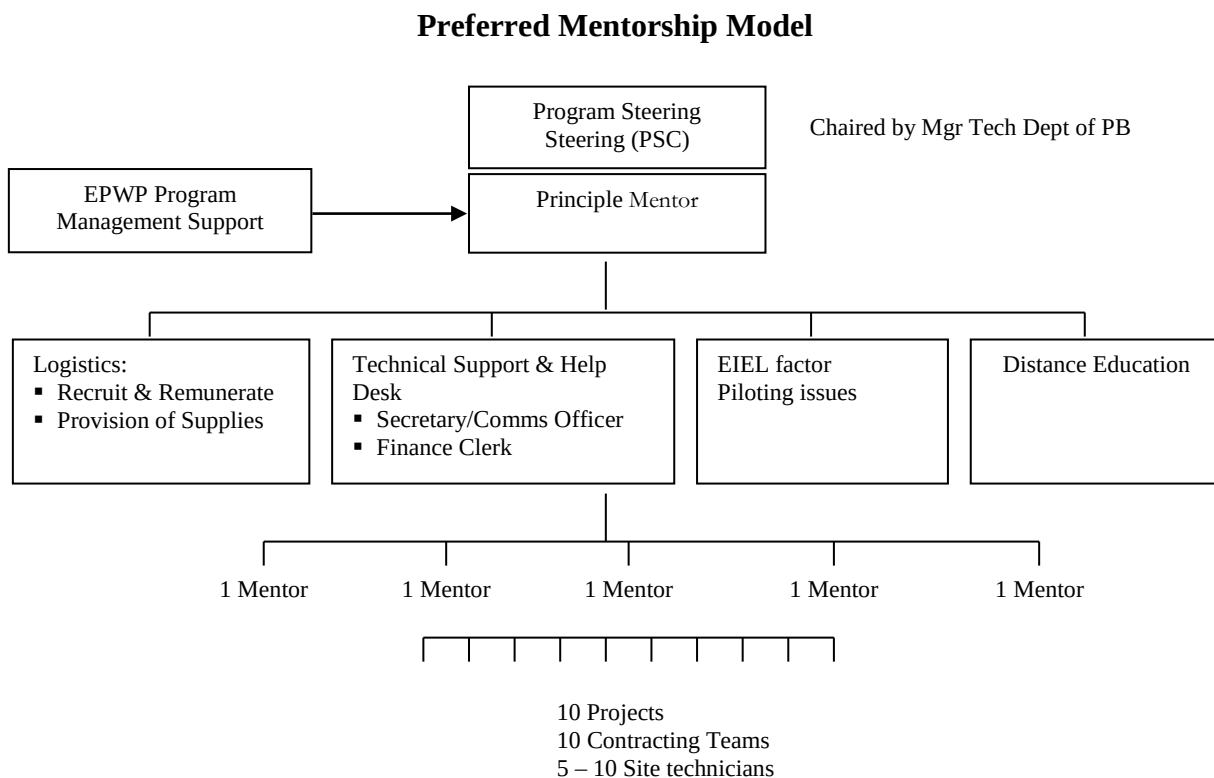


Figure 18 Preferred Mentorship Model [EPWP, 2005a]

Mentorship approach

The mentor is the extension of the trainer. The trainer should teach the theoretical background and the mentor should assist the learners to put the theory in practice. Most of the learners don't have any practical experience in the civil construction industry, so the learners need more assistance in the beginning of the programme than at the end. In other words, the role of the mentor will initially be more on the side of direct involvement and when gradually the learner gains more experience the true mentor role changes to a trusted and respected advisor see Figure 19.

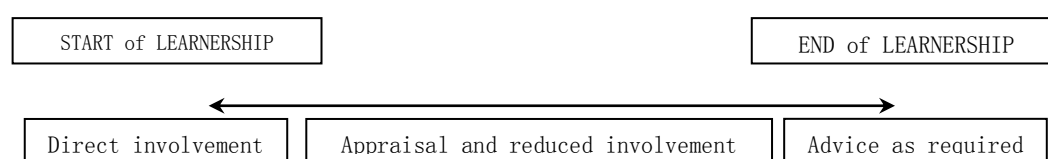


Figure 19 Progression of the EPWP mentorship [EPWP, 2005b]

The capacity of the learners and the specifications of every project are different, so the mentorship services for learnership contracting companies has to be investigated before the project started. In other words, which skills and tools have to be imparted during the project? [Watermeyer, 2006]

5.3 Execution mentoring in Rustenburg

Another company delivered the mentorship services for the first phase. LITEworks is appointed in March 2006 to deliver the mentorship services (the programme started in March 2005). The evaluation of the mentorship services is from this point. This period shows the strategy of LITEworks for mentoring this learnership. When the tasks of the mentoring team change, then *this* strategy needs to be changed.

The mentorship services for the 22 learnership contracting companies are delivered by two mentoring teams (according EPWP). The provision of the projects for the second phase has a (enormous) delay, so DPW has decided to cut the mentoring to one mentoring team.

To mentor the learners in an effective way the so-called Site Technicians are situated in Rustenburg (office of LITEworks is normally 150 km out of Rustenburg). This mentoring team of one fulltime person and two part-timers visit the project on a regular basis (2 - 3 times a week) and there is always someone at the office to advice and help learners. This team is assisted by two other part-timers; one experienced mentor and one high-qualified Project Mentor.

The mentoring of the learners (who have projects) has a demand driven / problem solved approach. This approach will be explained by an example. The mentoring of the VIP toilets happens on a controlling way. The mentors visit the projects to assist the learner contractor and his/her supervisors with problems that have occurred during the process. So the mentorship approach is based on the lessons that learners learn from their mistakes. The learners are making mistakes and are learned how to solve those mistakes. This demand driven / problem solved approach shows how to solve problems, but managing projects is all about controlling the risks in such a way that most of the problems can be foreseen and be prevented [Groote, 2001].

Another problem is the short-term vision of the learners. The learners are focused on earning money as soon as possible and not on the learning part of the programme. But teams (contractors and supervisors) increase their effectiveness and team members can develop team skills when a team intentionally focuses on learning [Kolb, 2005a].

Some other aspects need to be kept in mind:

- Learners in the learnership don't see problems and don't have capability to foresee problems and think in front.
- The linkage between training and mentoring is not there, because trainings and the mentorship services are delivered by a different company and the contact between those companies is not sufficient enough to

get a good linkage. Both companies have their own working style. Each company is delivering a good job but in total the services are not delivered in an effective way. The preference is that the trainers and the mentors are from the same company, what makes the communication and the linkage easier. Unfortunately, the market of trainers and mentors in South Africa is limited, especially the number of companies who have the capacity and the knowledge to give training and to mentor the learners [Watermeyer, 2006].

- The mentors and all the other people in the managing part of the programme (like engineers and people from the local municipality) should have at least NQF 5 in Labour-Intensive Construction. But some people have not any experience with any kind of labour-intensive projects, for example the engineers. The engineers have to prepare the tender documents for the projects. Because of a lack of knowledge of LIC the documents are made on the conventional way. The mentors have to assist those engineers to correct those documents, because the other people in the programme are not able to do it. This results in a delay in the programme and a more managerial task for the mentor.
- The LIC knowledge and experience within the mentoring team is mainly in the 'top' of the team. The site mentors are able to assist and support the learners, but cannot oversee the whole process.
- The objectives and the guidelines for mentoring are global and DPW doesn't control the mentors quite strict. This control consists of a monthly global report and meeting of the progress and not quite specific of the learner's mentoring approach. So the mentors can deliver the mentoring services on their own way. This is not a problem when DPW is testing the competences of the learners and take action out of the results. The competence test tests only skills and not the knowledge and the results are not used to update the mentorship approach to the learner. This problem is maybe also the result of two separate bodies coordinating the two major parts of the programme, what results in a training that is not particularly relevant to the skill requirements for implementing projects [EPWP, 2005a].

5.4 Conclusion/objective of the research

Analyzing the characteristics of the mentoring services of the learnership in Rustenburg, the main conclusion is the lack of structure. The mentoring team is not working out of a method, but assisting the learners when they ask for it. The mentoring team helps the learners with solving their problems and trying to answer their questions, only some tools are explained, not the concept behind the tool. So the learners know how to use the tool, but do not know why to use the tool. So the learners don't see the reason why to use the tool and the result is that they don't use it (at the right moment). The concept should be taught by the trainer and the mentor should implement the concept with some tools, but it is not useful to impart (a lot of) tools if the learners don't understand the line of thought.

A process model of mentoring an EPWP contractor learnership programme can help to mentor in a structured way. The model should take into account the objectives of the learnership and should give some guidelines how the mentoring process should be. This model should be written for the mentoring team and

DPW primarily, but some parts are relevant for the trainer provider as well. The trainings are part of the process to impart the knowledge to the learners and mentoring is quite difficult without a good training.

Focus of the model

A process model has to be made out of a focus, for example a theory. To come to this focus the objectives of the EPWP contractor learnership programme will set out first [EPWP, 2006b]:

- provide a contracting entity that is able to sustain itself in the open market after the two year learnership;
- provide a contracting entity that has experience in labour-intensive construction technology;
- provide a contracting entity that is able to operate locally and wider.

These objectives of the learnership programme tell a results and a process which should be partly realized by the mentoring team. The result is a contracting entity and the word ‘provide’ means a process to ‘realize’ this contracting entity. During the programme the learners should get the right competences to become a contracting entity. This means that the process model of the mentoring should focus on the content and the process of learning to become a contracting entity.

Objective

Developing a mentoring process model to improve the quality of the contracting entity at the end of the Labour-Intensive Construction Learnership Programme in Rustenburg by analysing the content and the process of learning to become a contracting entity

Appendix 6 Phasing models

The different phasing models can be grouped into three main groups [Groote, 2001]: linear phasing, cyclic phasing and parallel phasing. These different groups are briefly described in this appendix.

Linear phasing: This method of phasing is mostly used for concrete projects like building projects. It is mostly used for relatively small projects. Thereby it is important that in early stage of the project the end result is well definable and that there are not too many uncertainties. With linear phasing the phases follows each other sequentially. Each phase has to be finished completely and ended with a decision before the next phase can start.

Cyclic phasing: Cyclic phasing is used mostly for vague projects with a high level of uncertainty. This type of phasing characterises that solutions are developed with the latest known requirements. When during the execution of the project new requirements get known then there will start a new development process. With each new development process there will be less uncertainty and so it is possible to get a grip on this kind of projects. There are two different models: version phasing and development phasing. With version phasing a project is developed by using different versions, where each version must be seen as an independent part or project. With development phasing the phases project definition and design become especially cyclic. After an initial execution of these phases there is returned back to the definition phase and so on.

Parallel phasing: This type of phasing is used by simultaneous execution of different activities/phases. This type of phasing makes it possible to structure projects with a high level of complexity. Depending on the kind of projects this is done on a linear or on a more cyclic basis. Also this type of phasing can be divided into two different models: subproject phasing and simultaneous phasing. Subproject phasing is used on complex projects that can be subdivided into different parts. Seeking a solution for a part of the project will be less complex than creating a solution for the project as a whole. These different parts will be developed independently and assembled to one object later on. With simultaneous phasing the different phases are executed parallel which gives a great flexibility to adapt to new changes.

Appendix 7 Kolb's Learning Styles

The theory of experiential learning has defined four basic learning styles [Businessballs, 2007]:

Diverging (feeling and watching - CE/RO)

These people are able to look at things from different perspectives. They are sensitive. They prefer to watch rather than do, tending to gather information and use imagination to solve problems. They are best at viewing concrete situations several different viewpoints. Kolb called this style 'Diverging' because these people perform better in situations that require ideas-generation, for example, brainstorming. People with a Diverging learning style have broad cultural interests and like to gather information. They are interested in people, tend to be imaginative and emotional, and tend to be strong in the arts. People with the Diverging style prefer to work in groups, to listen with an open mind and to receive personal feedback.

Assimilating (watching and thinking - AC/RO)

The Assimilating learning preference is for a concise, logical approach. Ideas and concepts are more important than people. These people require good clear explanation rather than practical opportunity. They excel at understanding wide-ranging information and organising it a clear logical format. People with an Assimilating learning style are less focused on people and more interested in ideas and abstract concepts. People with this style are more attracted to logically sound theories than approaches based on practical value. The learning style is important for effectiveness in information and science careers. In formal learning situations, people with this style prefer readings, lectures, exploring analytical models, and having time to think things through.

Converging (doing and thinking - AC/AE)

People with a Converging learning style can solve problems and will use their learning to find solutions to practical issues. They prefer technical tasks, and are less concerned with people and interpersonal aspects. People with a Converging learning style are best at finding practical uses for ideas and theories. They can solve problems and make decisions by finding solutions to questions and problems. People with a Converging learning style are more attracted to technical tasks and problems than social or interpersonal issues. A Converging learning style enables specialist and technology abilities. People with a Converging style like to experiment with new ideas, to simulate, and to work with practical applications.

Accommodating (doing and feeling - CE/AE)

The Accommodating learning style is 'hands-on', and relies on intuition rather than logic. These people use other people's analysis, and prefer to take a practical, experiential approach. They are attracted to new challenges and experiences, and to carrying out plans. They commonly act on 'gut' instinct rather than logical analysis. People with an Accommodating learning style will tend to rely on others for information than carry out their own analysis. This learning style is prevalent and useful in roles requiring action and initiative. People with an Accommodating learning style prefer to work in teams to complete tasks. They set targets and actively work in the field trying different ways to achieve an objective.

Appendix 8 Interview with Gugu Matsotso

Minutes of Meeting with Gugu Matsotso (Bigen Africa)

Location: DPW office Pretoria

Date: 26th September 2006

Time: 10:00 AM

Attendants: Gugu Matsotso, Roy Spengelink, Harold Topper

Introduction

Harold starts with an introduction of the two Dutch students and their research. Afterwards Gugu tells that Bigen Africa is the programme manager of the learnership programme in Rustenburg. As the programme manager they are responsible for the coordination of the whole programme. Bigen Africa is appointed by the RLM, because the PMU of the RLM doesn't have the capacity and the skills to do this by themselves. The structure of Bigen Africa in this programme is:

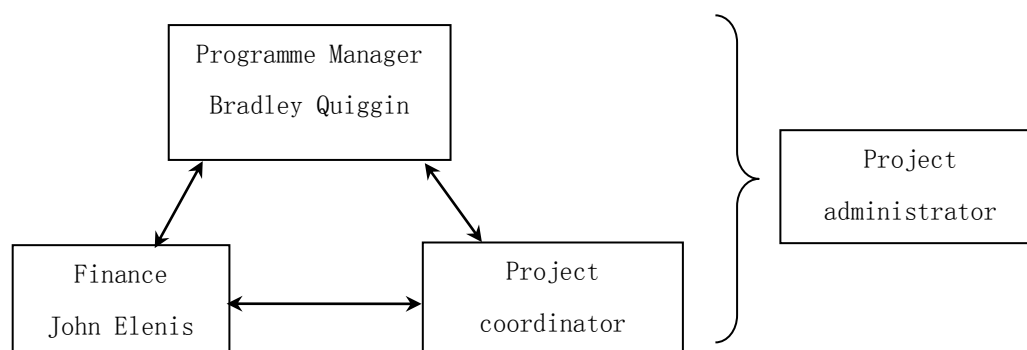


Figure 20 Bigen Africa's organization within the learnership

Before the programme started

The district of Bojanala has decided to start a learnership programme in their district without doing research to the feasibility and making a plan. So they selected 66 learners within their district to start with. They had selected the learners, but the district has no projects to facilitate the learners within their programme. They decided to ask the 5 municipalities within the district for projects for this learnership. The RLM was the only municipality with projects (for the first phase), 12 water and 10 road projects. But these projects and the RLM were not prepared to do these projects within a learnership programme. The RLM appointed Bigen Africa to do this because the RLM itself has not the skills.

Organization

Because of the fact that RLM was not prepared to have a LIC learnership programme, there was no organization. The projects had to start as soon as possible so the whole organization was focussed on these projects. The only meeting was the Project Committee meeting. These meeting were very long and decision couldn't be made, because these people were not allowed to make decisions.

The consulting engineers don't have the qualification of labour-intensive construction. This is also one of the delay problems. Now they are compulsory to have at least NQF 5.

All the people, who are appointed by the RLM, are only appointed for 1 financial year. So they don't look for the most efficient way of organizing in the long-term. Bigen Africa is for example appointed until May 2007 and hasn't even received the appointment letter for this year. The decision to what to do after May 2007 (official ending of the programme) has still not been made. The required provision of the projects is at least 2, so the RLM can stop after the second phase and the learners cannot be qualified.

Provision projects

The RLM delivered some projects to the learnership programme, but they were not really happy with this programme. This because the learners are mostly not coming from Rustenburg, so they are creating jobs for people out of their region. So they are not really committed to the programme.

Only the projects of phase 1 were ready when the programme started. These projects met the requirements of the EPWP, which are also the only requirements that the projects need to meet. Because of the lack of commitment of the RLM they didn't prepare projects for the second phase during the first phase. In addition, the process to get projects prepared to start construction is very long.

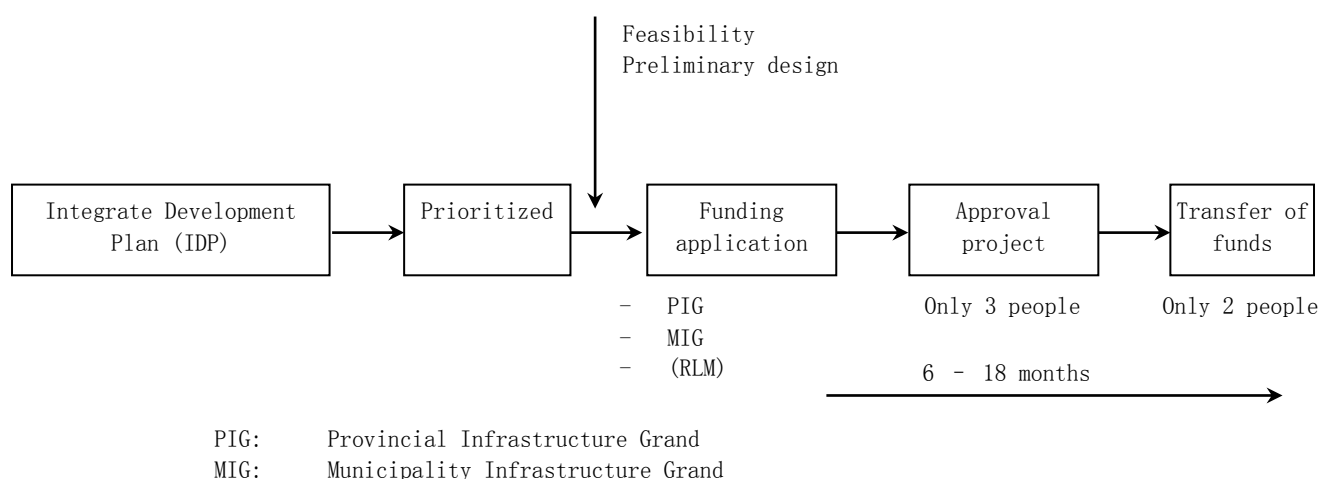


Figure 21 Project provision planning

The programme manger get a list of projects but the approval of the projects by DPW is not been done. There are only 3 people at DPW to approve projects for the whole country. So it takes time to get started with the construction.

Appendix 9 Interview with the RLM

Minutes of Meeting with Marks Rapoo and Joseph de Jager (RLM)

Location: RLM offices

Date: 16th November 2006

Time: 13:30 AM

Attendants: Marks Rapoo, Joseph de Jager, Harold Topper

This meeting consists of two parts. First is spoken to Joseph de Jager and afterwards with Marks Rapoo

Meeting with Joseph de Jager

Function of Mr. de Jager

Mr. de Jager is currently responsible for controlling the budgets for the projects of the infrastructure department of the RLM. Before this he was a project manager.

Project life cycle:

Mr. de Jager drawn out the project cycle at the RLM:

Table 7 Duration of the different phases

Phase	Duration
Identification of a project	1 month
Prioritise projects	2 months
Appointment of consultants	1 month
Preliminary design	2 month
Tender stage	2 months
Construction	6 months
Total	14 months

The mayor outreaches to the community for the identification of projects. He starts a process in which there will be investigations in the communities to identify backlogs and problems. After the completion of these investigations possible projects are identified. Broadly speaking there are three types of projects:

- Road
- Water and sanitation
- Electricity

The possible projects are handed over to the infrastructure directorate, which is responsible for the prioritisation of the projects. After the prioritisation a capital plan is made for the upcoming three years with which projects will be executed and how they are funded. This is all done in advance of the start of the financial year which at the RLM runs from July till June. Almost all projects of the learnership programme will be funded through the Municipality Infrastructure Grant (MIG) which is stated by the Government to provide a basic level of services to all inhabitants of South Africa by the end of the year 2013. During the

process of prioritisation of projects the registration of the MIG will also be completed. Some times there are struggles with these MIG-registrations because of delays in the process, because it also needs to be approved by the province and the Department of Provincial and Local Government. After the prioritisation of the projects there is looked which can be done “untraditional” and these projects will be selected to be labour-intensive.

Causes of delay of the provision of the projects

Mr. de Jager sets out some of the causes of the delay with the provision of the projects of the learnership programme.

It happens often that the different counsellors differ on the view of which projects has the highest priorities. They all want the best for the community they serve. These discussions slow down the process.

It is the first time that the RLM is executing a learnership programme. So some things that had to be done were new for the RLM and they also needed to find their way in working with a learnership programme.

The group size of 22 learner contracting companies is too large. So the RLM needs to deliver too many projects, which also cost a lot of money of which they are struggle to find funds for.

Lack of proper planning. In his opinion they should spend the first year of a three year capital plan on the planning and preparation of all the projects so that the construction can take place in the two years after.

Future

Mr. de Jager is sceptical over the future of the learnership programme. He shares the vision of the Director General that programme is three projects or two years. He says that only the new learnership is three years. Now the programme will be running two years in May 2007 the programme will stop after phase two projects and there will not be any phase three projects.

Currently they are working on the selection of the projects for the next financial year.

Meeting with Marks Rapoo

Function of Mr. Rapoo

Mr. Rapoo is the head of the Project Management Unit (PMU) of the RLM responsible for the learnership programme since September 2006. He is involved with the selection of the projects, the funding through MIG, the appointment of the consulting engineers and implementing the projects. Overall he's there to ensure the success of the learnership programme and succeeding in its objectives and take corrective actions were needed. He is also responsible to the projects meet the EPWP guidelines and for talking with the council

Function of Bigen Africa

Bigen is the project management office and responsible for the day-to-day activities related to the learnership programme. They are also responsible to oversee the engineers of the projects.

Causes of delay of the provision of the projects

In the opinion of Mr. Rapoo the biggest problems is the non proper planning in the past which caused that there weren't sufficient projects planned in advance. The current phase 2 projects has a problem with

documents which are not compliant because the engineers were not aware that they were working on EPWP projects

Future of the learnership

Mr. Rapoo says that is still uncertain if phase 3 projects will go on. This will depend on the progress of phase 2, but Mr. Rapoo wants the programme to continue.

Appendix 10 Interview with the national coordinator mentorship services

Minutes of Meeting with Johann Watermeyer (DPW)

Location: DPW office Pretoria

Date: 17th October 2006

Time: 09:00 AM

Attendants: Johann Watermeyer, Roy Spenkeliink, Harold Topper

Workplace assessment:

Trainer provider should do the workplace assessment, because they are responsible for the certifying of the learners.

- In Rustenburg all the training is given upfront, but needs still to be assessed on-site.
- The trainers only get paid when the workplace assessments are done, so to reduce their costs they try to let it be done by the mentors. There is also a chance that the trainer provider signs the learners off even if they are not competent, because else the trainer provider doesn't receive his money.

Task Johann Watermeyer:

His role is being the mentor manager on a national level (there are also 9 provincial managers). His task is to facilitate the mentors and look after them. Most of the work is crisis management. Thembani Mackaukau does the project management side of the programme in Rustenburg.

Johann is only working on a part-time base for EPWP, besides this he is also a consultant.

Relation learner-mentor:

The relation will depend on the skills of the learners. The vision of JW on how the relation of learner-mentor should look like is as follows:

- 90% of the time on-site
- 10% of the time off-site

Contracting is done on-site and not in the office. One of the problems is that a mentor only has 4 hours per week per learner to assist them.

Entrance criteria:

The entrance criteria for the learners to join the programme (with an aim on youth, women and disabled) are to low. The requirements are:

- Standard grade 8
- Some basis English and mathematical skills

The problems with the programme already start with the selection of the learners on the basis of these low requirements.

Nothing is learned on technical skills in a practical way during their classroom training, only in theory.

It would be better to get people with experience in contracting to join the programme. Because the current learners come in without any experience there are great problems with the tendering, but also with the execution of the projects.

The problem is that people with experience are black man (these are the subcontractors in the old days), which the programme not really aims on. These people already have technical knowledge and know-how to handle projects, but they need to get commercial skills. That would probably be an ideal situation.

There should be made a plan for the contractors and the supervisors how they need to be assisted. So it's important to test their capabilities before the start of projects.

Responsibility of the mentor:

In an ideal situation the mentor can completely focus on assisting the learners with the projects, which is the purpose of mentoring.

- Assist and guide u building sustainable contractors
- Minimize the risk by the realisation of the projects (helping the learners with the managing of the project)

The mentor shouldn't be involved in contract documentation (all consulting engineers need to be NQF 7), design issues and all that kind of issues.

The mentor should do:

- Get the assessment of the trainers
- Do their own assessment of the learners
- Start on-site with the contractors
- Guide the learners during the execution of the projects

Direction of mentoring:

At the moment around 70% of the mentoring is in the wrong direction. The mentors are doing work that is not within the tasks of the mentors. This is by not having municipalities which are not sufficient:

- Lack of resources
- Lack of knowledge

This is also because the overall knowledge of engineering in the South Africa is going down. Also because of time restriction there is no time made for proper documentation and designs.

Relation trainer-mentor provider:

There are only two companies in South Africa so far JW knows that can provide training- and mentoring services. But even when there are separate companies there should be a close relation between the two parties.

One of the problems is that there are no people available to check what the training providers deliver and what their quality is. Also there is not a real competition going on. Everything is done on fixed rates.

If training and mentoring is combined there should be proper monitoring systems within the company.

CETA is only doing the payments of the trainer provider (and even this is handled by EPWP)

Skills on-site:

- No technical skills during training (mostly commercial)
- And there is less than average mentoring on-site

To get learnerships programmes running, it is necessary to have proper mentors and learners, which have already the experience.

There also is an only a weak relation between what's learned during classroom training and the projects that need to be executed.

Testing:

The competency evaluation form is not linked to US.

There are no quality checks on the workplace assessment, which are done by the trainer providers.

In the future it is going to be the question what will happen when a trainer provider certifies a learner and a mentor comes back with an E1.a form which shows that the learner is not competent. In that case JW says there is a great chance that there will be looked by an external service provider to the knowledge of the learners.