Chapter 3: Investigating the need for a Clean Development Mechanism (CDM) specific stage/phase-gate project management strategy[9]

3.1 Introduction

This chapter focuses on the project management aspect of the CDM. The Project Management Body of Knowledge (PMBOK, 2004) defines project management as "the application of knowledge, skills, tools and techniques to project activities to meet project requirements". The objectives of this chapter are subsequently to:

1. Establish the current formalised state of CDM project management approaches in South Africa;
2. Establish the perceived need for a formalised CDM project management approach in South Africa; and
3. Explore the application of a stage-gate project management model to address the specific needs of CDM project management in South Africa.

A questionnaire was compiled to establish how formalised the approach to CDM project management was in industry and related bodies. From the limited questionnaire responses certain shortfalls within the South African CDM project management landscape could be identified.

3.2 CDM opportunities for South Africa and Africa

It is generally accepted that Africa will not be a major earner of CERs on a global scale (Cosbey et al., 2005). Studies differ regarding the estimates of the global CER market share that Africa will have, but it has been estimated as 4 to 14% (Haites, 2004) with 5% (Ellis et al., 2007) being a common figure used. This said Africa still holds significant potential for carbon dioxide

[9] This chapter has been published in a peer-reviewed journal: Lotz M, Brent AC, Steyn H, 2009. Addressing the need for a Clean Development Mechanism (CDM) specific project management strategy. South African Journal of Economic and Management Sciences 12 (2), 228-241.

sequestration through increased agricultural activities and soil carbon increase (Ringius, 2002).

Institutional capacity, including the presence of a DNA, was identified by Silayan (2005) as one of the major contributing factors for successful registration of CDM projects. Silayan (2005) states this to be one of the reasons of Honduras's recent success in registering CDM projects. In general, most developing countries with high absolute emissions have built institutional capacity in the form of a DNA. Countries with significant institutional capacity include China, India, Brazil, South Korea, Indonesia, Mexico and notably South Africa as the only country from Africa (Ellis et al., 2007).

Jung (2006) assessed 114 host countries on their CDM attractiveness. The criteria used for classification were mitigation potential, institutional CDM capacity and general investment climate. The countries with the highest potential for CDM (excluding forestry) projects were China, India, Brazil, Argentina, Mexico, South Africa, Indonesia and Thailand. It is interesting to note that South Africa was the only African country that gained the highest rating.

It would then seem that South Africa is perfectly suited to benefit from CDM project activities, although the benefit of CDM for Africa as a whole is limited. Heller and Shukla (2003) points out that other Southern African countries could potentially emulate South Africa regarding CDM success and in this way a larger section of Africa can benefit from the CDM.

According to the SA DNA (2010) there are 156 CDM projects were submitted to the unit. Of the 156 projects submitted 123 were Project Idea Notes (PINs) and 33 were Project Design Documents (PDDs). It should be noted that some of the PINs were submitted up to 5 years back and the recent activity of some of these projects are highly doubtful. Of these projects 17 have been registered and another project is up for review (UNFCCC, 2010). According to the UNEP Risø Centre (2010) SA has got 37 sent for "validation/determination." Although the sources to do not exactly agree regarding the number of projects what seem to be clear is that approximately

25% of projects that submitted PINs to the SA DNA will submit a PDD for validation and only 10% to 15% of all CDM projects that the SA DNA received formal communication from will get to be registered CDM projects.

3.3 Engaging the South African CDM industry

Little et al. (2007) have described the South African CDM landscape to some extent. They interviewed thirty “experts involved in the South African CDM process” and focused not on the management of the CDM process, but rather the identification of factors that inhibit and accelerate the CDM process in South Africa. As an extension of the study of Little et al. (2007) the South African CDM Industry Association (SA CDMIA), which was being formed during 2007, was engaged as a case study. A questionnaire consisting of twelve high level questions, and some sub questions, was used as basis for the engagement (See Appendix D[10]). One hundred potential affiliates of the then informal SA CDMIA were targeted. Only eight responded positively to the engagement.

The limited response is mainly attributable to the lack of formal structure of the SA CDMIA at the stage of the investigation; there was no single point of entry to engage the SA CDMIA in its entirety, although this is now changing. Those affiliates that did not respond positively also highlighted a concern about the potential use of sensitive information; by answering some of the questions posed in the questionnaire one would have easily identified the specific role-player in the small SA CDMIA community.

Although the low number of responses means that the SA CDMIA case study does not statistically represent the South African project management landscape, some insight can be gained regarding the maturity of the SA CDMIA, and specifically how CDM projects are viewed and approached in SA.

[10] The questionnaire in the appendixes is the 2nd questionnaire sent out. The 2nd questionnaire will be discussed in subsequent chapters. The 1st questionnaire consisted of the first 12 questions of the 2nd questionnaire.

In evaluating the answered questionnaires it was found that the positive respondents had been involved in at least three CDM projects already registered. At the time of the investigation South Africa had ten registered CDM projects in total as verified by the DNA (Department of Energy, 2010). The respondents further indicated that more than four CDM projects per respondent were in different stages of development, i.e. a total of at least thirty-two new projects; the total number of CDM projects under development in South Africa at the time of the investigation could not be determined, but some indications was provided in the previous section.

The questionnaire required the respondents to indicate their relative fields of expertise pertaining to the technical[11], financial[12] and regulatory[13] aspects of CDM project management[14]. Six of the eight respondents considered themselves partial towards the technical and financial aspects of CDM projects as opposed to the regulatory aspects. Since provincial/regional, national, international and CDM-specific regulatory approval could all be necessitated, depending on the specific project; the lack of regulatory associated expertise in the SA CDMIA is noteworthy.[15] To this end the questionnaire also aimed at establishing where CDM project developers and related parties perceived bottlenecks in the successful completion of a CDM project.

The perceived bottlenecks were also divided into financial, technical and regulatory aspects, and a distinction was made between domestic (South African) and foreign perceived bottlenecks. The South African regulatory environment was seen as the single largest bottleneck. This is true even of the efforts of the South African DNA to facilitate the development of CDM projects. Little et al. (2007) also identified the regulatory aspects, namely foreign, local and CDM specific, as major inhibitors. The bottleneck perceived

[11] Pertaining to the technical/engineering design required in an emission reduction project.
[12] Pertaining to the financial and banking requirements associated with an emission reduction project.
[13] Pertaining to the regulatory rules, both domestic and foreign, within which an emission reduction project must operate.
[14] Appendix F represents a summary of the results obtained from the 1st questionnaire.
[15] It is important to note that CDM developers in SA typical have 3 – 15 staff members. The result is that there are mostly no legal, technical or other discrete departments. Staff members have to fulfil various roles although they will have areas of focus.

as second largest was foreign technical requirements (An example could be sourcing equipment from overseas.) due to South Africa's dependence on foreign technological imports. Neither local nor foreign financial requirements were viewed as priority bottlenecks. This outcome differs from the outcomes of Little et al. (2007); they document "Africa (is) not an investment destination" as the 4^{th} highest of a total of fifty six identified inhibitors/facilitating factors. Even without a local versus foreign breakdown it was clear that financial concerns were considered to be the least important in the South African CDM environment. Given the expertise of the respondents does bring into question whether the perceived importance of regulatory bottlenecks is real or whether a lack of regulatory expertise on the part of the respondents induces a higher perceived risk of the regulatory aspect of CDM projects.

In terms of project management approaches, the following two issues were highlighted in the SA CDMIA:

- Only three of the eight respondents indicated that they follow a formalised CDM project management approach although seven of the eight respondents indicated a perceived need for such an approach. With a lack of formalised CDM project management followed in SA it was deduced that most project management is done on an ad hoc basis.
- Of the eight respondents, five indicated that they had a dedicated person/group acting as project manager for CDM projects. All five positive respondents concluded that the person/group acting as project manager succeeded in facilitating the development of the CDM projects.

From the comments received from the respondents regarding what specific project management models were used, two distinct approaches became clear (see Table 3.1):

- In the one approach CDM projects were forced to conform to a project management strategy or model that would be used by the respondents in other types of projects (non-greenhouse gas emission reduction projects).

In doing so the need for project management conformity overruled practical project management considerations.

It would then seem that the additional requirement of a CDM project and classical project management approaches followed in SA have not been merged well at all.

- On the other hand some respondents stated that the uniqueness of every CDM project implied that ad hoc project management was the only realistic strategy.

These issues and comments were useful to derive a proposed CDM project management model.

Table 3.1: Summary on comments regarding CDM project management models used and why the specific model is in use

First approach:	Second approach:
Force existing project management approaches on CDM projects	Deal with CDM projects on a purely ad hoc fashion
Comments received and reason for approach:	**Comments received and reason for approach:**
Some companies used an "internal project management system" or "internal developed standard"; These project management systems were based on company "political decisions"; It was stated that "all projects need to conform to this" internal "standard"	Projects are very diverse, with different approach needed for each one; Various role players each has own systems that don't always integrate; Inadequate training/experience in project management

3.4 Proposed CDM project management model - Model α

The research objective was then to merge the indicative findings. The indicative findings were produced and incorporated as follows:

- The specific requirements of a CDM CER (UNFCCC, 2007) project;
- The South African specific emission reduction project environment was discussed with the founding members of the SA CDM IA;
- From there the 1st questionnaire was compiled and distributed as discussed in section 3.3;
- Parallel to the 1st questionnaire all published academic literature on CDM focussed on South Africa was reviewed such as Little et al. (2007) and other sources; and

- Project management specific literature was reviewed. This included:
    - PMBOK (2004) and other sources for general project management guidelines; and
    - Cooper (2000) for guidance specifically regarding stage/phase-gate composition.

These inputs were combined to produce an initial stage/phase-gate model that was called Model α. The purpose of this model was to alleviate the perceived and real bottlenecks of CDM projects. A stage-gate model consists of project stages or phase followed by gates. Each phase is treated as a discreet separate entity (Perez-freije and Enkel, 2007) as if each phase was a separate project. The gates act as go/no-go points after evaluation of the objectives of a phase (Tingström, Swanström and Karlsson, 2006). Gates are also used for project portfolio ranking purposes. The reasoning is that scarce resource will be better allocated to more promising projects (Cooper, 1999). Figure 3.1 is a graphical representation of the developed stage-gate model.

In total thirteen phases were identified interlinked with ten gates. After the evaluation of Gate 10 the project returns to Phase 9 for monitoring of data for another year. This loop is then executed for the duration of CDM project registration.

The phases, which have to be completed by parties other than the project proponents were lumped together and indicated as “External phases.” These phases are completed by entities such as the DOE, DNA, and others.

Reference is made to an annual post-mortem. During this stage/phase problems that arose during the year are investigated and hopefully solved. It should be noted that the verification process, and subsequent issuance of CERs, can be done whenever the project owner wants to do it. The proposed annual post mortem is then not necessarily directly linked to the verification process The annual post mortem should rather be seen as a proposed formalized annual meeting to have all parties involved share their thoughts regarding issues that arose the past year.

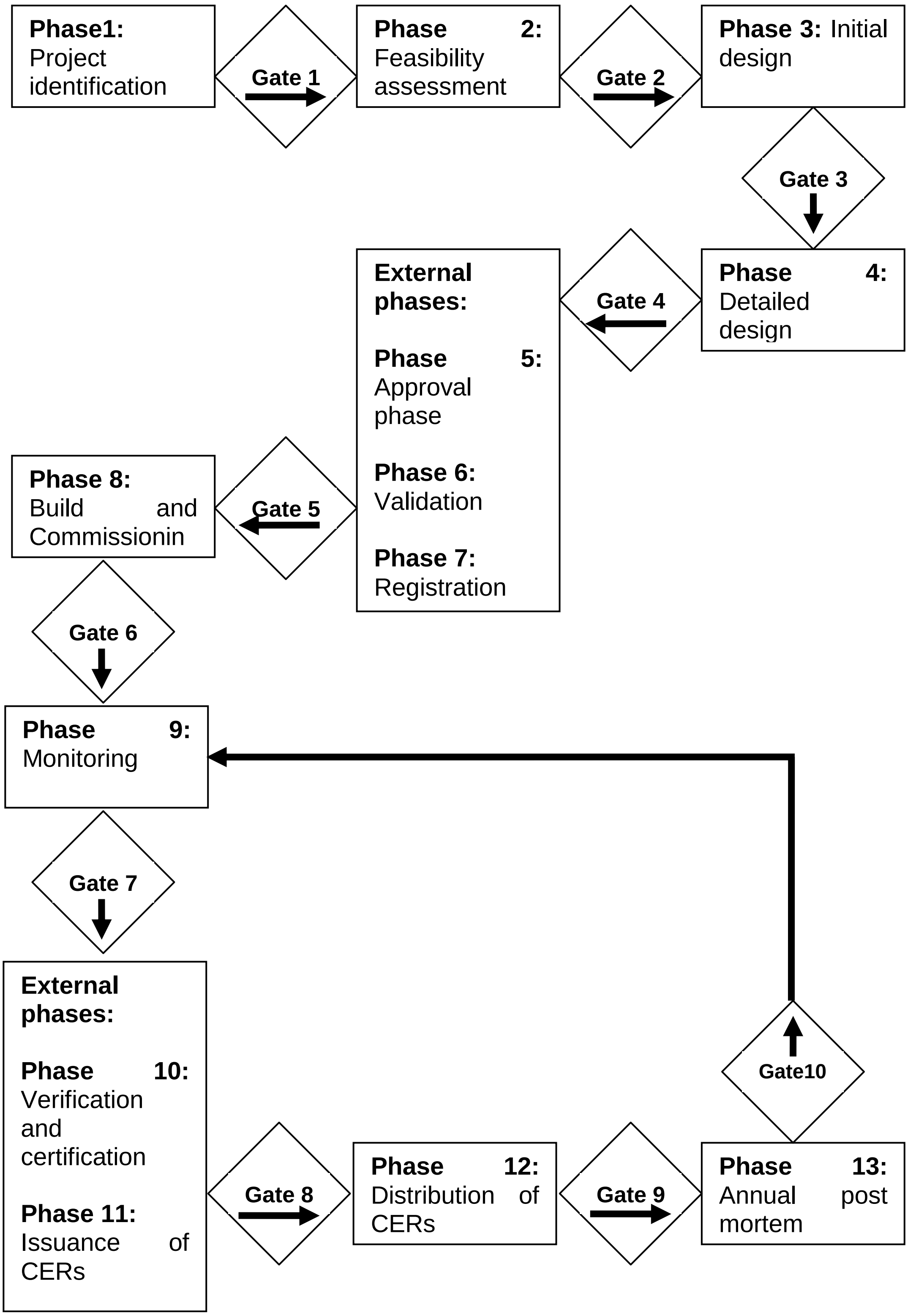


Figure 3.1: Stage-gate Model α for CDM project management

Only the summarised stage-gate flowchart is shown above for brevity. Each phase consists of certain objectives that have to be achieved. The evaluation of how successful each phase was is done during the gate analysis that follows on the specific phase. The gate consists of Go/Kill criteria and Ranking criteria. Go/Kill criteria implies that a certain objective must be completed before the next stage can start. If the Go/Kill criteria cannot be achieved at all then the project is killed. Stages during which all Go/Kill criteria were successfully completed now enter the Ranking part of the gate. Specific ranking criteria were established for each gate. A score of 1 to 10 will be given to each ranking criteria - a higher score indicates a more favourable circumstance. As an example for logistical concerns a project closer to the resources of the project developer will be favoured. Another example could be that projects resulting in more offsets could be preferred due to higher revenue potential. At this stage no weightings are included, but it is foreseen that project developers or other users of the model could subjectively add more value to a certain criteria. Weights can also be applied to the ranking criteria, but this was not done during the development of this stage-gate model. The weights of ranking criteria can be determined internally by model users as to fit specific company needs and resources.

The proposed stage-gate model merges existing project management lifecycle stages, like “detailed design” phase, with CDM project specific required phases like “distribution of CERs” phase. This will then be the first stage-gate model to be developed to incorporate the needs of CDM project management specifically for the South African context[16].

Table 3.2 is a typical example of a summary of a stage and gate - the complete Model α is presented in Appendix F. It is specifically the criteria for Phase 2: Feasibility assessment and the criteria for Gate 2.

[16] It is noted that CDM developers could have far more complex in-house project management models, but these models where not derived for the South African CDM environment and did not aim to consolidate experience from South African CDM developers.

Table 3.2: Phase objectives, Go/Kill and Ranking criteria for Phase 2 of Model α: Feasibility assessment

Phase name	**2. Feasibility assessment**			
Purpose of project phase	1	Clarify the need for the project. (revenue / corporate responsibility / etc)		
	2	Do an initial estimate of the emission reductions		
	3	Asses what is necessary in monitoring the inputs to calculate emission reductions		
	4	Do initial assessment of project risk (financial, technical and regulatory)		
	5	Obtain initial approval[17] from local DNA		
Gate 2 criteria	**No**	**Criteria**	**No**	**Yes**
Kill/Go criteria	1	Is there a need for this project?	Kill	Go
	2	Does the initial emission reduction warrant a CDM project?	Kill	Go
	3	Is the project risk level acceptable?	Kill	Go
	4	Are all inputs required measurable / obtainable?	Kill	Go
Comments	1	Various strategic reasons can exist for proposed emission reduction projects. Clarifying the need of these projects will help in obtaining backing from management.		
	2	If the estimated emission reduction achievable is too small then no CDM project exists. The project proponents should decide what they consider to be the lower cut off value regarding emission reductions achieved.		
	3	Projects should be stopped as soon as project risk reaches unacceptable levels.		
	4	It is foreseeable that insufficient data are available to accurately establish emission reductions. If the emissions reductions are not measurable then the project should be stopped.		
Ranking criteria	**No**	**Criteria**		**Score**
	1	Are there any perceived or real objections from the local DNA?		
	2	How attractive is the amount of CERs earned?		
Comment	1	In the development of this model it is proposed to get initial host country approval for a project at the earliest possible stage. This will help in managing project risk from the start although host country approval is according to CDM guidelines not strictly necessary at such an early stage.		
	2	The amount of carbon credit revenue earned is a direct function of the amount of CERs obtainable. All else being equal projects producing more CERs should take preference.		

[17] Initial approval can be obtained from the DNA in the form of an e-mail acknowledging the acceptance of a PIN which can also state that no objection is raised during this very early part of project development.

3.5 Layout transformation

As discussed in the previous chapter each stage/phase should result in the completion or progression of specific criteria required to complete an emission reduction project. These 'criteria' were labelled in this chapter with a 'C'. No stage/phase can be considered completed without accomplishing what the stage/phase criteria stated should be achieved.

After each stage/phase a gate follows. A gate consists of binary criteria and ranking criteria. Binary criteria are formulated as binary questions which will result in 'Yes'/'No' answers. For a stage/gate to be considered complete and to progress to the next stage/phase all answers should be positive from the project's point of view. In the models to follow the binary criteria were labelled with a 'B'[18].

There might be specific reasons why it is preferred to progress with a certain project faster than another project even though the binary criteria of both project's gates were met. To facilitate such portfolio management ranking criteria are also evaluated at the gates. The results of the ranking criteria is not a binary 'Yes'/'No' answer, but rather a score for example between 1 and 10 or a qualitative argument. In the models to follow the ranking criteria were labelled with an 'R'.

Due to physical page layout constraints the normal representation of a stage/phase-gate model was not followed. Instead each stage/phase with its accompanying gate was presented as a column labelled with 'C', 'B' and 'R' to represent the criteria, binary criteria and ranking criteria of each stage/phase and gate respectively. Figure 3.2 illustrates the conversion from the normal stage/phase-gate representation to the representation used in this chapter.

[18] In some cases the binary criteria will simply confirm that the criteria of a stage/phase were met. In other instances the binary criteria will have application in the ranking a project for portfolio management purposes.

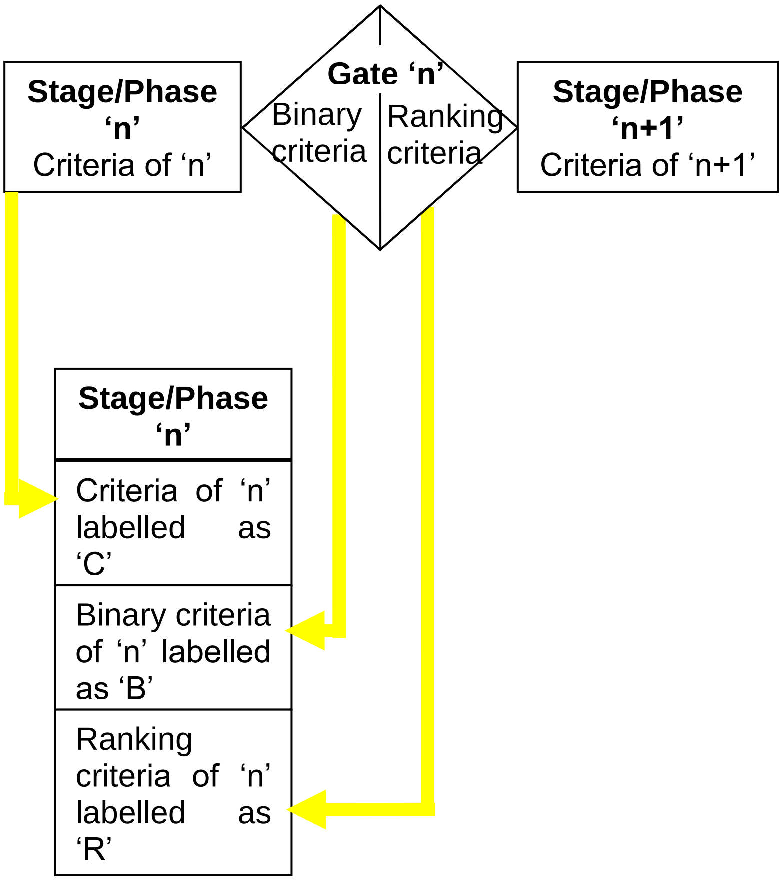


Figure 3.2: Conversion of normal stage/phase-gate representation to the representation used in the models

3.6 Model α layout transformation

Model α's layout will be transformed here as discussed in the previous section. The following are some comments to note regarding Model α:

- It consists of an arbitrary thirteen stages/phases. This implies that the number of stages/phases used is not crucial to the model although the model criteria, binary criteria and ranking criteria are considered fundamentally important;
- The criteria "How easy are the technical aspects?" were repeated in Model α as R.3.1 and R.4.1 and "Is the required capital relatively low?" was repeated as R.3.3 and R.4.3; and
- The ranking criteria R.9.1 "Identify and rank all steps that can be taken to increase the accuracy of the monitored data while still complying with the PDD" and R.13.1 "Identify and rank changes that can be made to increase the amount of CERs issued in the following year" were considered very similar. They were consolidated and presented to the interviewed experts as: "Identify and rank changes that can be made to increase the amount of CERs to be issued" and labelled R.C.1 (Consolidated Ranking criteria 1).

Figure 3.3: Model α

Phase 1

C.1
C.1.1 Identify potential emission reduction projects

C.1.2 Ascertain eligibility of projects regarding fundamental CDM criteria

B.1
B.1.1 Does this project conform to the fundamentals of the CDM?

B.1.2 Does the project fit the strategic business alignment of the project proponents?

R.1.1 What is the strategic importance of the proposed project?

R.1.2 Is this project reproducible?

Phase 2

C.2
C.2.1 Obtain initial approval from local DNA

C.2.2 Clarify the need for the project. (revenue / corporate responsibility / etc)

C.2.3 Do an initial estimate of the emission reductions

C.2.4 Asses what is necessary in monitoring the inputs to calculate emission reductions

C.2.5 Do initial assessment of project risk (financial, technical and regulatory)

B.2
B.2.1 Is there a need for this project?

B.2.2 Does the initial emission reduction warrant a CDM project?

B.2.3 Is the project risk level acceptable?

B.2.4 Are all inputs required measurable / obtainable?

R.2
R.2.1 Are there any perceived or real objections from the local DNA?

R.2.2 How attractive is the amount of CERs earned?

Phase 3

C.3
C.3.1 Do initial design for early estimates of regulatory / financial / technical requirements and iterate to determine initial best fit

C.3.2 Build and evaluate initial financial model

B.3
B.3.1 Is the project technically viable?

B.3.2 Is the project regulatory viable?

B.3.3 Does the project make financial sense?

R.3
R.3.1 How easy are the technical aspects?

R.3.2 Is the regulatory environment in place?

R.3.3 Is the required capital relatively low?

Phase 4

C.4
C.4.1 Do a detailed design for the financial / technical and non-CDM specific regulatory requirements and iterate to determine optimal case

C.4.2 Identify/develop the required CDM methodology

C.4.3 Develop the PDD

C.4.4 Develop all documentation required by the DNA

B.4
B.4.1 Does the detailed optimal design prove a bankable project?

B.4.2 Does the appropriate CDM methodology exist or can it be developed?

B.4.3Is the CDM PDD developed and completed?

B.4.4 Is all the documentation required by the DNA developed?

R.4
R.4.1 How easy are the technical aspects?

R.4.2 Is the regulatory environment in place?

R.4.3 Is the required capital relatively low?

R.4.4 Is there an existing appropriate CDM methodology?

R.4.5 Can the PDD be completed with relative ease?

Phase 5,6,7

C.5, 6, 7
C.5,6,7.1To achieve project approval

C.5,6,7.2 To achieve project validation

C.5,6,7.3 To achieve project registration

B.5,6,7
B.5,6,7.1 Are all the necessary written approvals in place from the host party? (From DNA and other parties.)

B.5,6,7.2 Was the project validated by the selected DOE?

B.5,6,7.3 Was the project registered by the CDM EB?

R.5, 6, 7
No ranking criteria suggested

Phase 8

C.8
C.8.1 To build and commission all equipment associated with the project activity

B.8
B.8.1 Are equipment built, commissioned and operating properly?

R.8
R.8.1 Can the building and commissioning phase be completed quicker with acceptable increases in cost?

Phase 9

C.9
C.9.1 To monitor all inputs required as prescribed in the registered PDD

B.9
B.9.1 Are all inputs measured in accordance to the PDD and all applicable tools?

R.9
R.9.1 Identify and rank all steps that can be taken to increase the accuracy of the monitored data while still complying with the PDD.

Phase 10,11

C.10, 11
C.10,11.1 Obtaining verification and certification of CERs from DOE

C.10,11.2 Obtain issued CERs from UNFCCC EB

B.10, 11
B.10,11.1 Did the DOE verify and certify the CERs?

B.10,11.2 Did the UNFCCC EB issue the CERs?

R.10,11
No ranking criteria suggested

Phase 12

C.12
C12.1 To distribute the CERs to the relevant parties

B.12
B.12.1 Were the CERs distributed to the relevant parties as contractually agreed upon?

R.12
No ranking criteria suggested

Phase 13

C.13
C.13.1 To investigate and correct any shortcomings that exist in the project activity

B.13.1 Annual post-mortem: Can all problems be overcome?

R.13
R.13.1 Identify and rank changes that can be made to increase the amount of CERs issued in the following year

3.7 Further discussion and clarification of Model α

With first glance Model α can seem either intimidating or to have certain preferences that are unclear. The purpose of this section is then to discuss diverse points that can arise while investigating Model α:

- The complete monitoring process should be discussed in the monitoring plan. This includes the frequency of monitoring, who the responsible parties are and what will be monitored (inputs to be monitored). In initial phases/stages of the model the focus is primarily on understanding what the inputs are and how it will be monitored. As project development progresses the complete concept of monitoring must be developed;
- The reference to doing an initial assessment of project risk, first highlighted in C.2.5, should be an ongoing process. Various types of risks should be evaluated. As indicated this should include an evaluation of financial, technical and regulatory risk. During the risk evaluation CDM risks should be differentiated from non-CDM risks;
- The question posed whether the initial emission reduction warrant a CDM project, see B.2.2, is the abbreviated version of the question: Would the initial emission reduction credit estimation make it likely that CER revenues would generate sufficient profit to cover the project risks? According to Little et al. (2007) in the South African CDM space the minimum annual CER range ought to be in the range of 20,000 tCO_2e/annum. This then links to the following point of CER price expectations;
- It is not only the possible number of credits that can be earned that is necessary to warrant a project but also the foreseeable price of the CERs. The CER price, and study thereof, is a complex field. This study will not directly contribute to these discussions, but the importance of the influence of price on the viability of a CDM project should be noted. For discussions regarding CER price and market behaviour see Capoor and Ambrosi (2007) and later publications. Sources like PointCarbon (2010) provide frequently updated information on CER prices and price predictions;

- What exactly is deemed to be acceptable risks in CDM project development will differ from one project developer to another. Model α does not aim to prescribe to each project developer what risk level they should accept, but rather aims to ensure that risk quantification and addressing risk is done throughout CDM project development;
- The ranking of CDM projects as part of portfolio management should be a continuous process. It should be noted though that the accuracy of the ranking process will increase as project development and PDD development progresses;
- At this stage the binary criteria and ranking criteria will not be weighted. It is foreseen though that eventual in-house application of the proposed model will result in model tweaks that could include weighting of factors;
- The reproducibility of a CDM project is typically seen as a great advantage as the developer can potentially rollout a specific CDM project with ease as compared to developing the project from scratch. This should however be juxtaposed with factors like the strategic importance of the proposed project (R.1.1);
- If one takes a look at Brent and Patrick (2007) it would seem that project development phases are typically broken down into 4 – 9 stages/phases. The amount of stages/phase of Model α was initially specified as 13 as to have less items per stage/phase. The number of phases/stages used could vary as external validity is investigated in the following chapter;
- The components of Model α must be viewed in its widest possible definition. It is then up to the validation of the model (chapter to follow) to ascertain whether the criteria/components are all required or if other components should be inserted. More on this in chapter 4;
- Regulatory viability, first mentioned in B.3.2, does not initially differentiate between domestic or international CDM regulatory viability. Differentiation between different types of regulatory risks and adding detail to the investigation can be driven in parallel with PDD development; and

- The purpose of criterion C.4.2 (Identify/develop the required CDM methodology) is to identify whether an approved methodology does exist that can be used for the CDM project being developed. If an appropriate methodology does not exist then a methodology could possibly be developed. It should be noted that the development of a new methodology can be costly and time consuming.

3.8 Potential inefficiencies of the developed stage-gate Model α

The Kill/Go criterion is binary. To terminate a CDM project according to this measure could be seen as extremely harsh and will only be done if criteria cannot be met. This is especially true the further a project progresses as a loss of time and money will certainly be incurred if projects are terminated. It is then important to stress that all possible actions must be taken to satisfy the Kill/Go criteria. This also true if credit issuance is rejected as the project can reapply for issuance. It is only when no acceptable solution can be found that a project should be terminated. This approach ensures that lingering unsuccessful projects are taken off the project portfolio as to maximise available project development resources.

According to Model α many parties (all project proponents, DNA, DOE, CDM EB, financial institutions, etc.) can execute the Kill/Go criteria. This decentralised control structure induces risk as the number of parties increase. This said the decentralised control of a CDM project exists whether the project management structure points it out or not. What the stage-gate then actually achieves is coordination of the stakeholders and other parties involved during the development of a CDM project and this is advantageous. Getting all the stakeholders and parties involved to agree can be tedious. It is then imperative for the stage-gate model to identify only the relevant stakeholders and parties involved in each stage. By doing this the amount of parties and stakeholders per stage, and thus the level of decentralized control, can be minimized.

Bessant et al. (2005) argue that stage-gate models do not manage the innovation of “breakthrough innovations” effectively. This is not seen as detracting from the appeal to use a stage-gate model in CDM projects, since CDM projects are arguably not “breakthrough innovations.” CDM projects have to follow a strict predetermined regulatory path, which suites the stage-gate model approach.

The uniqueness of each CDM project can lead to incompatibilities with project management models. For this reason a more generic approach to stages and gates were proposed in the developed stage-gate model. It is foreseen that some CDM projects will greatly differ in the time and money required per stage.

Chapter 4: Validation of Model α

4.1 Introduction

Model α was derived from evaluating the following sources of information:

- A literature review; and
- The results of a questionnaire.

The purpose of this chapter is to evaluate the validity of the derived model through case studies and to expand or alter the model if and where necessary, based on the findings of the case studies. The research questions for this component of the study are:

- Does a project management model address at least some of the difficulties encountered in CDM projects?
- How does the proposed emission reduction project management model cope with the requirements of the CDM?
- Why is the current model adequate/inadequate?
- How should the model be altered to achieve successful emission reduction project management?

This also correlates with Yin's (2004) view on case study application in which he states that case studies are suitable to investigate research questions of "How?" and "Why?".

4.2 Background on case study research

Yin (2004) defines a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.

To expand on this definition Yin (2004) states that a case study inquiry:

- copes with technically distinctive situations in which there will be many more variables of interest than data points as one outcome of the inquiry;
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion as another outcome of the inquiry; and
- benefits from the prior development of theoretical propositions to guide data collection and analysis in the inquiry.

Yin (2004) and Darke et al (1998) argue that case study research is a complete research methodology that goes far beyond data gathering. Criticism of the case study research technique should then be aimed at the incorrect or incomplete application of the research technique rather than at the research technique itself.

Case study research is often underrated due to prevalent misunderstandings of such research. Flyvbjerg (2006) states that the five largest misunderstandings regarding case study research are:

- Misunderstanding 1: General, theoretical (context-independent) knowledge is more valuable than concrete, practical (context-dependent) knowledge;
- Misunderstanding 2: One cannot generalize on the basis of an individual case. Therefore, the case study cannot contribute to scientific development;
- Misunderstanding 3: The case study is most useful for generating hypotheses. That is, in the first stage of a total research process, whereas other methods are more suitable for hypotheses testing and theory building;

- Misunderstanding 4: The case study contains a bias toward verification, that is, a tendency to confirm the researcher's preconceived notions; and
- Misunderstanding 5: It is often difficult to summarize and develop general propositions and theories on the basis of specific case studies.

Flyvbjerg (2006) discusses these misunderstandings in his research and concludes by stating that:

- A scientific discipline without a large number of thoroughly executed case studies is a discipline without systematic production of exemplars, and a discipline without exemplars is an ineffective one; and
- Social science may be strengthened by the execution of a greater number of good case studies.

Darke et al. (1998) state that research bias could exist in case study research due to the data collection and data analysis processes, which could be subject to the influence of the researcher's characteristics and background, and rely heavily on the researcher's interpretation of events, documents and interview material. That, said Darke et al. (1998), then also refers to the view of Yin (2003) noting that bias may enter into the design and conduct of other types of research also.

Some of the concerns surrounding case study research bias could be alleviated by using the accounts of different participants to draw upon multiple perspectives. According to McDonnell (2000) this form of triangulation is an important feature of the case studies. The result is the development of a more complete, holistic and contextual portrayal of real-life situations like case studies (McDonnell, 2000).

It is generally accepted that case studies can be subdivided in three categories. The three categories and main attributes are illustrated in Figure 4.1 (Yin, 2004).

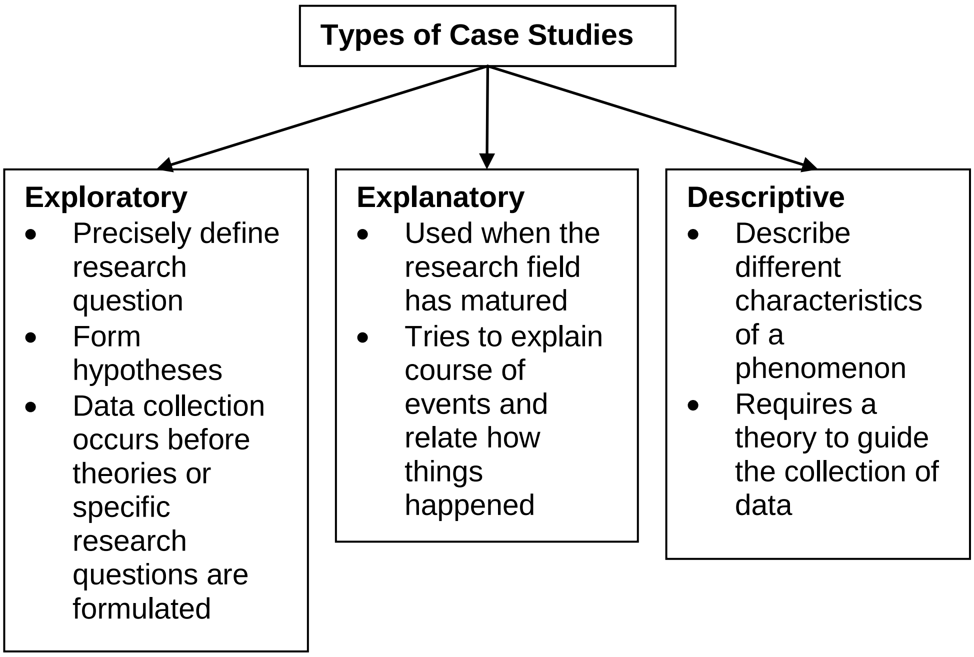


Figure 4.1: Summary of Yin's (2004) view on case study types

It is often possible for case study research to have components of various types of case studies. Regarding project management of emission reduction projects the following can be said:

- Data was available before the onset of the research. It was actually the review of data that prompted the research. This said data collection, for completeness, was undertaken during the research. The research was then more exploratory than descriptive since no theory was required before data collection started; and

- The “research field” is not mature. Emission reduction projects are a recent phenomenon. (See discussion on the origins and implementation of the UNFCCC’s CDM (2010.) It can be argued that due to the extensive research already done in project management that project management as a field is mature, but the combination of project management of a new project type results in a non-mature research field. The research was then arguably exploratory rather than explanatory.

As a conclusion it is then stated that this research was mostly in the form of exploratory case study research. Some components of other case study methodologies, and indeed other research methodologies, were also used to a lesser extent.

4.3 Case study approach

Figure 4.2 illustrates the steps taken in the case study research.

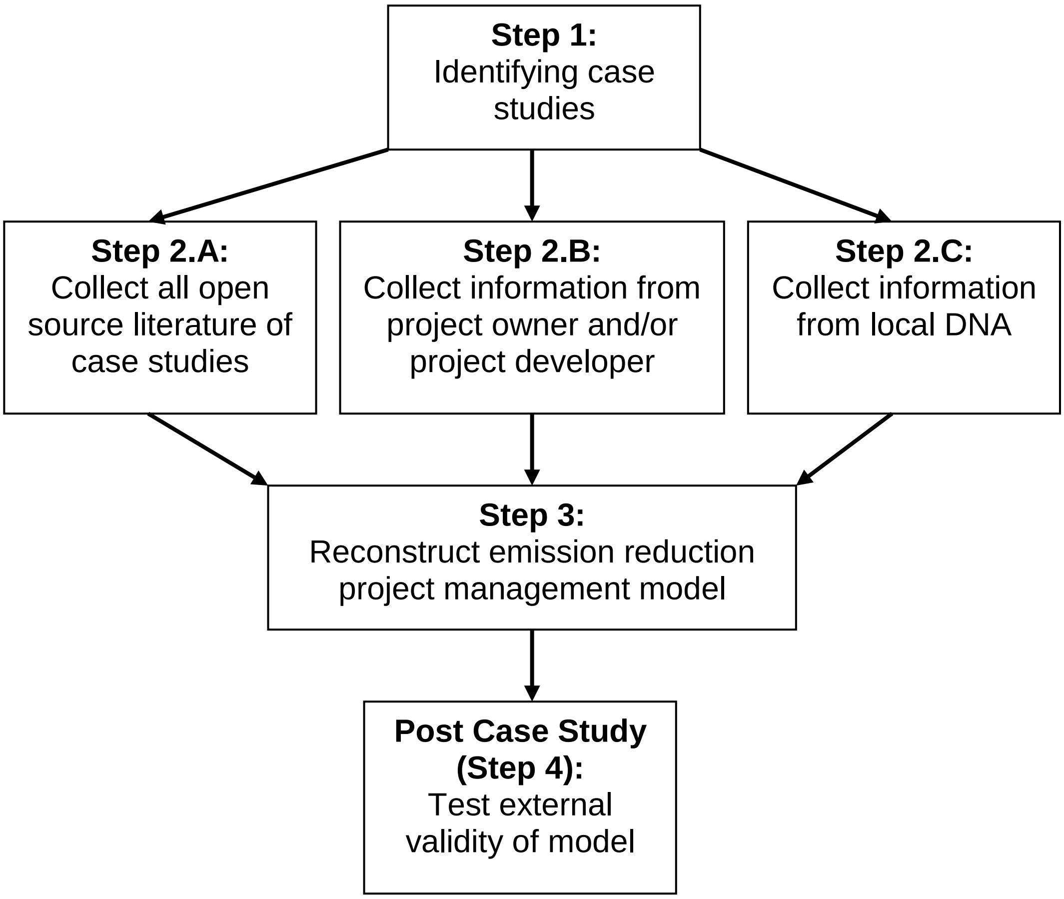


Figure 4.2: Order of case study research steps

4.4 Discussion of case study protocol steps

Step 1: Case study identification

One of the first important decisions in case study research is to decide on the structure and amount of case studies to be investigated. Yin (2004) and Darke et al. (1998) states that multiple case studies overall offer more robust research design if executed correctly. Darke et al. (1998) argues that multiple case studies can strengthen research findings analogous to how multiple experiments strengthen experimental research findings. The research resource requirements of multiple case studies exceed that of single case studies. The resources required for multiple case study research detracts from the attractiveness of such an approach if an individual researcher is involved.

The aims of the multiple case study approach were further to achieve:

- A comprehensive and reliable research design overcoming the perceived and real shortcomings of single case study research (Yin, 2004; Flyvbjerg, 2006; Darke et al., 1998);
- A manageable research load for a single researcher, with in-depth knowledge of the case studies. A single case study would most probably have resulted in an easier research load, but could potentially have sacrificed some of the robustness associated with multiple case study research. On the other hand expanding the number of case studies could have led to an unmanageable research load for a single researcher. Furthermore, as described by Darke et al. (1998), there is no ideal number of case studies when it comes to case study research;
- Replication logic could be applied between case studies. Literal replication is expected since similar results for the various case studies are expected (Yin, 2004); and
- Replication and expansion of future research of other CDM sectors would follow an easy modular approach - this will be part of theoretical replication.

The focus of this investigation is on projects aimed at the CDM emission reduction scheme, but can be just as easily changed to Voluntary Emission Reduction (VER) type projects. The reasons for limiting the research to the CDM were:

- The CDM is perceived as the most strict emission reduction scheme. This argument is made since the CDM has more levels of regulatory approval and external checks as compared to voluntary emission reduction systems which are not governed by the UN. So if the project management model works for CDM then the idea is that it will satisfy most emission reduction schemes;
- The CDM documentation is open source and easily obtainable; and
- The CDM has an industry association in South Africa. The result is that the sector is more formalized as compared with other emission reduction schemes.

The criteria for the selection of case studies must be stated and completely transparent as to ensure the non-bias of the research. The criteria used for case study selection in this research were that the cases studies:

- Are projects in South Africa;
- By implication all the cases then went through the South African Designated National Authority (DoE, 2010);
- Logistically South African projects were also more realistic;
- Are relevant to the South Africa energy sector since all the case studies selected combust energy rich gases[19]; and
- Required approachable project owners and/or developers.

[19] All the case studies aim to produce electricity or at least could produce electricity in theory. The reason for focussing on potential electricity producing CDM projects is that South Africa has an electricity shortage. Due to the abundance of coal future CO_2 emissions associated with electricity production seems imminent. For more details on this see 'energy policies for sustainable development in South Africa' (Winkler et al., 2006).

The multiple case study design consisted of three case studies with a single embedded unit of analysis in two case studies, and two units of analyses in the other case study. All three case studies dealt with emission reduction projects primarily aimed at the CDM. The embedded units of analyses of one of the case studies are logical subunits as both deal with the destruction of mine emitted methane. Figure 4.3 illustrates the case study and embedded units of analyses that will be followed during this research.

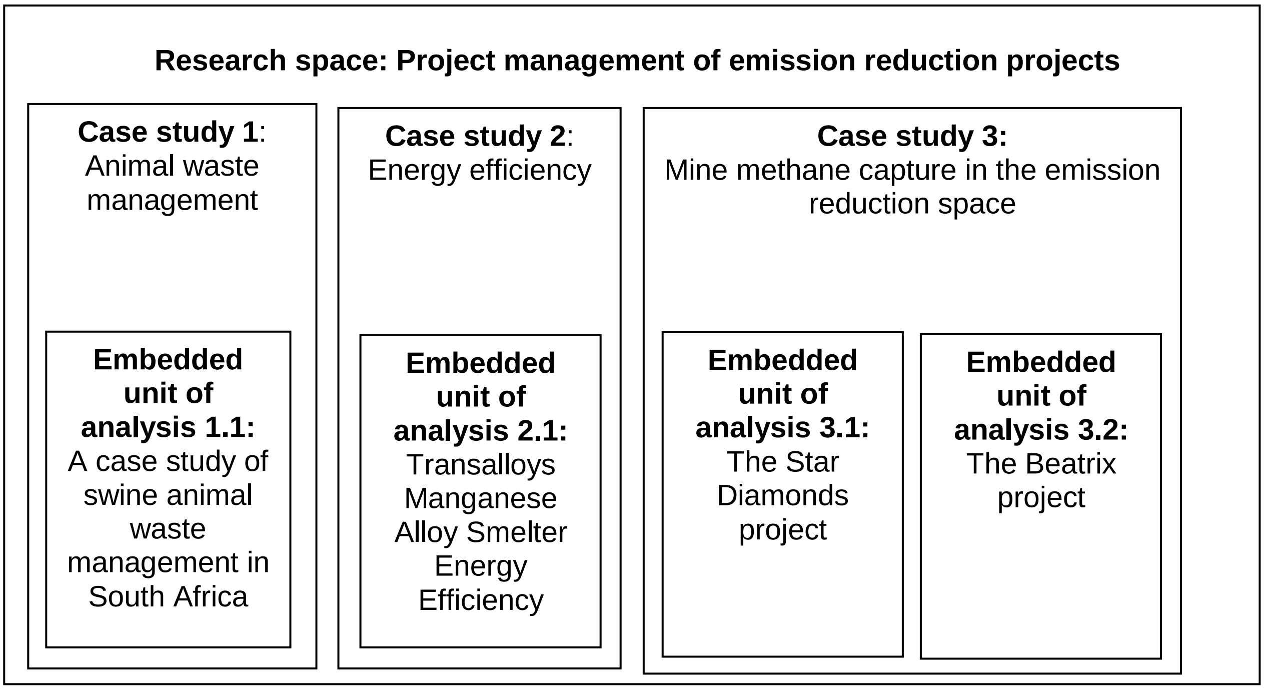


Figure 4.3: Illustration of how unit of analysis and case studies fit in the research space

At this stage it is important to disclose any involvement of the researcher in the chosen case studies. This is done to prevent any perceived or real research bias. The researcher was an observer of case study 3 and also assisted in the development of certain aspects of the embedded units. At no time was the researcher appointed in a role where the project management or portfolio management was solely under his control. For this reason his involvement in case study 3 is deemed as an observer participant. The researcher was not involved in the other case studies.

Step 2.A: Collect all open source literature for the case studies

The main source of information was the CDM website of the United Nations (UNFCCC, 2009). The documents that were sourced were the:

- CDM approved methodology used by the case studies to quantify the emission reductions achieved; and
- Project Design Document (PDD) that is developed to obtain CDM registration.

Other sources of information included:

- Host country, in this case South Africa, specific CDM sustainable development criteria. These criteria are easily obtainable from the website of the South African DNA (DNA, 2009). The purpose of this document is to establish the criteria and method which will be used by the local DNA to provide or withhold host country approval; and
- Articles in popular and other literature, which are valuable in determining the public exposure of the project activity.

Step 2.B: Collect information from project owner and/or project developer

Interviews where held with the project owners and/or project developers of all the case studies. All interviews with project developers were with individuals at director level. The information that was retrieved during these interviews included:

- A narrative on the history and progression of the project and where project specific issues arose. This information proved to be very valuable in determining perceived and real problems experienced by the project developer and/or project owner.
- Subjective views on the efficiency of the local DNA, various CDM bodies, DOEs, and other parties external to the project developer and/or owner.
- The release of confidential information for academic research. The aim of this research was discussed during the interview phase of data collection. Some of the people interviewed disclosed confidential

information as they were satisfied with the intent of the research and researcher.

- Information for the reconstruction and completion of an emission reduction specific project management model based on the model derived in chapter 3.

Step 2.C: Collect information from local DNA

As mentioned earlier a CDM project has two objectives:

- Firstly to ensure that real and measurable greenhouse gas emissions occurred in an project activity; and
- Secondly to ensure that the sustainable development of the host country was aided due to the project activity.

It is the objective of the Designated National Authority (DNA) to evaluate the sustainable development benefits of proposed emission reduction projects.

An interview was held with the DNA to gather information regarding:

- The evaluation of sustainable development criteria in the South African CDM space in general; and
- The specific application of CDM country specific sustainable development criteria to the case studies evaluated in this research.

The DNA gave project-specific feed up regarding the selected case studies and some general feedback regarding their perception and difficulties on various aspects of the CDM. The general feedback can be found in Appendix G.

Step 3: Reconstruct the emission reduction project management model

The real value added by the interviewed experts[20] was deemed to be more than just the information regarding the historical case study events. The experts also provided great insight into the applicability of Model α and what possible changes could be made to this model. An ideal was to obtain inputs from the experts regarding the validity of the derived α Model. This proved to be challenging. The following options were identified as to obtain input on such an emission reduction project specific management model:

- **Disclose Model α to the experts that were interviewed**

  Showing the experts Model α and asking for input could have led to research bias. The experts could potentially simply accept the model since they are all busy professional people. This would not have aided in ensuring that the model is correct or to establish external validity. On the other hand if the model was simply rejected by the experts without clearly stating why and how the model should be changed then little would also have been gained.

- **Carte blanche approach**

  Another option to obtain input from the experts, without bias to the current Model α, was to ask the experts to provide the researcher with a proposed emission reduction project management model. By doing this the individual views of the experts could have been captured. This approach proved to be futile for various reasons, including:

[20] The experts interviewed during this research were all directly involved with project development or project developers themselves. These experts were responsible for 5 out of the 10 registered CDM projects as on 15 July 2009. The experts all insisted on being anonymous as the input given was considered confidential.

  - The experts could have construed the development of such a model as too much effort and not partake in the research further; and
  - Providing no guidance to the experts could have led to such diverse inputs that reconciling it to produce a single project management approach could potentially have been impossible.

Not one of these two approaches would have captured, entirely, the value obtainable from the expert input. A delicate balance had to exist between providing guidance to the experts without inducing bias towards the existing Model α. The following approach was decided on to facilitate the expert input process:

- **Reconstruction approach**

  To guide the experts' input it was decided to deconstruct Model α into the fundamental three components:
  - The objectives that had to be accomplished per stage/phase;
  - The binary criteria evaluated at the gates; and
  - The ranking criteria that was evaluated at the gates of Model α.

  The experts were provided with the following:
  - The three fundamental model components as discussed above. The three individual lists were randomized as not to prejudice the order in which the experts allocated the components;
  - An illustrative example of a stage/phase-gate model, the purpose of which was to illustrate the structure of the model that was aimed for; and
  - Space was provided for comments and additional stage criteria, binary gate criteria and ranking criteria.

The experts were asked to construct a stage/phase-gate emission reduction project specific model from the inputs provided. Certain limitations were placed on the experts and certain degrees of freedom were provided including:

- The model had to be constructed keeping in mind the case studies of this research which the expert was involved with;
- The number of phases/stages to be used was up to the discretion of the experts;
- The stage/phase-gate figure was for illustrative purposes only and was not meant to restrict the input of the experts;
- Additional components could be added to the model;
- Not all the identified components had to be allocated to stages/phases and gates;
- Components could be allocated to more than one stage/phase or gate; and
- All additional input and comments could be provided in the comments section.

The models proposed by the interviewees had to be reconciled to a single model. This was made difficult by the fact that no set number of phases and/or gates where prescribed to the interviewees. It was however assumed that all proposed models started at the same point and aimed to finish with a successful project.

Two of the three model interviewees recommended that ±15 stages would suffice although they used 18 to 20 phases. As a first step then an arbitrary number of 15 phases were chosen for the reconciled model.

It is then apparent that two of the proposed models had to be condensed so that the 18 and 20 phases they respectively consisted of fitted into the 15 phases of the reconciled model. Nevertheless, condensing did not imply that any of the phase criteria, gate binary criteria or ranking criteria of the model of the interviewee could be omitted. All it meant was that some phases and some gates had to be combined.

In the same manner the interviewee model that consisted of only 8 phases had to be split up in the proposed 15 phases of the reconciled model. This could be achieved if one remembers that all models start at the same point and aims to end with a successful project.

Figure 4.4 illustrates the process of reconciling two input models of 3 and 5 phases respectively to a model consisting of 4 phases:

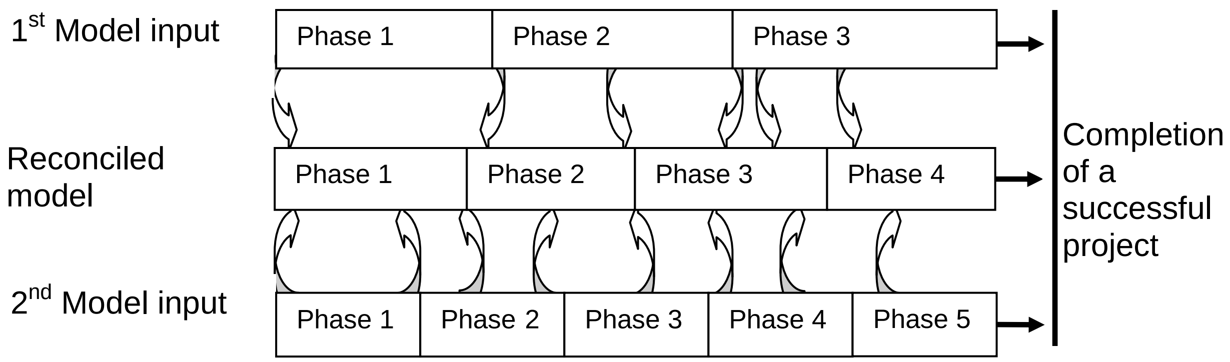


Figure 4.4: Euclidean length approach to phase consolidation

A set of rules were necessary to achieve this reconciliation. The rules for Phase criteria, Binary criteria and Ranking criteria allocation were:

- Rule of Consensus – if all proposed models had criteria in the same phase then the criteria were allocated to that phase in the reconciled model.
- Rule of Majority – if most models (2 of 3) put criteria in a specific phase then those criteria were allocated to that phase of the reconciled model.

- Rule of Score – if no clear consensus or majority existed for criteria allocation then the Euclidian length[21] of the phase in which the interviewee allocated that criteria was compared to the length of the reconciled model.

  In terms of the latter, as an example, the Euclidian length of the 1st Input model had to be lengthened to illustrate that this model also leads to a successful project even though it consisted of fewer phases. Now Phase 1 of the 1st Input model is "longer" than Phase 1 of the reconciled model. The result was then that most of the criteria of Phase 1 of the 1st Input Model were allocated to Phase 1 of the Reconciled Model. This was done by using the "lengths" of the phases to calculate the percentage that was allocated, namely 80% of Phase 1 of the 1st Input Model was allocated to Phase 1 of the reconciled model and 20% to Phase 2 of the reconciled model.

  The "lengths" of the 2nd Input Model had to be shortened in order to have the same Euclidian length as that of the reconciled model. The overlapping lengths of phases were then used to allocate criteria from the 2nd Input Model to the reconciled model. As an example it is clear that all criteria from Phase 1 of the 2nd Input Model should be allocated to Phase 1 of the reconciled model. Furthermore 33% of the criteria of Phase 2 of the 2nd Input model had to be allocated to Phase 1 of the reconciled model.

- Rule of Earliest phase association – If two or more phase have same score then criteria were allocate to the earlier stage.

[21] The concept of "Euclidian length" implies here that in Figure 4.4 Phase 1 of the 1st Model was "longer" then Phase 1 of the Reconciled model. This is only true since both models aim to achieve the same goal. In the same way the 2nd Model's Phase 1 is "shorter" then Phase 1 of the reconciled model since the 2nd Model consisted of more phases to achieve the same goal as the Reconciled model.

- Rule of Binary criteria - If binary criteria were allocated to a phase before the phase in which that criterion was executed, then the binary criteria were moved to the phase of execution. The reason is that the successful completion of a criterion (listed as "B") cannot be expected before the model indicated that criterion (listed as "C") had to be executed.

- Rule of Eliminating empty phases - A phase with no criteria associated after executing the rules is deleted. This was done separately for Criteria, Binary and Ranking. Then the results were merged. Some smaller alterations still took place. The smaller alterations included formatting and eliminating redundancies that resulted due to copying.

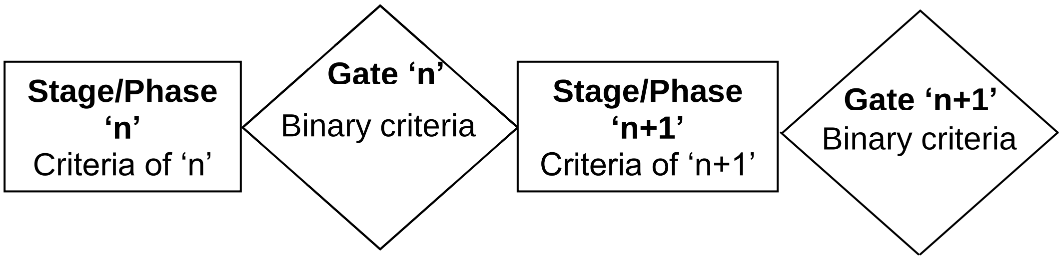
The application of the above set of rules will become apparent in the following section which demonstrates how the rules have been applied.

4.5 Discussion of the proposed project management model of Case Study 1

The expert interviewed in Case Study 1[22] had an interesting view on the application of the ranking criteria during project execution. The expert's view was that ranking should run concurrent and parallel to the stages/phases and binary gate evaluation and should not form part of the gate evaluation itself. The implication is that ranking can be executed at any stage as it is not associated with specific gates. Figure 4.5 illustrates the parallel and concurrent Stage/Phase independent ranking proposed by the interviewed expert.

[22] See Appendix I for a brief summary of Case Study 1

Stage/Phase-Gate section of the model:



Ranking section of the model:

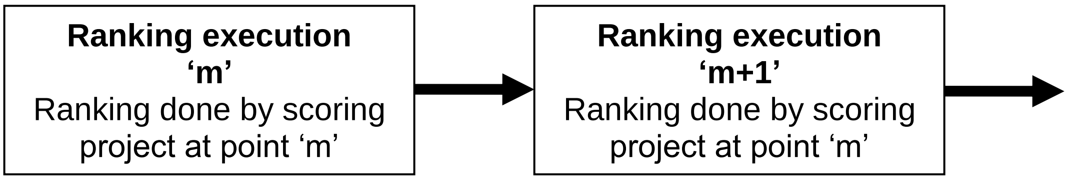


Figure 4.5: The view of the interviewed expert of Case Study 1 on the split between Stage/Phase-Gate execution and parallel concurrent ranking

The interviewed expert added or expanded on the following components of Model α:

- During the grouped Phase 3,4,5 the following stage/phase criteria was added: "Acquire a mandate." The expert explained that it was imperative to get the client to sign a contract with the developer so that the developer can be assured that the CDM work is allocated to that specific developer and no other;
- In Phase 12,13 the criteria "To achieve project validation" was expanded to "To achieve project validation (and final DNA approval)."Do remember that validation is performed by the DOE. It was the view of the expert that this would also be the best time to finalize all outstanding issues that the DNA could have had which could result in withholding host country approval; and

- The expert also proposed an additional ranking criterion: “Where is the project situated geographically?” The expert indicated that simple logistics plays a big role in the timely completion of existing projects and hence the evaluation of new projects. The importance of this additional ranking criterion to the expert is evident from the fact that the expert placed this additional ranking criterion in the first set of ranking criteria to be executed.

The expert indicated that the number of stages used by him, which was 20, was not a hard constraint. He indicated that he suspects that the final CDM project management model should consist of ±15 stages/phases. Taking this comment into account some of the expert’s stages/phases were lumped together as illustrated in Figure 4.6.

Figure 4.6: Case Study 1

Phase 1,2

C.1.1 Identify potential emission reduction projects

C.1.2 Ascertain eligibility of projects regarding fundamental CDM criteria

B.1.1 Does this project conform to the fundamentals of the CDM?

Phase 3,4,5

C.2.2 Clarify the need for the project. (revenue / corporate responsibility / etc)

C.2.3 Do an initial estimate of the emission reductions

C.2.4 Asses what is necessary in monitoring the inputs to calculate emission reductions

C.2.5 Do initial assessment of project risk (financial, technical and regulatory)

<u>NEW Acquire a mandate</u>

B.1.2 Does the project fit the strategic business alignment of the project proponents?

B.2.1 Is there a need for this project?

B.2.2 Does the initial emission reduction warrant a CDM project?

B.2.3 Is the project risk level acceptable?

B.3.2 Is the project regulatory viable?

Phase 6

C.3.2 Build and evaluate initial financial model

B.3.3 Does the project make financial sense?

Phase 7

C.2.1 Obtain initial approval from local DNA

Phase 8

C.4.2 Identify/develop the required CDM methodology

B.2.4 Are all inputs required measurable / obtainable?

B.4.2 Does the appropriate CDM methodology exist or can it be developed?

Phase 9

C.3.1 Do initial design for early estimates of regulatory / financial / technical requirements and iterate to determine initial best fit

B.3.1 Is the project technically viable?

Phase 10,11

C.4.3 Develop the PDD

C.4.4 Develop all documentation required by the DNA

B.4.3 Is the CDM PDD developed and completed?

B.4.4 Is all the documentation required by the DNA developed?

B.5,6,7.1 Are all the necessary written approvals in place from the host party? (From DNA and other parties.)

Phase 12,13

C.5,6,7.1To achieve project approval

C.5,6,7.2 To achieve project validation <u>(and final DNA approval)</u>

C.5,6,7.3 To achieve project registration

B.5,6,7.2Was the project validated by the selected DOE?

B.5,6,7.3 Was the project registered by the CDM EB?

Phase 14

C.4.1 Do a detailed design for the financial / technical and non-CDM specific regulatory requirements and iterate to determine optimal case

B.4.1 Does the detailed optimal design prove a bankable project?

Phase 15

C.8.1 To build and commission all equipment associated with the project activity

Phase 16

C.9.1 To monitor all inputs required as prescribed in the registered PDD

B.9.1 Are all inputs measured in accordance to the PDD and all applicable tools?

Phase 17,18

C.10,11.1 Obtaining verification and certification of CERs from DOE

C.10,11.2 Obtain issued CERs from UNFCCC EB

B.10,11.1 Did the DOE verify and certify the CERs?

B.10,11.2 Did the UNFCCC EB issue the CERs?

Phase 19

C.13.1 To investigate and correct any shortcomings that exist in the project activity

B.8.1 Are equipment build, commissioned and operating properly?

B.13.1 Annual post-mortem: Can all problems be overcome?

Phase 20

C12.1 To distribute the CERs to the relevant parties

B.12.1 Were the CERs distributed to the relevant parties as contractually agreed upon?

Ranking 1

R.1.1 What is the strategic importance of the proposed project?

R.1.2 Is this project reproducible?

R.2.2 How attractive is the amount of CERs earned?

R.3.3 Is the required capital relatively low?

R.4.1 How easy are the technical aspects?

R.4.4 Is there an existing appropriate CDM methodology?

<u>NEW Where is the project situated geographically?</u>

Ranking 2

R.4.2 Is the regulatory environment in place?

Ranking 3

R.2.1 Are there any perceived or real objections from the local DNA?

Ranking 4

R.8.1 Can the building and commissioning phase be completed quicker with acceptable increases in cost?

Ranking 5

R.C.1 Identify and rank changes that can be made to increase the amount of CERs issued in the following year

Ranking 6

R.4.5 Can the PDD be completed with relative ease?

4.6 Discussion of the proposed project management model of Case Study 2

Without being instructed explicitly the expert interviewed in Case Study 2[23] associated specific ranking criteria with specific stages/phases. This was also analogous to how Model α was constructed in that each stage/phase had a specific gate associated with it and during the execution of that gate both binary criteria and ranking criteria were evaluated. (Remember this was not a view shared by the expert interviewed in Case Study 1.)

The interviewed expert did not add or expand on the any of the components of Model α. The expert did however duplicate the following components:

- C.2.4 "Asses what is necessary in monitoring the inputs to calculate emission reductions" in stage/phase 2, 6 and 7;
- C.4.2 "Identify/develop the required CDM methodology" in stage/phase 1 and 2;
- C.9.1 "To monitor all inputs required as prescribed in the registered PDD" in stage/phase 6 and 7;
- B.2.4 "Are all inputs required measurable / obtainable?" in stage/phase 3 and 7;
- B.13.1 "Annual post-mortem: Can all problems be overcome?" in stage/phase 3, 7 and 8; and
- R.1.1 "What is the strategic importance of the proposed project?" is stage/phase 1 and 3.

The repeated components will be underlined in Figure 4.7.

The expert used only 8 stages. By implication to achieve project completion each stage/phase and gate had more criteria associated with it then what was proposed in Model α.

[23] See Appendix J for a brief summary of Case Study 2

Figure 4.7: Case Study 2

Phase 1

C.1.1 Identify potential emission reduction projects

C.1.2 Ascertain eligibility of projects regarding fundamental CDM criteria

C.2.2 Clarify the need for the project. (revenue / corporate responsibility / etc)

C.2.3 Do an initial estimate of the emission reductions

C.4.2 Identify/develop the required CDM methodology

B.1.1 Does this project conform to the fundamentals of the CDM?

B.1.2 Does the project fit the strategic business alignment of the project proponents?

B.2.1 Is there a need for this project?

B.2.2 Does the initial emission reduction warrant a CDM project?

B.3.3 Does the project make financial sense?

R.1.1 What is the strategic importance of the proposed project?

R.1.2 Is this project reproducible?

R.2.2 How attractive is the amount of CERs earned?

R.3.3 Is the required capital relatively low?

Phase 2

C.2.4 Asses what is necessary in monitoring the inputs to calculate emission reductions

C.4.2 Identify/develop the required CDM methodology

B.4.2 Does the appropriate CDM methodology exist or can it be developed?

R.4.4 Is there an existing appropriate CDM

Phase 3

C.2.5 Do initial assessment of project risk (financial, technical and regulatory)

C.3.1 Do initial design for early estimates of regulatory / financial / technical requirements and iterate to determine initial best fit

C.3.2 Build and evaluate initial financial model

C.4.1 Do a detailed design for the financial / technical and non-CDM specific regulatory requirements and iterate to determine optimal case

C.13.1 To investigate and correct any shortcomings that exist in the project activity

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B.2.3 Is the project risk level acceptable?

B.2.4 Are all inputs required measurable / obtainable?

B.3.1 Is the project technically viable?

B.3.2 Is the project regulatory viable?

B.4.1 Does the detailed optimal design prove a bankable project?

B.5,6,7.1 Are all the necessary written approvals in place from the host party? (From DNA and other parties.)

B.13.1 Annual post-mortem: Can all problems be overcome?

R.1.1 What is the strategic importance of the proposed project?
R.2.1 Are there any perceived or real objections from the local DNA?
R.3.1 How easy are the technical aspects?
R.3.2 Is the regulatory environment in place?
R.4.5 Can the PDD be completed with relative ease?

Phase 4

C.4.3 Develop the PDD

C.4.4 Develop all documentation required by the DNA

B.4.4 Is all the documentation required by the DNA developed?

Phase 5

C.2.1 Obtain initial approval from local DNA

C.5,6,7.2 To achieve project validation

B.4.3Is the CDM PDD developed and completed?

B.5,6,7.2 Was the project validated by the selected DOE?

Phase 6

C.5,6,7.1To achieve project approval

C.5,6,7.3 To achieve project registration

C.2.4 Asses what is necessary in monitoring the inputs to calculate emission reductions

C.9.1 To monitor all inputs required as prescribed in the registered PDD

B.5,6,7.3 Was the project registered by the CDM EB?

R.8.1 Can the building and commissioning phase be completed quicker with acceptable increases in cost?

R.C.1 Identify and rank changes that can be made to increase the amount of CERs issued in the following year

Phase 7

C.2.4 Asses what is necessary in monitoring the inputs to calculate emission reductions

C.8.1 To build and commission all equipment associated with the project activity

C.9.1 To monitor all inputs required as prescribed in the registered PDD

C.10,11.1 Obtaining verification and certification of CERs from DOE

C.10,11.2 Obtain issued CERs from UNFCCC EB

B.2.4 Are all inputs required measurable / obtainable?

B.8.1 Are equipment built, commissioned and operating properly?

B.9.1 Are all inputs measured in accordance to the PDD and all applicable tools?

B.10,11.1 Did the DOE verify and certify the CERs?

B.10,11.2 Did the UNFCCC EB issue the CERs?

B.13.1 Annual post-mortem: Can all problems be overcome?

Phase 8

C12.1 To distribute the CERs to the relevant parties

B.12.1 Were the CERs distributed to the relevant parties as contractually agreed upon?

B.13.1 Annual post-mortem: Can all problems be overcome?

4.7 Discussion of the proposed project management model of Case Study 3

The results from the expert interviewed in Case Study 3[24] indicated a strong correlation of the stage/phase criteria and binary gate criteria associated with stages/phases and gates as compared to Model α. What did differ was that the expert mostly associated the ranking criteria with the middle stages/phases. From this it was concluded that it was the view of the expert that the viability and attractiveness of a project (and compared to other projects) was evaluated only after the successful completion of initial stages/phases.

The interviewed expert did not add or expand on any of the stage/phase criteria components or ranking criteria of Model α. The expert did however exercise his discretion regarding the binary criteria as follows:

- Omitting B.3.1: "Is the project technically viable?"; and
- Duplicating B.2.2: "Does the initial emission reduction warrant a CDM project?" in stage/phase 4 and 6 as underlined in Figure 4.8.

As was the case with the expert of Case Study, 1 the expert in Case Study 3 indicated that the number of stages used by him was not a hard constraint. (The expert of Case Study 3 used 18 stages/phases.) Taking this comment into account some of the expert's stages/phases were lumped together as illustrated in Figure 4.8.

[24] See Appendix K for a brief summary of Case Study 3

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Figure 4.8: Case Study 3

Phase 1,2

C.1.1 Identify potential emission reduction projects

C.1.2 Ascertain eligibility of projects regarding fundamental CDM criteria

C.2.2 Clarify the need for the project. (revenue / corporate responsibility / etc)

B.1.1 Does this project conform to the fundamentals of the CDM?

B.2.1 Is there a need for this project?

B.3.2 Is the project regulatory viable?

Phase 3

C.3.1 Do initial design for early estimates of regulatory / financial / technical requirements and iterate to determine initial best fit

Phase 4

C.2.3 Do an initial estimate of the emission reductions

C.2.5 Do initial assessment of project risk (financial, technical and regulatory)

B.2.2 Does the initial emission reduction warrant a CDM project?

B.2.3 Is the project risk level acceptable?

Phase 5

C.3.2 Build and evaluate initial financial

B.3.3 Does the project make financial sense?

Phase 6

C.5,6,7.1 To achieve project approval

B.1.2 Does the project fit the strategic business alignment of the project proponents?

B.2.2 Does the initial emission reduction warrant a CDM project?

R.1.1 What is the strategic importance of the proposed project?

R.1.2 Is this project reproducible?

R.2.1 Are there any perceived or real objections from the local DNA?

R.2.2 How attractive is the amount of CERs earned?

R.3.1 How easy are the technical aspects?

R.3.2 Is the regulatory environment in place?

R.3.3 Is the required capital relatively low?
R.4.4 Is there an existing appropriate CDM methodology?
R.4.5 Can the PDD be completed with relative ease?
R.8.1 Can the building and commissioning phase be completed quicker with acceptable increases in cost?

Phase 7

C.4.2 Identify/develop the required CDM methodology

C.4.4 Develop all documentation required by the DNA

B.4.2 Does the appropriate CDM methodology exist or can it be developed?

B.4.4 Is all the documentation required by the DNA developed?

Phase 8

C.2.1 Obtain initial approval from local DNA

C.2.4 Asses what is necessary in monitoring the inputs to calculate emission reductions

B.2.4 Are all inputs required measurable / obtainable?

Phase 9,10

C.4.1 Do a detailed design for the financial / technical and non-CDM specific regulatory requirements and iterate to determine optimal case

C.4.3 Develop the PDD

B.4.1 Does the detailed optimal design prove a bankable project?

B.4.3 Is the CDM PDD developed and completed?

R.C.1 Identify and rank changes that can be made to increase the amount of CERs issued in the following year

Phase 11

C.5,6,7.2 To achieve project validation

B.5,6,7.2 Was the project validated by the selected DOE?

Phase 12

C.13.1 To investigate and correct any shortcomings that exist in the project activity

B.9.1 Are all inputs measured in accordance to the PDD and all applicable tools?

Phase 13

C.5,6,7.3 To achieve project registration

B.5,6,7.1 Are all the necessary written approvals in place from the host party? (From DNA and other parties.)

B.5,6,7.3 Was the project registered by the CDM EB?

Phase 14

C.8.1 To build and commission all equipment associated with the project

B.8.1 Are equipment built, commissioned and operating

Phase 15

C.9.1 To monitor all inputs required as prescribed in the registered PDD

B.13.1 Annual post-mortem: Can all problems be overcome?

Phase 16,17

C.10,11.1 Obtaining verification and certification of CERs from DOE

C.10,11.2 Obtain issued CERs from UNFCCC EB

B.10,11.1 Did the DOE verify and certify the CERs?

B.10,11.2 Did the UNFCCC EB issue the CERs?

Phase 18

C12.1 To distribute the CERs to the relevant parties

B.12.1 Were the CERs distributed to the relevant parties as contractually agreed upon?

Omitted

B.3.1 Is the project technically viable?

4.8 Discussion of the reconciled model – Model β

The proposed project management models of the various case studies were consolidated using the Euclidian geometrical "lengths" attributed to each stage/phase and gate as discussed in the previous chapter.

All the new or altered components, as suggested by the interviewed experts, were included in Model β. These components were:

- C.5,6,7.2 Was altered to "To achieve project validation (<u>and final DNA approval</u>)" in stage/phase 7;
- "Acquire a mandate" was a new criterion inserted in stage/phase 4; and
- "Where is the project situated geographically?" was a new ranking criterion inserted in stage/phase 1.

It is also interesting to note that Model α consisted of 13 stages/phases and after reconciling the case study project management models Model β was derived consisting of 12 stages/phases.

In accordance with the "Rule of Binary criteria" presented above. B.5,6,7.3 ("Was the project registered by the CDM EB?") was moved from phase 7 to phase 9. This was done since the successful completion of the criterion (listed as "B") cannot be expected before the model indicated that criterion (listed as "C") had to be executed.

Model β is presented in Figure 4.9.

Figure 4.9: Model β

Phase 1

- C.1.1 Identify potential emission reduction projects
- C.1.2 Ascertain eligibility of projects regarding fundamental CDM criteria
- C.2.2 Clarify the need for the project. (revenue / corporate responsibility / etc)

- B.1.1 Does this project conform to the fundamentals of the CDM?
- B.1.2 Does the project fit the strategic business alignment of the project proponents?
- B.2.1 Is there a need for this project?

- R.1.1 What is the strategic importance of the proposed project?
- R.1.2 Is this project reproducible?
- R.2.2 How attractive is the amount of CERs earned?
- R.3.3 Is the required capital relatively low?
- R.4.1 How easy are the technical aspects?
- R.4.4 Is there an existing appropriate CDM methodology?
- <u>NEW Where is the project situated geographically?</u>

Phase 2

- C.2.3 Do an initial estimate of the emission reductions

- B.2.2 Does the initial emission reduction warrant a CDM project?

Phase 3

- C.2.4 Assess what is necessary in monitoring the inputs to calculate emission reductions
- C.2.5 Do initial assessment of project risk (financial, technical and regulatory)
- C.3.2 Build and evaluate initial financial model
- C.4.1 Do a detailed design for the financial / technical and non-CDM specific regulatory requirements and iterate to determine optimal case

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- B.2.3 Is the project risk level acceptable?
- B.3.2 Is the project regulatory viable?
- B.3.3 Does the project make financial sense?

Phase 4

- C.2.1 Obtain initial approval from local DNA
- <u>NEW Acquire a mandate</u>

- B.2.4 Are all inputs required measurable / obtainable?
- B.4.2 Does the appropriate CDM methodology exists or can it be developed?
- B.4.4 Is all the documentation required by the DNA developed?

- R.3.2 Is the regulatory environment in place?

Phase 5

- C.3.1 Do initial design for early estimates of regulatory / financial / technical requirements and iterate to determine initial best fit
- C.4.2 Identify/develop the required CDM methodology
- C.4.4 Develop all documentation required by the DNA

- B.3.1 Is the project technically viable?
- B.4.1 Does the detailed optimal design prove a bankable project?

- R.2.1 Are there any perceived or real objections from the local DNA?
- R.3.1 How easy are the technical aspects?
- R.4.2 Is the regulatory environment in place?
- R.4.5 Can the PDD be completed with relative ease?
- R.8.1 Can the building and commissioning phase be completed quicker with acceptable increases in cost?

Phase 6

- C.4.3 Develop the PDD

- B.4.3 Is the CDM PDD developed and completed?
- B.5,6,7.2 Was the project validated by the selected DOE?

Phase 7

- C.5,6,7.1 To achieve project approval
- C.5,6,7.2 To achieve project validation (<u>and final DNA approval</u>)

Phase 8

- C.13.1 To investigate and correct any shortcomings that exist in the project activity

Phase 9

- C.5,6,7.3 To achieve project registration
- C.8.1 To build and commission all equipment associated with the project activity
- C.10,11.2 Obtain issued CERs from UNFCCC EB

- B.5,6,7.3 Was the project registered by the CDM EB?
- B.5,6,7.1 Are all the necessary written approvals in place from the host party? (From DNA and other parties.)
- B.8.1 Are equipment built, commissioned and operating properly?
- B.9.1 Are all inputs measured in accordance to the PDD and all applicable tools?
- B.10,11.2 Did the UNFCCC EB issue the CERs?

- R.C.1 Identify and rank changes that can be made to increase the amount of CERs issued in the following year

Phase 10

- C.9.1 To monitor all inputs required as prescribed in the registered PDD

Phase 11

- C.10,11.1 Obtaining verification and certification of CERs from DOE

- B.10,11.1 Did the DOE verify and certify the CERs?
- B.13.1 Annual post-mortem: Can all problems be overcome?

Phase 12

- C12.1 To distribute the CERs to the relevant parties

- B.12.1 Were the CERs distributed to the relevant parties as contractually agreed upon?

4.9 Overall results, conclusions and next steps

During the interviews with the experts it became apparent that no expert had a strong opinion regarding the number of stages/phases that should be used. The large variance in the number of stages/phases used by the experts, which ranged from 8 to 20, is also notable. The two experts that identified 18 and 20 stages/phases did indicate that they would consider ±15 stages/phases to be a reasonable number.

Allowing the interviewed experts to add, alter, repeat and omit any of Model α's components resulted in the most flexible and non-prescribed responses while still providing them with guidance. The various project management models envisaged by the experts could be reconstructed from their input and consolidated to produce Model β.

Model β can now be present to the South African Clean Development Industry Association (SA CDM IA) for comments, critic and feedback. The input from the SA CDM IA will then result in the increased external validity of Model β.