PHASING TECHNOLOGY TRANSFER PROJECTS FOR SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT

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ABSTRACT

This paper describes appropriate phases and review points (or 'gates') for South African projects aimed at transferring technology for socio-economic development. Data gathering was done through a Delphi survey supplemented by a focus group session. A total of 42 knowledgeable respondents participated. The most significant phases of projects under consideration were confirmed, and relevant activities per phase and criteria for reviewing at the 'gates' between phases were identified. A total of 59% of resources should be made available for pre- and post-implementation activities, compared with the 41% of project resources to be made available during implementation. The causes of the failure of technology transfer projects under consideration were also identified. It is concluded that the use of a phased approach would improve the probability of project success.

OPSOMMING

Hierdie artikel beskryf die relevante fases en oorsig punte (of 'hekke') vir Suid-Afrikaanse projekte wat gemik is op die oordrag van tegnologie vir sosio-ekonomiese ontwikkeling. Die insameling van data is gedoen deur middel van 'n Delphi opname wat aangevul is met 'n fokusgroep. 'n Totaal van 42 kundige respondente het deelgeneem. Die mees beduidende fases van projekte onder bespreking is bevestig, en relevante aktiwiteite per fase asook kriteria vir oorsigpunte by die 'hekke' tussen die fases is geïdentifiseer. 'n Totaal van 59% van die hulpbronne behoort aangewend te word tydens die fases voor en na implementering, in vergeleke met 41% tydens implementering. Die oorsake vir mislukking van projekte onder bespreking is ook geïdentifiseer. Die gevolgtrekking word gemaak dat die gebruik van 'n gefaseerde benadering die waarskynlikheid van projek sukses behoort te verhoog.

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1. INTRODUCTION

1.1 Technology for socio-economic development

Technology is regarded as a key driver for global competitiveness. Developing countries therefore need to build capabilities in developing and/or applying new technologies in order to enhance cost-effectiveness, make the best use of natural resources, and compete in international markets.

Most technological progress in developing countries stems from the absorption and adaptation of existing technologies, rather than the invention of completely new technologies. Technologies can be sourced, assimilated, and adopted from all over the world to be utilised in high-value added production. In developing countries, technology transfer projects usually aim to introduce new techniques through investment in new plants, improving existing techniques, and generating new knowledge [1, 2, 3, 4].

Technology transfer indicates the movement of technology from one place to another – i.e. between persons, organisations, or even countries. It could relate to products, processes, applications, or people. It is often a complex, dynamic process, and success is not always guaranteed. Technology means knowledge (ideas, engineering, and technical know-how), people (skills, organisational structures, and behavioural patterns) and tools (procedures, equipment, and facilities) used to provide products and services to the market. Technology is not static, but rather entails continuous innovation for increased profitability, growth, sustainability, and competitiveness. Transfer consists of (1) materials, final products, components, equipment, and plants; (2) designs, blueprints, and know-how to create the desired capability; and (3) the know-why and information to innovate and to adapt existing technology. Transfer does not only mean a movement from one entity to the next, but also encompasses exchange, cooperation, partnerships, and collaboration [2, 4, 5, 6, 7, 8, 9].

Typically, the transfer of technology and knowledge can take place either for commercial gain or to achieve a non-commercial goal such as socio-economic impact. Ultimately the objective of technology transfer is to enhance productivity and promote economic growth at a project, firm, industry, and country level. Technology transfer is often an option used by developing countries to improve their socio-economic conditions. In addition, technology transfer for development often involves substantial adaptation for local conditions [5, 6, 10].

Government has a role to play in creating an efficient business environment in which all enterprises can operate. In cases of market failure, government has the responsibility to initiate and implement programmes that provide funding and other support to address the failure. Government has a role to provide programmes that increase access, diffusion, and transfer of technology in order to boost the number of start-ups and the competitiveness of existing businesses. Government interventions can be through technology policy; technology transfer and technological services, such as standards, testing, and certification; patenting; strategic business alliances; entrepreneurship development; and venture capital funding [2, 4, 6, 11].

1.2 Technology transfer for socio-economic development in South Africa

In South Africa, the creation of sustainable enterprises, especially in the underdeveloped areas of the country, can play a significant role in mitigating poverty, unemployment, and economic inequalities. Sustainable economic growth requires socio-economic development in areas where people do not have access to the technologies they require to make contributions to the economy. Transfer of appropriate technologies forms the basis for small, medium, and micro enterprises to become sustainable businesses [7].

Some examples of technology transfer projects for development in South Africa in different industries are the establishment of agro-processing facilities (e.g. the distillation of

essential oils); the introduction of downstream beneficiation of natural resources (e.g. developing new products for the mining sector); the introduction of new agricultural methods (e.g. growing herbs hydroponically); or the performance of value-adding activities on existing raw materials in an area (e.g. converting indigenous fruits into jams and preserves). These projects are typically funded by government departments or by large corporate companies as part of their social responsibility programmes. The aim of these projects is to uplift the communities in which they are implemented. So the projects are often implemented in areas of the country where there is a lack of formal employment, infrastructure, or opportunities for economic activity. The implementing organisation has to build capacity and develop skills in technology and management through training and mentoring; establish links with other government programmes and departments to obtain additional funding and support; provide access to information and markets; establish infrastructure; negotiate contracts with suppliers and customers; and monitor and evaluate project progress. In order to implement projects in a sustainable way, enterprises need to be established that are ultimately owned and managed by the beneficiary communities [12].

The South African government is actively promoting and funding innovation and technology as drivers of economic growth. A number of instruments and incentives relating to innovation and technology have been established. In addition, different government departments, science councils, academic institutions, and funding agencies are directly related to the innovation and technology arena in South Africa. All these organisations form part of the national system of innovation (NACI, 2008; The Government of the Republic of South Africa, 1996). Figure 1 is a graphical representation of the technology transfer context in South Africa.

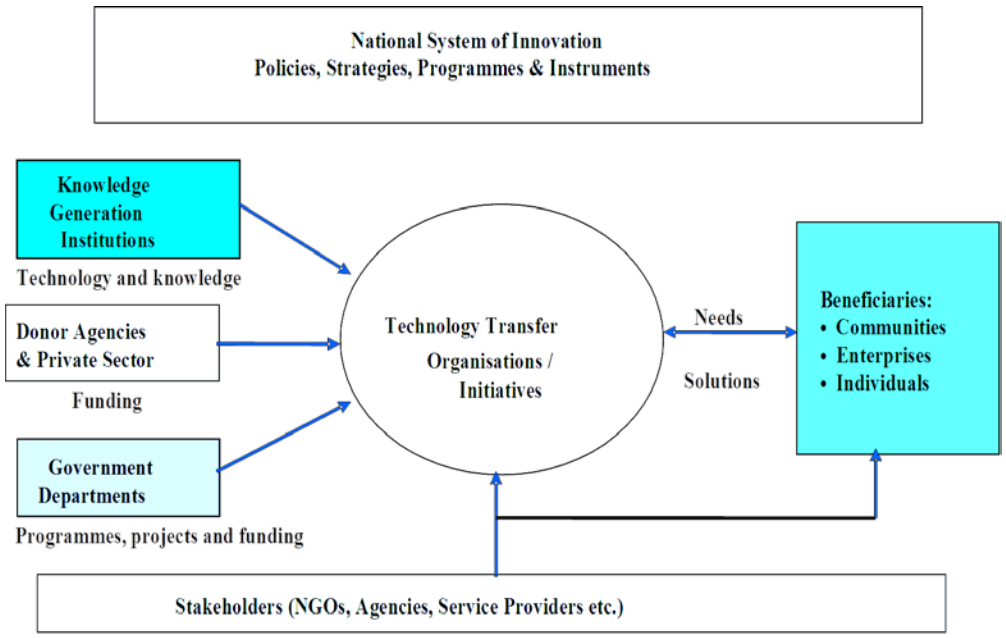

Figure 1: Technology transfer context in South Africa [13]

It is evident from the literature that not all technology transfer projects for socio-economic development in South Africa succeed in achieving the outcomes desired by all stakeholders [14, 15, 16]. In the South African context of development projects in general, and in technology transfer projects in particular, very few studies have evaluated the causes of or factors contributing to success or failure. Some of the aspects that have been raised in South Africa include a lack of planning; the absence of best practice models; and a lack of feasibility studies, piloting, and post-implementation support to beneficiaries [14, 15, 16, 17, 18, 19, 20].

1.3 Project management methodology for technology transfer

The way in which technology transfer projects for development are phased seems not to be conducive to delivering the planned outcomes of sustainable economic development. Although somewhat neglected in the literature, the principles of planning project life-spans in phases are well established in practice. A set of specific phases and gates normally forms the basis of company-specific project management methodologies. The objective of this research was therefore to identify the appropriate phases and review points (or 'gates') for the implementation of technology transfer projects for socio-economic development in South Africa. Further purposes of the research included: the determination of the resource allocation to project phases; the identification of activities required per phase; and the identification of criteria against which progress at the gates between phases should be reviewed.

Technology transfer projects for socio-economic development are complex endeavours, due to the many different stakeholder expectations that need to be managed; the lack of support in terms of policies, infrastructure, and information; a lack of skills and expertise on the part of beneficiaries; limited access to development finance; and cultural differences between funders, implementers, suppliers, and beneficiaries. It is therefore important to split these projects into manageable phases, in order to limit risks to the current phase (as the project is appraised at the end of each phase and could be terminated at the gate before continuing to the next phase); to generate information to address uncertainties and risks in future phases; to ensure continued buy-in from all stakeholders; and to monitor and control project implementation progress [4, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 38].

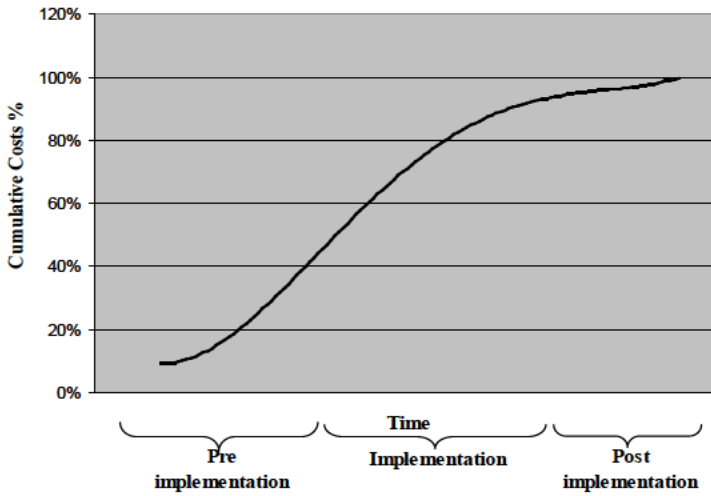

Figure 2: Cumulative project cost [19]

As illustrated in Figure 2, the cumulative cost of a project typically follows an S-curve: initially, during the early phases - such as the pre-feasibility and feasibility phases - expenditures rise gently and form a relatively small percentage of the total cost. During the pilot phase expenditures increase somewhat, and as the implementation phase is reached, cost and risk rise exponentially. The principle is that each phase has the objective of reducing the risk of subsequent phases in a cost-effective way. A relatively small amount of resources is spent in each phase to lower the risk of subsequent phases or, if an appraisal is done at the end of the phase and there are no feasible mitigation steps or plans available, the project could be terminated. For instance, conducting a technical feasibility study during the pre-implementation phases could ensure that potential risks during the implementation phase could be quantified and mitigated, or addressed in advance. If the risk of subsequent phases cannot be reduced sufficiently, or if the criteria for continuing to

the next phase cannot be met, the project should be terminated earlier [19, 38]. The acceptance criteria for each phase should be stated in gate acceptance criteria and, where these criteria cannot be met, a mitigation plan should be presented.

At the end of each project phase there should be a review point (or 'gate'), where deliverables are reviewed and future work is approved and authorised. At each gate the project members and other key stakeholders assess whether the outcomes of the current phase have been achieved. In accordance with the project management literature, the criteria to be achieved at each gate are those established by the stakeholders with the deliverable from the previous phase; having a documented execution plan for the next phase; and the approval of resources and funding for the next phase. If the criteria for a specific phase have not been achieved, the next phase should not be started. Based on the assessment, the project could progress to the next stage, work from the current stage could be repeated, or the project could be terminated [9, 17, 19, 20, 24, 25, 28, 31, 38]. The stakeholders could proceed to the next phase if there is acceptance of the inherent risk to proceed without satisfying the agreed gate criteria. This should not be the norm, and should be highlighted in the project documentation.

While the principles are well established, there were, prior to this study, no guidelines for distributing resources over the various project phases of projects for socio-economic development. In fact, this kind of information for projects in general is meagre. This paper provides the guideline for the type of project under consideration.

2. RESEARCH METHODOLOGY

Due to the lack of empirical and quantifiable data in the domain of technology transfer for socio-economic development in South Africa, as well as the small number of role players in the South African technology transfer field, a purely quantitative technique could not be used for data collection. Making effective decisions or solving problems in situations where there is insufficient or ambiguous information calls for the use of consensus methods such as committees, Delphi studies, the nominal group technique, and brainstorming [32]. Delphi and the nominal group technique are more cost-effective than alternatives such as surveys [33]. In addition, Delphi and the nominal group technique eliminate the problems often experienced with committees, such as one dominating person who leads the decision making; committee members who do not want to differ publicly from someone with a higher rank or status; committee members' fears of appearing foolish; a vocal minority who override the majority; members agreeing simply to avoid confrontation; and an unwillingness to give a judgement before all facts are known [34, 35]. Mullen [39] also confirms that the Delphi survey is the appropriate method to obtain consensus from a panel of experts.

Secondary data was collected in the form of a comprehensive literature review on project management, phases, and success; technology transfer context and methodology; and data gathering methods. Thereafter, primary data was collected through two group consensus techniques, namely a Delphi study and a focus group session.

2.1 Delphi process

The criteria used for the identification and selection of participants were that they had to be part of one of the organisations that support innovation or technology transfer activities in South Africa; they had to have experience in the field of technology transfer, socio-economic development, or management of socio-economic projects; and they had to be available and willing to participate in both Delphi rounds. The first-round participants were identified by contacting organisations in the national system of innovation, and requesting them to identify possible candidates.

In the first-round questionnaire, a set of project phases was provided to the participants, who were asked to identify the importance of each of these phases. Participants were asked to list success criteria for phases, as well as criteria to be reviewed at the gates

between phases. They were also asked to add to a pre-compiled list of possible causes of the failure of technology transfer projects, and then indicate the frequency the causes. Finally, the participants were asked to identify any other organisations or individuals that could contribute to the research project.

A total of 60 first-round questionnaires were sent out, and 32 completed questionnaires were returned, giving a response rate of 53%. The respondents had on average ten years of experience in technology transfer, nine years in socio-economic development, and 12 years in project management. In addition, they had worked on an average of 20 technology transfer projects or initiatives, and on 17 socio-economic development projects or initiatives.

From the responses received, a summary was compiled and made available to the respondents. The second-round questionnaire was based on the responses received in the first round. Any question on which there had been consensus in the first round was excluded from the second round. Where draft summaries had been made by the researcher, participants were asked to confirm their agreement with or provide inputs to these summaries. Where the first questionnaire had asked participants to list items, the second-round questionnaire asked them to indicate agreement or disagreement with the items supplied by the first-round participants.

The summary from the first questionnaire; the second questionnaire; and additional data or information requested by first-round participants were sent out to 70 participants, and 32 completed questionnaires were returned, giving a response rate of 46%. The respondents had on average 11 years of experience in technology transfer, eight years in socio-economic development and 12 years in project management. In addition, they had worked on average on 24 technology transfer projects or initiatives and on 17 socio-economic development projects or initiatives.

From the responses received, the researcher again compiled a summary for each of the questions. Any question on which consensus had not been reached was included in the agenda of the subsequent focus group session. Further details about the Delphi study are provided elsewhere [12]. The authors are of the opinion that the Delphi method requirements were satisfied, and that the results are a true reflection of consensus between experts in the field.

2.2 Focus group session

A focus group session was held with managers responsible for technology transfer for socio-economic development projects. The focus group confirmed and validated results for which consensus had not been reached during the Delphi study by means of the nominal group technique. In the focus group session, five project managers from the Enterprise Creation for Development Unit of the South African Council for Scientific and Industrial Research (CSIR) participated. The participants had on average seven years of experience in technology transfer, seven years in socio-economic development, and eight years in project management. In addition, they had worked on average on seven technology transfer projects or initiatives and on seven socio-economic development projects or initiatives.

3. RESULTS

3.1 Project management methodology

This research confirmed the most important phases for technology transfer projects for development, derived from the literature. The project phases, which were highlighted in the literature with regard to projects in general [9, 17, 19, 20, 24, 28, 31, 36], and confirmed during the data-gathering phase of this research for technology transfer projects specifically for development, are the following:

(i) Pre-feasibility study – An idea is conceptualised; the need for the project is clarified; and the scope and objectives are set.
(ii) Feasibility study – All issues are addressed, such as market size and needs, business establishment and operational costs, return on investment, and economic viability; and the proposed deliverables, budget, and delivery schedule for the project are planned.
(iii) Pilot project – A trial is done to validate viability before scale-up; test whether the equipment works and can deliver against specifications; address areas considered to be the greatest risks; and amend project documents to reflect any changes.
(iv) Launch, start-up and implementation – Final approval of the implementation to go ahead; official start of the project; and implementation of the proposed solution.
(v) Handover to the beneficiary – Ownership of the enterprise is transferred to the beneficiaries, including documentation, facilities, and infrastructure.
(vi) Operation or maintenance support – Provide support and assistance to beneficiaries as required.
(vii) Project finalisation and closure – Official completion of the project where a close-out meeting is held with all stakeholders; a formal project review is done; and the project implementation team continue to their next project.

To ensure that the correct information is gathered and that the desired outputs are generated in every phase, a list of activities for each of the phases was developed. If all these activities are addressed, there is a greater probability that a technology transfer project for development will achieve its desired outcome of sustainable economic development. There are specific technology-transfer related activities to be addressed, such as the identification of the appropriate technology; the technology transfer agreements, as applicable; the piloting of the technology to ensure that it works; technical support systems to be implemented; and the future upgrading of the technology. Also specific to the developmental context in which these projects are typically implemented, there are an unusually high number of activities that focus on the beneficiaries. These include the selection of beneficiaries; getting their buy-in; training, capacity building, and skills transfer; ownership issues to address; and continued operational support for some time after the full-scale implementation and handover. The phases and their associated activities that resulted from the Delphi survey are illustrated in Appendix A.

For technology transfer projects for development, the criteria to be considered at the gates between consecutive phases have been identified by this research project. Criteria that are specific to technology transfer include an illustration of the successful application of the technology; considerations with regard to the scalability of the technology; and the assimilation and satisfactory performance of the technology. Criteria specific to the developmental context include the addressing of ownership issues in sufficient detail; the availability of able and committed management and decision-making structures to sustain the business; ensuring that beneficiaries have been adequately trained; and having post-implementation support mechanisms in place. The gates with their associated criteria, as agreed upon by the Delphi respondents, are illustrated in Appendix B. The results are discussed in more detail elsewhere [12].

3.2 Effective deployment of project resources

The Delphi survey has shown that for technology transfer projects for socio-economic development, a total of 59% of project resources should be made available for pre- and post-implementation activities, compared with the 41% of project resources to be made available during implementation. This is illustrated in Figure 3. These figures will obviously differ for different types of projects and in different industries. However, the research also indicated that the pre-implementation studies and post-implementation support are often not done because the funders or sponsors of the projects prefer to fund only the implementation.

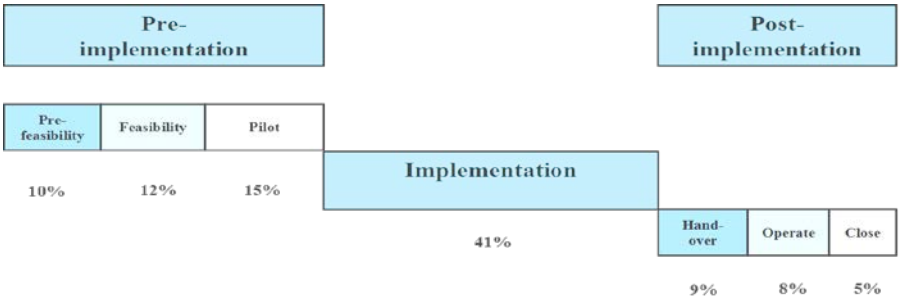

Figure 3: Resources per project phase

The project life cycle phases that are typically funded for socio-economic development projects are initiation, development, implementation, and hand-over. Stakeholders of the project expect certain outcomes or benefits from the project. However, Saad et al. [4] argue that, for technology transfer projects, project success is often determined by the operation of the provided technology – that is, the actual benefits could only be compared with the expected benefits during the operation and maintenance phases. The lack of funding for the pre- and post-implementation phases was listed as one of the causes of project failure. It is therefore important that sufficient resources are made available during the pre- and post-implementation phases of technology transfer projects for development, in order to improve the chances of achieving the desired outcomes.

3.3 Achieving project success through a phased approach

The causes of the failure of technology transfer projects for socio-economic development, identified through the empirical research, were related to (a) project phases; (b) technical or external factors; (c) project management; (d) stakeholders; or (e) beneficiaries. The causes directly related to the lack of application of project phases and gates in the execution of these projects (as suggested by this research) are: insufficient planning of project phases and gates before project implementation; failure to do a proper feasibility study or pilot project as an initial phase of the project; objectives, not clearly specifying their priorities and a checklist of activities to address per project phase; lack of funds for pre-project feasibility study and for ongoing support after implementation; and unplanned project termination or not closing the project at the right time, because no clear criteria exist to determine whether to continue with the project or not. The way in which the other causes of project failure could be addressed through the appropriate project phases, activities, and gates is illustrated in Table 1.

Table 1: Strategy for addressing causes of project failure

Cause of failure	Strategy for success
Technical or external:	
Lack of commitment, as well as poor delivery and implementation by subcontractors and service providers	• Implementation: Identify suppliers and establish relationships and service level agreements. • Retention of funds.
Project concept or technology was inappropriate with regard to the context, local conditions, available resources and skills levels of beneficiaries	• Feasibility: Identify proven and available technology that is best for the application, as well as technical capabilities. • Pilot: Test the high risk areas and components to prove that the concept works and can deliver the required result.
Project management:	
Monitoring, control and progress reporting was not done during project implementation	• Agree the Project Execution Plan up front. • Pilot: Monitor and control actual quality, costs, and timescales against the plan. • Implementation: Monitor and control progress against the scale-up plan and overcome barriers. • Handover: Monitor and control the transfer from the project team to the beneficiaries.

Cause of failure	Strategy for success
Technical or external:	
	• Support: Monitor customer satisfaction and market feedback. • Close-out: Compare actual outputs, costs, and timescales with the plan.
Project manager and team did not have the required experience	• Feasibility: Identify a competent project manager and team to implement the project. Support Project Manager with project specialists. • Pilot: Appoint an experienced project team for scale-up and commissioning, if a different team from the pilot project will be used.
Discrepancy between project performance and the project impact, because of the wrong measurements for project success (i.e. numbers vs. impact)	• Set up charter that will set the objectives and measure the definition of success. • Feasibility: Determine the availability of funding and the conditions from donors or funders. • Pilot: Evaluate the effectiveness of the pilot outcomes in addressing the real needs and being a solution to the problem.
Stakeholders:	
Key stakeholders were not identified and involved	• Pre-feasibility: Identify stakeholders and obtain their buy-in and support.
Decision-making is slow and bureaucratic and causes delays	• Feasibility: Define roles and responsibilities of stakeholders, beneficiaries, and project team.
Inadequate communication with stakeholders in all phases re interests/concerns	• Proper Project Execution Plan with a communication plan. • Pre-feasibility: Identify stakeholders and obtain their buy-in and support. • Feasibility: Define roles and responsibilities of stakeholders, beneficiaries, and project team. • Implementation: Communicate regularly with stakeholders to retain their buy-in and commitment. • Handover: Determine stakeholders' satisfaction with the transferred technology. • Support: Report to stakeholders with regard to progress and challenges. • Close-out: Conduct a close-out meeting with all stakeholders.
There is not a shared vision among stakeholders, and their expectations are not aligned	• Project charter required. • Pre-feasibility: Identify stakeholders and obtain their buy-in and support.
Some stakeholders have hidden / political agendas and vested interests	• Agree the charter. • Build stakeholder relationships and manage. • Feasibility: Define roles and responsibilities of stakeholders, beneficiaries, and project team.
Beneficiaries:	
Project implementation was not informed by the ultimate needs of the beneficiaries in terms of the socio-economic situation, skills development, and empowerment	• Pre-feasibility: o Identify the real need of the market and beneficiaries, and compile a problem statement and specification. o Conceptualise and define the proposed intervention model to address the need. o Determine if there is a compelling reason for the project in the area or community.
Lack of involvement of the beneficiaries in all project phases	• Pre-feasibility: Identify the real need of the market and beneficiaries, and compile a problem statement and specification. • Feasibility: Analyse the business model and the ability of beneficiaries to manage the project. • Pilot: Provide training and empower beneficiaries to manage the transferred technology. • Implementation: Ensure that beneficiaries are committed to making the business a success.

Cause of failure	Strategy for success
Technical or external:	
	• Handover: Verify beneficiaries' training and skills in management and technical aspects. • Support: Establish an administrative support base for the beneficiaries. • Close-out: Ensure that assets and documentation have been handed over to beneficiaries.
Failure to conduct capacity building with beneficiaries with regard to skills to manage the project on their own (including management, technical, and business skills)	• Pilot: Provide training and empower beneficiaries to manage the transferred technology. • Implementation: Enhance the capacity of beneficiaries in management and technical skills. • Handover: Verify beneficiaries' training and skills in management and technical aspects.

4. CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the application of a phased project approach, with appropriate phases and gates (as proposed in Figure 3), would improve the probability of project success and prevent wasteful expenditure on projects or phases with a low potential of success. If the risk of subsequent phases cannot be reduced sufficiently, or if the criteria for continuing to the next phase cannot be met, the project should be terminated. In addition, spending more resources during the pre- and post-implementation phases would improve the chances of achieving the desired outcomes even more. Greater success in technology transfer projects for socio-economic development will benefit communities, enterprises, and individuals, and would result in more sustainable economic development.

This research revealed some integrative insights with regard to project phases, gates, and causes of failure, based on the knowledge and experience of experts in the field. As very few publications relate to technology-transfer projects for socio-economic development in South Africa, the research described in this paper provides the foundation for the development of a project management methodology for this specific application, and thus contributes to the bodies of knowledge on project management and technology transfer for socio-economic development.

Recommendations with regard to technology transfer projects for socio-economic development in South Africa (and possibly also in other developing countries) are that project phases and gates should be employed; a proper feasibility study should be conducted as the first phase of the project; funding and support for technology transfer projects should continue after the hand-over phase; and monitoring and evaluation must be done during project implementation and thereafter to ensure the achievement of the desired outcomes. Clear guidelines for the relative effort to be spent on each project phase are provided.

Possible areas for further research include the ranking of the different activities and criteria identified; the development of a generic technology transfer methodology that could be used in development projects; a comparison of the actual resources made available per project phase and its impact on project success or failure; and a comparison of the actual methodologies used by different donors or funders, and their effect on project success or failure.

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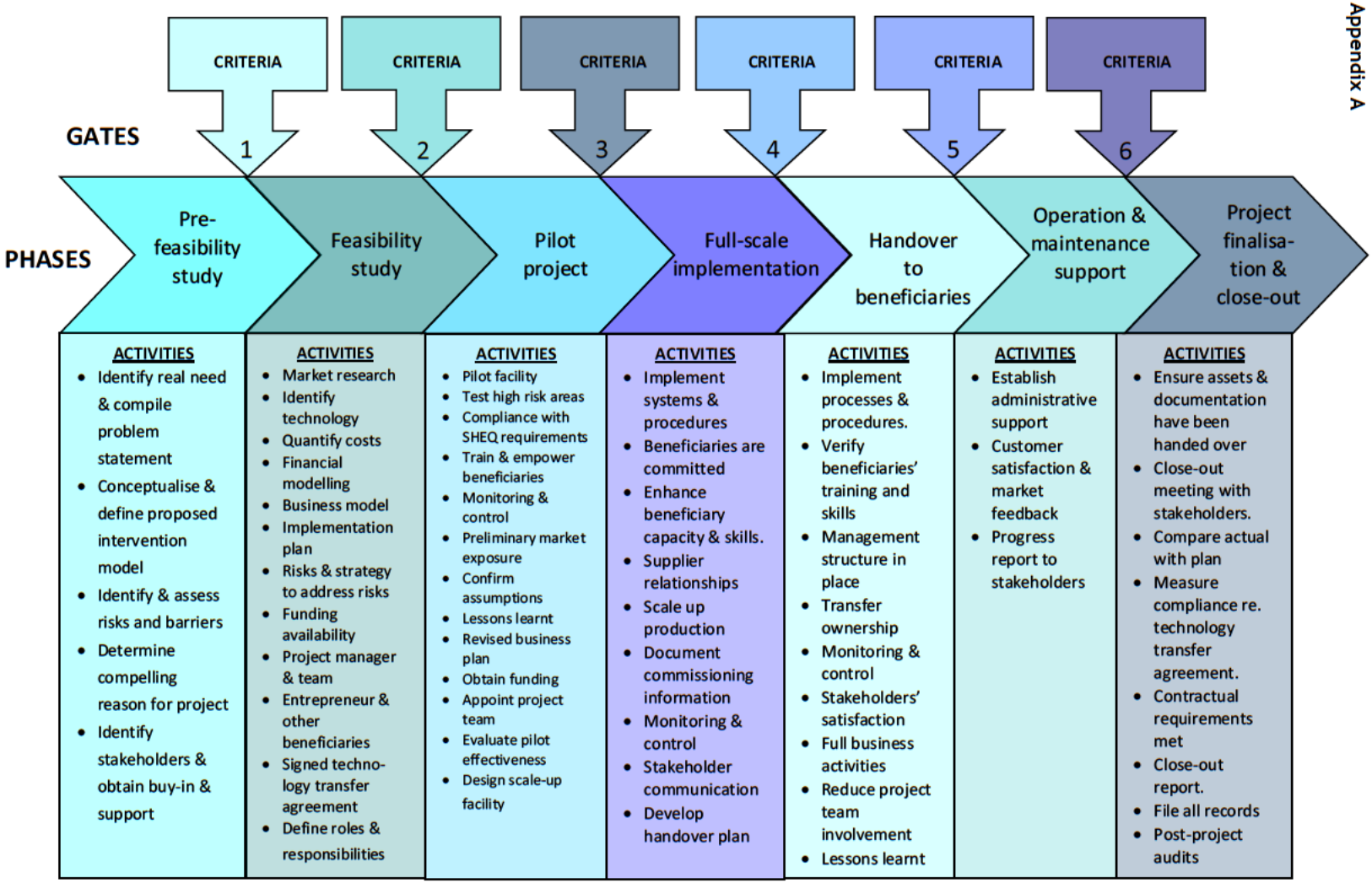
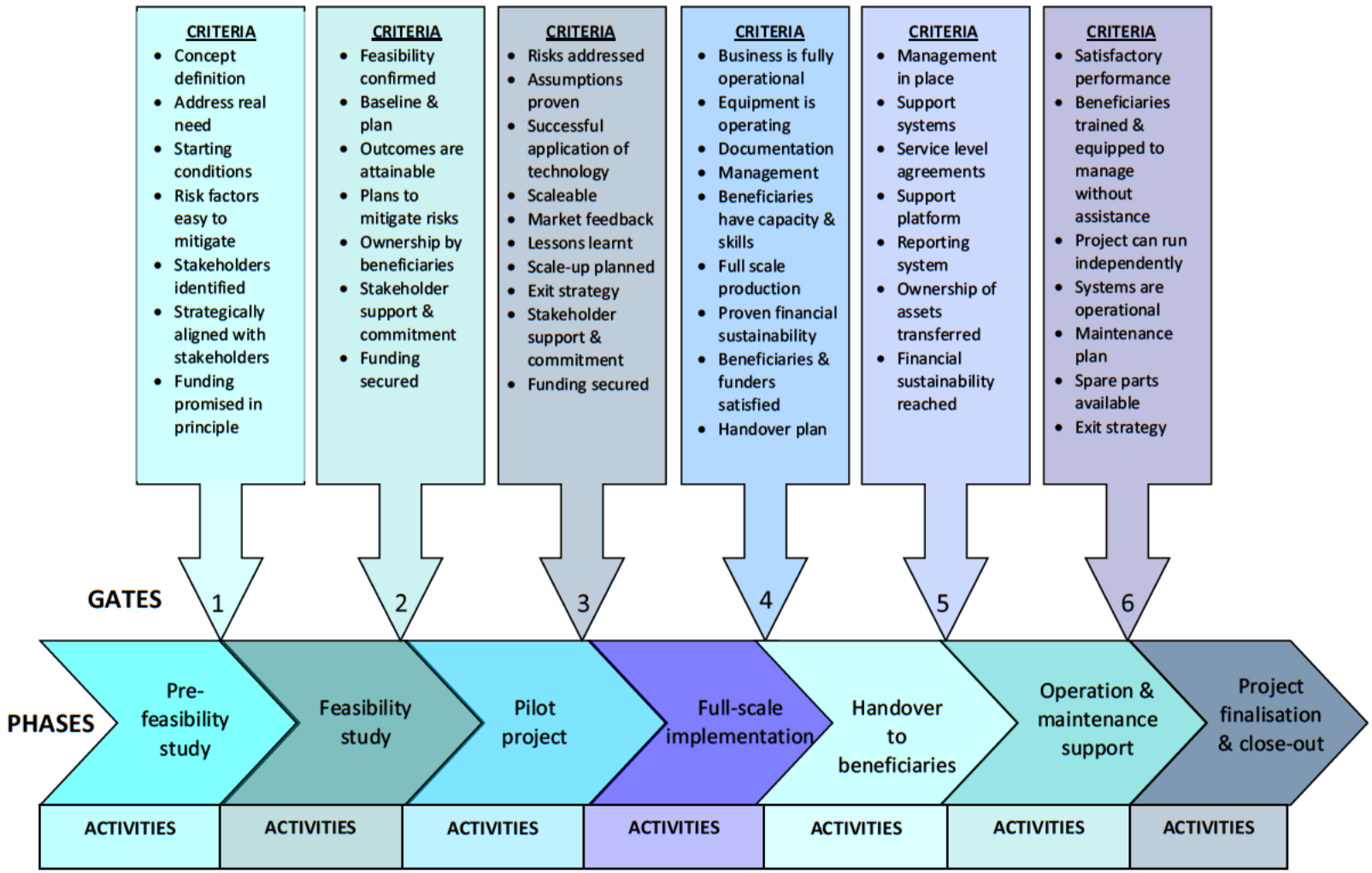

CRITERIA
CRITERIA
CRITERIA
CRITERIA
CRITERIA
CRITERIA
GATES
1
2
3
4
5
6
PHASES
Pre-feasibility study
Feasibility study
Pilot project
Full-scale implementation
Handover to beneficiaries
Operation & maintenance support
Project finalisa-tion & close-out
ACTIVITIES
Identify real need & compile problem statement
Conceptualise & define proposed intervention model
Identify & assess risks and barriers
Determine compelling reason for project
Identify stakeholders & obtain buy-in & support
ACTIVITIES
Market research
Identify technology
Quantify costs
Financial modelling
Business model
Implementation plan
Risks & strategy to address risks
Funding availability
Project manager & team
Entrepreneur & other beneficiaries
Signed techno-logy transfer agreement
Define roles & responsibilities
ACTIVITIES
Pilot facility
Test high risk areas
Compliance with SHEQ requirements
Train & empower beneficiaries
Monitoring & control
Preliminary market exposure
Confirm assumptions
Lessons learnt
Revised business plan
Obtain funding
Appoint project team
Evaluate pilot effectiveness
Design scale-up facility
ACTIVITIES
Implement systems & procedures
Beneficiaries are committed
Enhance beneficiary capacity & skills.
Supplier relationships
Scale up production
Document commissioning information
Monitoring & control
Stakeholder communication
Develop handover plan
ACTIVITIES
Implement processes & procedures.
Verify beneficiaries' training and skills
Management structure in place
Transfer ownership
Monitoring & control
Stakeholders' satisfaction
Full business activities
Reduce project team involvement
Lessons learnt
ACTIVITIES
Establish administrative support
Customer satisfaction & market feedback
Progress report to stakeholders
ACTIVITIES
Ensure assets & documentation have been handed over
Close-out meeting with stakeholders.
Compare actual with plan
Measure compliance re. technology transfer agreement.
Contractual requirements met
Close-out report.
File all records
Post-project audits


CRITERIA
Concept definition
Address real need
Starting conditions
Risk factors easy to mitigate
Stakeholders identified
Strategically aligned with stakeholders
Funding promised in principle
CRITERIA
Feasibility confirmed
Baseline & plan
Outcomes are attainable
Plans to mitigate risks
Ownership by beneficiaries
Stakeholder support & commitment
Funding secured
CRITERIA
Risks addressed
Assumptions proven
Successful application of technology
Scaleable
Market feedback
Lessons learnt
Scale-up planned
Exit strategy
Stakeholder support & commitment
Funding secured
CRITERIA
Business is fully operational
Equipment is operating
Documentation
Management
Beneficiaries have capacity & skills
Full scale production
Proven financial sustainability
Beneficiaries & funders satisfied
Handover plan
CRITERIA
Management in place
Support systems
Service level agreements
Support platform
Reporting system
Ownership of assets transferred
Financial sustainability reached
CRITERIA
Satisfactory performance
Beneficiaries trained & equipped to manage without assistance
Project can run independently
Systems are operational
Maintenance plan
Spare parts available
Exit strategy
GATES
1
2
3
4
5
6
PHASES
Pre-feasibility study
Feasibility study
Pilot project
Full-scale implementation
Handover to beneficiaries
Operation & maintenance support
Project finalisation & close-out
ACTIVITIES
ACTIVITIES
ACTIVITIES
ACTIVITIES
ACTIVITIES
ACTIVITIES
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