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CONTRACTORS' SELECTION AND ITS EFFECTS ON WATER INFRASTRUCTURE DELIVERY

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Recognising the impact of the dearth of water infrastructure on the economy and social wellbeing of the citizens, the government of South Africa has continued to invest in the development of suitable water infrastructure. Unfortunately, the current pace of water infrastructure delivery is not complementary to the investment made, due to an ineffective procurement system that fails to produce quality performing contractors. The work quality of contractors influences the successful execution of infrastructure delivery. Therefore, it is imperative to evaluate the current procurement system. In this research, the single site case study method of qualitative research was adopted. Semi-structured questionnaires, complemented by interviews, were used as instruments for data collection. The participants were drawn from the supply chain management functions unit, the bid adjudication committee, technical team, consultants, and contractors. The findings revealed that the combined effects of the use of an ineffective procurement system and low capacity of professionals in the in-house team of the client have contributed to the delays in procuring the services of the specialist sub-contractors required for the execution of the rehabilitation scheme of the Clanwilliam Dam project. Therefore, this research recommends the adoption of contractors 'pre-qualification to facilitate the selection of quality contractors as well as to increase of the capacity of the in-house professionals.

Keywords: Clanwilliam dam, contractors 'pre-qualification, selection of quality contractor, procurement process, water infrastructure delivery

INTRODUCTION

Water is a basic resource necessary for life, energy, farming and other economic growth. While water is needed for various uses, it is a scarce resource that is unequally distributed and, most of the time, used inefficiently. South Africa receives an annual average rainfall of 465 mm, which is about half of the world's average of 860 mm (DWS, 2019). The effective management of this resource is necessary to meet the current and future water demand. Water infrastructure is built by the government to regulate, monitor and provide clean water to all users. The infrastructure includes dams, pipelines, water treatment plants and canals. Water

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infrastructure is capital intensive in terms of development, operation and maintenance. The critical phases of design, construction, operation and maintenance of water infrastructure require a team of highly skilled human capacity of diverse professionals. If these professional human capacities are not integral to the in-house team of the organisation (such as the National Department of Water and Sanitation – NDW&S), their services can be sourced through appropriate procurement systems. However, when the procurement process is not effectively managed, it could lead to engaging incompetent professionals, low skilled consultants, and poor-quality contractors. The net effect of this action results in the delays in water infrastructure delivery, loss of investments and revenue.

The background to this research is the execution of the rehabilitation project of the Clanwilliam Dam. The Clanwilliam Dam was built in 1935 on the Olifants River in the Western Cape, near the town of Clanwilliam. Safety inspections on the dam showed that remedial work is required to stabilise the dam wall distortions. In addition to strengthening the existing wall, it was decided to increase the storage capacity of the Dam. The proposal included raising the dam wall by 13 m, which would provide an additional storage capacity of 70 million m3 per annum. This would improve the reliability of water supply, provide additional resources to farmers and enhance the tourism potential of the benefiting municipalities. A feasibility study confirmed that the rehabilitation was both technically feasible and economically viable. The design of the rehabilitation scheme was prepared by the in-house engineering department of the National Department of Water and Sanitation, Infrastructure Development Unit, with professional inputs from a specialist consulting civil engineering firm.

The contract for the rehabilitation project was awarded to the in-house construction management unit of NDW&S, as the main contractor for the project. Work on the project officially commenced in October 2018 and was scheduled to be completed in 48 months. However, before the commencement of work, the contractor requested the appointment of sub-contractors necessary to execute specialist work before and during the rehabilitation process. The three critical specialist service providers required were:

- Drilling and blasting,
- Drilling and grouting of the foundation, and
- Preparation of concrete surfaces.

Subsequently, the tender documents for each specialist's work were submitted to the procurement unit. Unfortunately, by June 2019, none of the sub-contractors had been appointed. These delays have had negative impacts on the project timeline and contract price.

Therefore, this paper explores the factors responsible for the delays in the execution of the Clanwilliam rehabilitation plan.

LITERATURE REVIEW

The success of infrastructure delivery depends significantly on the quality of contractors. The three performance indicators of time, cost and quality, commonly referred to as the iron triangle, have been used as the factors for measuring project success in the last couple of decades (Atkinson, 1999). However, Toor and Ogunlana (2010), suggest that these performance measures can no longer be the sole determinant of project success, in view of current realities. In their opinion, other factors that should be considered in the discussion are safety, efficient use of resources, effectiveness, satisfaction of stakeholders and reduced conflicts. According to Tookey et al. (2001), the correct selection of the procurement method is fundamental to a successful selection of the project execution team (PET) members, especially the contractors (Mchopa, 2015). Therefore, a successful procurement exercise should commence at the selection of appropriate and suitable procurement route(s).

Selecting procurement route

The process of selecting the appropriate procurement system depends on the client's objectives. According to Oyegoke et al. (2009), the construction procurement priorities of the client are shifting from lowest cost to best value procurement. In the opinions of Ruparathna and Hewage, (2015), procurement is an avenue that integrates value for money (VFM), sustainability and safety into a construction project. A project's VFM performance relies on the procurement method (open, restricted, etc.) and the procurement route selected, for example, the traditional design, bid and build (DBB) system (Escamilla and Ostadalimakhmalbaf, 2016), the design and build (DB) system (Idoro, 2012), or the relationship-based procurement system (Jefferies et al., 2014). Seeking the best VFM requires, among other things, diligent procurement planning and design. Marinelli and Antoniou (2019) noted that, although procurement options are well established in terms of procedure, organisation and governance, many of the procurement exercises (especially through the traditional procurement system) have failed to produce the best VFM, because of the practice of patronising the lowest bidder (Deep et al., 2017).

Procurement has the potential to impact on public project performance, because the process determines the quality of the PET, which includes the consultants and contractors. The construction project delivery system has changed over the past decades, transitioning from traditional procurement to the introduction of a range of alternatives which include design and build, design-build-maintain, private finance initiative, and partnering and project alliancing (Walker and Hampson, 2003). Clients are advised to choose the procurement route which best suits the needs of the project. To select a quality contractor for the effective execution of water infrastructure projects, the procurement process should begin with the pre-qualification of suitable contractors.

The influence of pre-qualification of contractors in an effective procurement system

The selection of quality contractors holds the potential of engaging adequately resourced contractors, knowledgeable in the project at hand, reducing the

incidence of rework, capable of producing an overall quality project, which is delivered within schedule, reasonable cost and enabling the client to achieve VFM (Jafari, 2013; Ruparathna and Hewage, 2015). Therefore, it is necessary to introduce systems that will assist in filtering prospective contractors, with the aim of selecting the most suitable one(s) for the infrastructure type to be executed. This filtering process is commonly referred to as the 'pre-qualification 'process. To achieve good results in the pre-qualification process, Jafari (2013), proposed a pre-qualification model which uses the Quality Function Method. This model considers both the client's requirement and the contractor's capabilities, focusing on the contractor's capacity to perform, evidence from previous projects executed and financial stability as tools to identify a suitable contractor. The information in the pre-qualification document should be comprehensive. The process should include a detailed examination of the documents submitted by each contractor, complemented by physical verifications. The category or categories of contractors to be invited for pre-qualification should be specified, so that the shortlisted contractors will be approximately equal in capacity and capability (Ogbeifun et al., 2018). At the end of the pre-qualification process, a shortlist of suitable contractors is produced. The shortlisted contractors are then invited to tender for the construction project. This approach holds the potential of selecting quality contractors, simplifying the process of tender evaluation, providing an opportunity to examine the technical competency, balanced pricing and a workable schedule or project timeline of the contesting contractors. This process should lead to objective decisions on the chosen contractor(s) (Jafari, 2013).

RESEARCH METHOD

The aim of this research is to explore the impact of the selection of suitable contractors on the effective execution of water infrastructure projects. The case study method of qualitative research was considered as the most suitable to answer the research questions as the case study strategy is suitable for the in-depth study of the different perceptions and concerns of the research participants in a real-world situation (Yin, 2014). In addition, it focuses on responding to the how and why questions about contemporary occurrences or systems and improving systems or organisations (Yin, 2014). Procuring the services of suitable contractors to execute the rehabilitation project of the Clanwilliam Dam is a real problem in a real world.

Population, sample and sampling

The population for this research was all the staff of the Department of Water and Sanitation responsible for infrastructure development. However, due to resource and time constraints, the purposive method of sampling (Day and Bobeva, 2005) was used to select participants (influenced by the role they play), from the supply chain management function, technical team, heads of departments, contractors and consultants directly involved with the rehabilitation project of the Clanwilliam Dam. The 15 officials, shown in Table 1, who responded to the invitation are highly knowledgeable about the subject of the research and actively participated in the research exercise.

Table 1 Participants

S/No	Cluster	Number selected	Designation
1	Selected Heads of Unit/Division		
1a	Mechanical and Electrical	1	Senior Management.
1b	Integrated Environmental Engineering	1	Senior Management
1c	Infrastructure Development	1	Engineer
1d	Strategic Asset Management	1	Senior Management
1e	Hydrological Services	1	Senior Management
1f	Supply Chain Management	2	Senior Management
2	Technical Team	3	Engineers
3	Contractor	3	Project Manager and Engineers
4	Consultant	2	Project Manager and Engineer
	Total	15	

In qualitative research, there are no strict rules on the sample size, the principle is to attain 'saturation 'of information from a truly representative population (Hennink et al., 2011). Nevertheless, when using homogeneous samples, the participant size of 6-8 is ideal. Nevertheless, a sample of 12 or more may be necessary when dealing with heterogeneous population (Zyzanski et al., 1992). The participants for this research are considered heterogeneous because they are from different professional backgrounds and perform different functions in the Clanwilliam Dam rehabilitation project. The goal is not to increase the quantity of the sample but to concentrate on the quantity and diversity of information to be collected, that effectively address the research questions (Hennink et al., 2011).

Data collection and analysis

The data was collected in two stages, first using a semi-structured questionnaire with open-ended questions to collect preliminary information from participants. Secondly, one-on-one interviews were conducted with one selected individual within these clusters:

i. Engineering (Mechanical/Electrical)
ii. Infrastructure (Asset management, Integrated environment
iii. Hydrological services
iv. Supply chain management
v. Technical team

The semi-structured questionnaires were delivered to the respondents electronically, commonly referred to as 'the self-administered questionnaire (Yin, 2009). The questions were open-ended, which allowed an elaborate account from respondents. After the analysis of the preliminary data, face-to-face interviews of forty minutes each were held with five (5) participants from the specified clusters above. This second phase of data collection was done to enable these key participants to provide additional and succinct information necessary to answer the research questions. The principles of content analysis of qualitative data were used in the analysis of the information collected (Hsieh and Shannon, 2005).

To ensure the reliability and validity of the research, participants were drawn from the strategic and tactical levels of leadership as they are knowledgeable about the subject of the research (Hsieh and Shannon, 2005). The information provided by the respondents and the synthesis of the researcher were circulated to respondents for confirmation of accuracy in interpretation.

The details of the data collected, and the results of the analysis are shown in the findings and discussion section.

FINDINGS AND DISCUSSIONS

This section provides the information gathered from the participants using the two instruments for data collection, their analysis and discussions of best practices gleaned from literature, starting with the background to the research.

Findings and analysis

An excerpt of the data collected from the interview responses and the analysis is shown in Table 2. For the sake of brevity, this paper will focus on the Questions 1-6, which are relevant to the procurement process and the impact of contractor selection on infrastructure delivery. According to Wong, (2008), qualitative data analysis involves making sense of the vast amount of data by reducing the volume of raw information, followed by identifying important patterns, extracting meaning from the data, and creating a logical chain of evidence. The principle of content analysis of qualitative data was used for the purpose of summarising and tabulating data. The analysis of the data collected provides an explanation, understanding or interpretation of participants 'experiences and situation (Sunday, 2019). The synthesis from the analysis of respondents 'information led to the identification of suitable themes. The three themes identified and discussed in this paper are: Procurement management and improvement require end-user's involvement, Quality contractors enhance project delivery and Pre-qualification of contractors, as shown in Table 2.

Discussion of findings

The research findings, summarised as suitable themes (Table 2), are procurement management and improvement require end-user's involvement; quality contractors enhance project delivery, and pre-qualification of contractors. These themes are discussed in the following sub-sections.

Procurement management and improvement require end-user's involvement.

The above theme is the product of information gleaned from responses to survey Questions 1, 2, 3 and 4. The participants observed that there are inherent deficiencies in the current procurement process, noting that relevant internal units of end-users are not involved early in the project procurement process. They further opined that the deficiencies in the procurement process "have not been able to address the issue of selecting poor performing contractors". The desire to improve the infrastructure delivery processes in South Africa has led to the development of the Standard for Infrastructure Procurement and Delivery Management (SIPDM). It was meant to guide public institutions on procurement practices in the delivery of suitable infrastructure and provide contract management standards that will ensure value for money and on-time delivery

(National Treasury, 2016). Nevertheless, participants observed the following, as major, deficiencies in the current procurement system:

- No clear implementation processes.
- Lack of training in the use of SIPDM.
- Over centralisation of supply chain management (SCM).
- Low input from operators of procurement system when developing new ones.

This suggests that, if meaningful improvements in the procurement system are to be achieved, it requires timely and active participation of the end-users, where their experience and areas of concern in previous endeavours are highlighted. These observations should be carefully crafted into the development of new systems. The procurement documents and procedures should be user friendly, with reduced technical difficulties, incorporating adequate training for prospective users. Furthermore, the current practice (over-centralisation of operations), where the procurement process is managed by the SCM unit established by Treasury, is slowing down effective procurement performance.

Table 2. Analysis of responses

Interview Questions	Synthesis of Participants' Response	Suitable Theme
1. In your opinion, what do you think are the causes of the delays in the execution of water projects in this department, especially the rehabilitation of Clanwilliam Dam	Deficient procurement process: Internal procedures not involved early in project procurement. Poor planning and budget constraints; Low professional capacity.	Procurement management and improvement require end-user's involvement
2. In your opinion, has the selected method of procurement been able to effectively deliver technical services needed for the raising of Clanwilliam?	No; The procurement system has not addressed the issue of poor performing contractors; The consultants are lagging in enforcing quality assurance; Tenders cancelled due to errors in specifications.	
3. How involved is internal audit in the process of water infrastructure procurement?	Internal procedures are not involved early in project procurement; Difficulty in cost control; Incomplete bill of quantities, frequent variation orders.	
4. There have been several improvements on the infrastructure procurement system (SIPDM), have these improvements translated to effective delivery of water infrastructure and why?	Although SIPDM was supposed to be an improvement on previous procurement systems, no clear implementation process; Lack of training in the use of SIPDM; Low input from operators of the procurement system in the development of new ones; Decentralisation of supply chain management to the end-user; Due to faults in SIPDM, FIDPM was introduced in 2019.	
5. What are the impacts of the quality of selected contractors on effective water project delivery?	With quality contractors, projects are delivered on time, within cost, safety and with quality; Low operation and maintenance costs; Meet national objectives; Improve service delivery and satisfy water demand.	Quality contractors enhance project delivery
6. What additional processes do you suggest we can introduce into the procurement system that will assist in the selection of competent contractors?	Adapt CIDB construction procurement process; Conduct contractors' pre-qualification first before invitation to tender; Assess the competence and performance capabilities of contractors.	Pre-qualification of contractors

In the opinion of reference (Atkinson, 1999), a decentralised SCM system, in most cases, produces optimal results. This is in tandem with the suggestion of participants that "supply chain management (SCM) should be decentralised to the end-users". This approach will allow for the adaptation of procedures peculiar to respective end-users and their projects, with the potential of the speedy execution of the procurement process. It is, however, crucial that SCM decentralisation obtains organisational support and the deployment of skilled SCM practitioners. This will facilitate the procurement of suitable service providers for the execution and effective delivery of the much-needed water infrastructure.

During the continuous search for the improvement of infrastructure delivery, the SIPDM was amended and in 2019 replaced by the Framework for Infrastructure Delivery and Procurement Management (FIDPM). According to the National Treasury, changes were made to the SIPDM system due to misalignment with other relevant government policy prescripts (National Treasury, 2019/2020). The objectives of FIDPM are to promote VFM in all the phases of infrastructure delivery, as well as the allocation of responsibilities for decision making to definite persons or portfolios. Like the deficiencies observed with the implementation of the SIDPM system, the new FIDPM may not achieve the desired objectives if the SCM processes are not decentralised and the end-users adequately empowered to use the new scheme. Nevertheless, to achieve success in infrastructure delivery, the participants believed "clients or project coordinators should be actively involved in the development or amendment of the procurement system and the decision on the selection of the most appropriate project procurement route". The chosen procurement route should produce a quality contractor suitable for the execution of the project at hand.

Quality contractors enhance project delivery

The role of the contractor is central to the realisation of the construction project's objectives. It therefore suggests that stakeholders should be meticulous in the process of selecting suitably qualified contractor(s). The participants affirmed this position, noting that when a quality contractor is selected, a "project can be delivered timely, within cost allocated, quality specified, executed safely and environmental regulations compliant". Research evidence abounds that the use of the concept of the price of the 'lowest bidder 'as the determining factor to award a contract has fatal flaws, resulting in the execution of low-quality work with high life-cycle cost (Jafari, 2013). In South Africa and other developing countries, emphasis on the capability of the contractor should include the quality and quantity of relevant equipment, personnel and previous projects completed. In this regard, it is important to commence the process of contractor selection from the pre-qualification process.

Pre-qualification of contractors

The contractor is the most visible active force on the construction site among the PET members. Therefore, the selection of this group of actors requires careful consideration (Ogbeifun et al., 2018). Contractor selection involves a multi-faceted decision-making process with multiple selection criteria. In practice, the contractor selection process follows a two-stage process, known as the pre-qualification and post-qualification stages (Jafari, 2013). The pre-qualification process involves inviting many contractors to submit the information required by the procuring

client, so that an array of eligible contractors can be identified (Jafari, 2013). The client should provide comprehensive information in the pre-qualification document, followed by a detailed examination of the documents submitted by each contractor and physical verification, in terms of completed projects, the company's profile and financial capacity. The document should specify the boundaries for the prospective contractors to be invited for the pre-qualification exercise to ensure that the shortlisted contractors will be operatives of similar capacity and capability (Ogbeifun et al., 2018).

Furthermore, participants observed that one of the major setbacks in the process of selecting the specialist contractors required for the rehabilitation exercise of the Clanwilliam Dam was that "prospective contractors, invited to tender for the specialist services, did not meet the requirements stipulated by CIDB". These facts were only discovered at the bid evaluation stage. If the client had adopted the concept of pre-qualification of contractors before the invitation to tender, the problem of prospective contractors not meeting the required grading criteria of CIDB would have been avoided.

CONCLUSIONS AND RECOMMENDATIONS

The research focused on exploring the factors responsible for the delays in the execution of the rehabilitation work on the Clanwilliam Dam project. A feasibility study was conducted, which confirmed that the proposed rehabilitation exercise was both technically feasible and economically viable. The decision to execute the rehabilitation exercise through in-house units was made to save money. However, the project awarded, scheduled to commence in October 2018 and be completed within 48 months, had hardly taken off as of December 2019. This is largely because of the late discovery of the need for sub or specialist contractors.

The factors responsible for the delays were explored and found to include the deficiencies in the current procurement system and lack of sifting of prospective contractors. It was discovered that the procurement system does not have a clear implementation process; it encourages over-centralisation of SCM, does not provide for continuous training nor does it incorporate the opinions of end-users. As a result of the lack of comprehensive tender document, it only became obvious at the bid evaluation stage that the majority of the contractors did not satisfy the criteria for the level of work they were bidding for. The conclusion is that the delay in appointing quality specialist contractors for the execution of the Clanwilliam Dam rehabilitation exercise is due to the combined effects of a defective procurement system and the low human capacity of cognate professionals in the in-house team of the client. Therefore, this research recommends the adoption of the concept of pre-qualification of contractors to ensure that only contractors with acceptable criteria, capacity and capabilities are invited for the tender process. Secondly, the client should improve on the human capacity of the in-house team in all areas of procurement management.

REFERENCES

Atkinson, R., (1999), Project management: cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria International Journal of Project Management vol. 17, no. 6, pp 337–342.

Day, J., & Bobeva, M. (2005), Generic toolkit for the successful management of Delphi studies The Electronic Journal of Business Research Methodology vol. 3, pp. 103–116.

Deep, S., Bilal, M., & Ahmad, S. (2017), A study of various factors affecting contractor's performance in lowest bid award construction projects International Journal of Civil Engineering and Technology vol. 8, No. 2, pp 28–33.

DWS, (2019), National Water and Sanitation Master Plan Available http://www.dwa.gov.za/National%20Water%20and%20Sanitation%20Master%20Plan/Documents/NWSMP%20Call%20to%20Action%20v10.1.pdf, Accessed 14 June 2019.

Escamilla, E. F., & Ostadalimakhmalbaf, M. (2016), Capacity building for sustainable workforce in the construction industry The American Institute of Constructors vol. 41, no. 1, pp 51–70.

Hennink, M., Hutter, I., & Bailey, A. (2011), Qualitative Research Methods, London, SAGE.

Hsieh, H. F., & Shannon, S. E. (2005), Three approaches to qualitative content analysis Qualitative Health Research, vol. 15, no. 9, pp. 1277–1288.

Idoro, G. (2012), Comparing levels of use of project plans and performance of traditional contract and design-build construction projects in Nigeria. Journal of Engineering, Design and Technology vol. 10, no. 1, pp 7–33.

Jafari, A. (2013), A contractor pre-qualification model based on the quality function deployment method Construction Management and Economics, vol. 31, no. 7, pp. 746–760.

Jefferies, M., Brewer, G. J., & Gajendran, T, (2014), Using a case study approach to identify critical success factors for alliance contracting Engineering, Construction and Architectural Management vol. 21, no. 5, pp 465–480.

Marinelli, M., & Antoniou, F. (2019), Improving public works' value for money: a new procurement strategy International Journal of managing projects in business vol. 13, no. 1, pp. 85–102.

Mchopa, A. (2015), Integrating contract management practices into achievement of value for money in Tanzania public procurement: evidence from selected procurement entities in Moshi Municipality Journal of Public Procurement, vol. 15, no. 2, pp 129–149.

National Treasury, (2016, July 1). National Standard for Infrastructure Procurement and Delivery Management. Available online at: www.treasury.gov.za: http://www.treasury.gov.za/legislation/pfma/TreasuryInstruction/Annexure%20A%20-%20Standard%20for%20Infrastructure%20Procurement%20and%20Delivery%20Management.pdf, Accessed 31 April 2019.

Ogbeifun, E., Mbohwa, C., & Pretorius, J. H. C. (2018), The influence of stakeholders ' relationship on project success Proceedings of the International Conference on Industrial Engineering and Operations Management Pretoria South Africa, October 29–1 November 2018, pp 185–194.

Oyegoke, A. S., Dickinson, M., Khalfan, M. A., McDermott, P., & Rowlinson, S. (2009), Construction project procurement routes: an in-depth critique. International Journal of Managing Projects in Business vol. 2, no. 3, pp 338–354.

Ruparathna, R., & Hewage, K. (2015), Review of contemporary construction procurement practices Journal of Management in Engineering vol. 31, no. 3, pp 1–11.

Sunday, C. E. (2019), Qualitative data analysis Available https://www.uwc.ac.za/Student/Postgraduate/Documents/Qualitative data analysis.pdf, Accessed 24 June 2020.

Toor, S., & Ogunlana, S. (2010), Beyond the iron triangle: stakeholder perception of key performance indicators (KPIs) for large-scale public sector development projects International Journal of Project Management vol. 48, pp 229–236.

Tookey, J. E., Murray, M., Hardcastle, C., & Langford, D (2001), Construction procurement routes: re-defining the contours of construction procurement Engineering, Construction, and architectural Management vol. 8, no. 1, pp 20–30.

Walker, D., & Hampson, K. (2003), Procurement strategies: a relationship-based approach, UK London, Blackwell Science.

Wong, L. P. (2008), Data analysis in qualitative research: a brief guide to using NVivo, Malaysian Family Physician: The Official Journal of the Academy of Family Physicians of Malaysia, vol. 3, no. 1, pp 14–20.

Yin, R. K. (2009), Case Study Research: Design & Methods 4th edition, California, SAGE.

Yin, R. K. (2014), Case study research – design and methods 5th edition, Singapore, SAGE.

Zyzanski, S. J., McWhinney, I. R., Blake, Jr. R., Crabtree, B. F., & Miller .W, (1992), Qualitative Research: Perspective on the Future, In Crabtree B F and Miller W L (ed), Doing qualitative research, London, SAGE.