Drivers of Blood Donation Collection Costs: A Case Study at the Western Province Blood Transfusion Service

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by
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GLOSSARY OF TERMS

<table>
<thead>
<tr>
<th>Term</th>
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<tbody>
<tr>
<td>Capex</td>
<td>The capital expenditure in setting up a new clinic (bus, caravan, mobile or fixed site), including the vehicle/fixtures &amp; fittings, and the bleeding equipment such as chairs/beds, shakers and haemacues.</td>
</tr>
<tr>
<td>Clinic Classification</td>
<td>The classification of a clinic as either: commercial, educational, fixed site, hospital, industrial, mall or residential.</td>
</tr>
<tr>
<td>Consumables Costs</td>
<td>Expenditure on consumables that are directly attributable to either a unit of blood collected or a clinic held. Administrative overhead costs are not included in consumables costs.</td>
</tr>
<tr>
<td>Cost Code</td>
<td>A code used to identify each category of consumables expenditure in a financial system.</td>
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<tr>
<td>Fixed Site</td>
<td>A blood donation clinic operated from a permanent location. WPBTS operates two fixed sites, in Long Street and at the N1 City Mall, both in Cape Town.</td>
</tr>
<tr>
<td>Haemacue</td>
<td>A device that measures the haemoglobin level in the blood.</td>
</tr>
<tr>
<td>Phlebotomist</td>
<td>An individual trained to draw blood from a person.</td>
</tr>
<tr>
<td>Roaming Unit</td>
<td>A term used to refer to the three blood donation collection methods that do not operate from a fixed site. It includes the bus, caravans and mobile units.</td>
</tr>
<tr>
<td>Staff Costs</td>
<td>Salaries and wages paid to nurses, phlebotomists, donor hosts/hostesses, drivers and assistants who run blood donation clinics and tend to blood donors.</td>
</tr>
<tr>
<td>WPBTS</td>
<td>Western Province Blood Transfusion Service</td>
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Jonathan Davids
ABSTRACT

The cost of collecting blood from donors makes up a substantial proportion of the price paid by recipients of blood and blood products at hospitals. Understanding what drives the cost of collecting blood from donors will contribute significantly to understanding what can be changed to reduce that cost and ultimately influence the price of blood for patients.

The first objective of this study is to identify the factors that drive the costs incurred by Western Province Blood Transfusion Services (WPBTS) in collecting blood from donors. The second objective is to establish if those factors vary depending on the collection methods used and classification of the clinics visited. Collection methods include fixed site clinics, mobile clinics, caravans and a bus. Clinic classifications include residential, educational, commercial, industrial, hospital and mall clinics.

The first phase of the study comprises a series of interviews with the collections manager at WPBTS, to establish the main areas where collection costs are incurred. The second phase involves a quantitative analysis of the main cost areas: consumables costs, staff costs and capital expenditure (capex), and analyses them across the different collection methods and clinic classifications. The third and final phase of the study uses the Shank and Govindarajan (1993) model of structural and executional cost drivers to identify the factors that influence blood donation collection costs and discusses those factors relative to the quantitative findings of the phase before it.

The following factors were found to drive blood donation collection costs:

- Scale of Operations
- Experience of Employees
- Complexity of Services
- Capacity Utilization
- Linkages with Suppliers and Customers

Clinics of different classifications, making use of different collection methods, were found to be influenced differently by the cost drivers of scale of operations, complexity of services and capacity utilization.
1 INTRODUCTION

1.1 Research Area and Problem

The Western Province Blood Transfusion Service (WPBTS) is an incorporated association not for gain and its main activities are the collection, testing, processing and distribution of blood and certain derivatives of blood (Western Province Blood Transfusion Service, 2010).

As a non-profit organisation, WPBTS prices its blood and blood products relative to its input costs. Within WPBTS, there is a drive to keep operating costs low, in order to keep the selling price of blood low. A low selling price is particularly important to price-sensitive hospitals run by the South African government (the customer), which has been known to question the selling price set by WPBTS. (Champion, 2011)

WPBTS makes use of a number of collection methods, operating fixed site donation centres and roaming units. The roaming units include mobile clinics, caravans and a bus. Mobile clinics are dependent on venues such as church halls, community centres or places of business, while the bus and caravan collection methods are self-contained units that host onboard facilities for blood donation.

Roaming units visit places of business, residential areas, educational institutions and hospitals. The various collection methods and clinic classifications described here result in widely varying costs of collection. This means that some collection methods or types of sites visited may be expensive compared to others. (Champion, 2011)

The purpose of the study is to identify the factors that drive operating costs at WPBTS, specifically within the donation collections division. The study is focused on the collections division because the cost of collecting blood from donors makes up one of the biggest proportions of the cost of running the WPBTS. With a better understanding of what drives collection costs, WPBTS will be in a better position to design effective cost-reduction programmes.

This research will inform decision-making around blood donation collection, which may result in an overall reduction in the price of blood at hospitals, thereby improving the efficiency of delivering this life-sustaining product to hospitals in South Africa.
1.2 Research Questions and Scope

Understanding the factors that drive the cost of collecting blood from donors will allow the WPBTS to make informed decisions about the ways in which costs may be reduced. The primary research question is:

Which are the key factors that drive the costs incurred by WPBTS in collecting blood from donors?

If the factors driving collection costs vary by collection method and clinic classification, WPBTS will be in a position to make strategic choices about the collection methods they use and the types of locations that they visit. The second research question is:

Do the factors that drive collection costs vary depending on collection method used and classification of the clinics visited by WPBTS?

The scope of the research is limited to understanding cost drivers in the collections division of WPBTS. The study has not investigated collection costs at any other blood service organisation such as the South African National Blood Service (SANBS). This limited scope implies that results may not be generalised to other divisions within WPBTS or the collections division at SANBS.

The study considers both fixed site and roaming blood donation clinics operated by WPBTS but only considers the roaming clinics that are based at WPBTS headquarters in Cape Town. Roaming clinics headquartered in Worcester, Paarl and George have been excluded from the study, so as to remove a level of complexity because the cost dynamics of roaming units operating in those regions are different to those operating in Cape Town and its surrounds.

1.3 Research Assumptions

The research relies on the availability of quality historical cost data from existing sources within WPBTS. Saunders, Lewis, & Thornhill (2009) highlight that while the advantage of using a secondary data source is that the information already exists in the organisation, the potential pitfall may be that because that data was collected for a different purpose by the organisation, the data may not suit the purpose of the
research. The assumption regarding the quality of available data has been met in that the data provided by WPBTS has been of an adequate level of detail and was sufficient for the purposes of this study.

WPBTS expressed concern over the time which might be required to gather secondary data from various sources, which would depend on the level of detail required and the volume of data. The assumption at the outset was that this would not pose a problem. Subsequently, this assumption has been met.

1.4 Research Ethics

Confidentiality of data relating to individuals covered by this study is of paramount importance. At no point has the researcher or research supervisor divulged any personal data relating to either blood donors or WPBTS staff to any parties outside of WPBTS. Data related to WPBTS staff wages have not been shared with any unauthorised individual, not even individuals employed by WPBTS.

WPBTS expressed concern over sensitivity around specific amounts of money paid to certain suppliers. This problem has been avoided by not reporting costs at such a fine level of detail. As a result, there has been no need to mathematically distort any figures presented in this report.

The research includes interviews with the manager of the collections division. These interviews cover matters relating to the costs incurred by the collections division and the researcher has not met with any privacy issues in tying the views expressed to the identity of the interviewee.

1.5 Structure of the Report

This introductory chapter is followed by Chapter 2, a review of the literature relevant to the research problem. Chapter 3 describes the research methodology adopted in this study. Chapter 4 presents the research findings, analyses those findings and discusses the implications of the findings on the research problem. Chapter 5 concludes the research report and addresses the research questions.
2 LITERATURE REVIEW

The literature review considers a number of models that have found prominence in the field of management accounting. This section presents a general overview of Activity Based Costing and Strategic Cost Drivers, followed by a review of recent studies that have analysed cost drivers in various organisational settings. The final sub-section of the literature review concludes with a summary of what was found in the literature and its implications for the frameworks used in this study.

2.1 Activity Based Costing

Kaplan (1988) describes individual product cost measurement as one of four areas addressed by cost systems and Cooper (1988) describes the challenges experienced by manufacturing firms in their attempt to accurately assign production costs to different products. In respect of volume-related costs, such as direct labour hours, it is appropriate for those costs to be assigned to a product because those direct labour hours are a legitimate cost driver. However, conventional cost systems tend to also use a single, volume-related allocation base, such as direct labour hours, to trace shared or volume-unrelated costs to different products. This practice makes for inaccurate product costing.

Cooper (1988) presents Activity-Based Costing (ABC) as an alternative methodology that produces more accurate product costs. ABC considers the costs of the activities that produce the product and assigns costs to the product in proportion to those activities consumed by the product.

The ABC methodology is relevant to understanding the cost structure of the collections division of WPBTS. The collections division incurs both donation-volume-related costs, which are directly related to the collection of an individual unit of blood, such as the bag and needle kit, as well as volume-unrelated costs such as the staff costs associated with running the clinic. Since batch-level (clinic-level) staff costs are of similar magnitude to unit-level donation costs, an ABC system should, in theory, help to assign product costs to units donated much more accurately than a conventional costing system.
2.2 Strategic Cost Drivers

Shank and Govindarajan (1993) recommend that a firm pursuing a cost leadership strategy should develop keen insights into its cost structure. This should allow the firm to control its cost drivers better than its competitors, in pursuit of sustainable competitive advantage. Building on the work of Riley (1987) and Scherer (1980), Shank and Govindarajan (1993) describe two categories of cost drivers, namely structural cost drivers and executional cost drivers. Structural cost drivers include the (1) scale of operations, (2) scope of operations in the context of the value chain, (3) experience of the firm and its employees in providing present products and services, (4) technology used by the firm and (5) complexity of products and services offered. Executional cost drivers include (1) levels of work force involvement, (2) total quality management, (3) capacity utilization, (4) plant layout efficiency, (5) product configuration and (6) exploiting linkages with suppliers and/or customers.

WPBTS does not seek sustainable competitive advantage since it is not in competition with any other blood transfusion service. However, there is value in WPBTS understanding its cost structure and controlling its cost drivers in order to deliver a cost-effective service. The framework of structural and executional cost drivers is as relevant to WPBTS as it is to firms in pursuit of cost leadership.

2.3 ABC Implementation Challenges

Abernethy, Lillis, Brownell, & Carter (2001) affirm the intuitive appeal of ABC cost systems but note that ABC cost systems have not been extensively implemented in practice, citing the works of Innes & Mitchell (1995) and Chenhall & Langfield-Smith (1998). The literature points to a middle-ground between the complexity of a full-blown ABC system and the use of a crude, single volume-based costing system by considering a subset of cost drivers which capture the essence of what drives costs in a production environment.

Arnaboldi & Lapsley (2004) describe the challenges in implementing ABC at an organisation that produces health care products from blood transfusion services. One of the key lessons from the study is that the ABC system implementation process required that system developers have an understanding of the production processes, in order to ascertain cost drivers. The study also highlights challenges experienced by
one of the manufacturing plants in collecting cost driver information. Financial information was reliable since it was housed in well-structured databases while non-financial information was unreliable and difficult to collect since it was gathered from non-homogeneous reports.

2.4 Limiting the Number of Cost Drivers

Researchers have developed mathematical models that can be used to select an optimal number of cost drivers that balance the cost of using multiple cost drivers with the benefits of more accurate cost allocation (Homburg, 2001; Schniederjans & Garvin, 1997). Such a technique may be useful in this study, to isolate a small selection of cost drivers which capture the essence of what drives collection costs, without the need to implement an ABC system. The appropriateness of this approach will be informed by the number of cost drivers identified through this study. If many cost drivers are found, then it may be useful to consider a method for reducing those cost drivers to a more manageable sub-set. However, if few cost drivers are identified then the research will make use of all of those cost drivers, without the need to limit the number of cost drivers.

2.5 Cost Analyses Using Linear Regression Techniques

Davidson & Dewsnup (2009) analyse the cost and revenue structure of a blood bank using least squares regression analysis. They estimate the incremental cost of each unit of blood collected, based on eighty-two observations of monthly expenditure data relating to all functional units of the blood bank. Because the study uses monthly aggregated data, the authors describe difficulty in estimating costs associated with different collection methods because their input data includes costs shared by different collection methods. As a result, they are not able to conclude that any method of collection is more or less expensive than the others.

The Davidson & Dewsnup (2009) study also used linear regression to analyse aggregated monthly expenditure data to produce a statistically significant estimation of the marginal cost for each unit of blood collected by the Lane Memorial Blood Bank. However, for a three month period falling within the period that that study was based on, the organisation experienced large increases in monthly expenditure due to large capital investments. Over that same period, the number of units of blood
collected did not increase in step with the increase in monthly expenditure. This highlights a potential weakness of using linear regression as a local linear approximation of a phenomenon over time. If the variables being regressed are not linearly related, then the linear regression does not accurately model reality.

Davidson & Dewsnup (2009) introduce a constant variable to represent inflationary increases in costs over time. However, we cannot be sure that this variable truly represents changes in price levels due to inflationary effects or if costs increased generally because of a change in the operating efficiency over time. This highlights a weakness in the study which attempts to establish a marginal cost of collecting a unit of blood when the data that the study is based on spans almost seven years. That research was meant to be cross-sectional in time, yet the data collected seems more appropriate to a longitudinal study.

This cross-sectional study at the WPBTS focused on data spanning a relatively short period of time. This is discussed in more detail in the Research Methodology section to follow.

2.6 Multiple Techniques for Understanding Costs

Bjørnenak (2000) uses a number of approaches to identify and analyse operating cost differences between various public schools (both primary and secondary) in Norway’s four largest cities. The study uses a regression analysis, activity analysis, structural cost driver analysis and a product attribute analysis. The regression analysis tests the significance of each variable’s ability to predict the net operating cost per school (the dependent variable). After eliminating insignificant explanatory variables, ten variables are used to explain 91% of the variation in operating costs at each school. This regression analysis yields strong results but the author notes that the weakness of the regression technique is that it does not give insight into why, how and by how much each of those variables contributes to net operating cost.

The second phase of the study by Bjørnenak (2000) uses an activity analysis approach to disaggregate the single net operating cost value reported for each school. In doing so, the researcher is able to understand the cost structure of each school, based on the cost drivers that make up that cost. The author highlights that the approach used does not follow the ABC methodology strictly and does not attempt to allocate shared
activity costs to different groups of pupils. Instead, the activity analysis technique merely attempts to explain differences between the average costs per pupil at different schools.

The third phase of the study by Bjørnenak (2000) found that the listing and grouping of cost drivers by Shank & Govindarajan (1993) was not fully compatible with their observations of cost drivers at public schools in Norway. They found value in adding two more categories of cost drivers, namely institutional cost drivers and discretionary policies, to the list suggested by Shank & Govindarajan (1993).

2.7 Conclusion

To reach an understanding of what drives costs in an organisation, a number of approaches and analysis methods can be used. From the literature reviewed, it appears that linear regression is a popular choice. However, this technique is often used without a fundamental framework of what drives costs. As a result, a variable can be shown to have significant correlation with some measure of cost but the researcher may be left in want of an explanation as to whether or not that variable really drives costs or why a given variable is strongly related to cost.

A theoretical framework such as ABC presents a model for thinking about what drives costs. ABC proposes that activities drive costs and activities are the most reliable measure by which to assign batch-related costs to different products. Studies show that ABC is not widely implemented in practice. However, the framework does allow for a comprehensive list of cost drivers to be identified. Thereafter, the researcher may narrow focus on those cost drivers that are economical to measure, and those that have the most explanatory power or produce most accurate results of product costs.

In this study, the ABC framework has been used as a guide to thinking through the activities involved in blood donation collection, the direct and indirect costs involved and the assignment of those costs to different collection methods and clinic classifications. ABC is integral to the quantitative analysis phase of the study and in addressing the first research question about the key factors that drive blood donation collection costs.
The framework of structural and executional cost drivers suggested by Shank & Govindarajan (1993) provides a schema through which organisations can think through the cost structure implications of their strategic choices. In this study, the cost drivers framework is used to question the ways in which different blood donation collection methods are utilised and how different clinic types are operated. The use of the cost drivers framework is integral to addressing the second research question about the extent to which the factors that drive collection costs vary depending on collection method used and clinic classification.
3 RESEARCH METHODOLOGY

This chapter describes the methodology followed in this study. It highlights the research approach and strategy by considering ontology, epistemology, axiology, and research paradigm and research approach. The sections that follow consider the research design, data collection method and research instruments used in the study. Finally, this chapter concludes with sections on how sampling has been conducted, how data has been analysed and the limitations brought about by the sampling and analysis choices.

3.1 Research Approach

The researcher has taken an objectivist approach to the research. From an ontological perspective, the author contends that factors which drive costs of blood donation collection are objective entities which can be measured in monetary terms. Those factors which drive costs are not deemed to be influenced by the social actors in the system, such as blood donors or the WPBTS staff that collects donations.

The researcher also adopts a positivist view regarding the epistemology of the research. Only the observable costs associated with collections are used to derive an explanation of what drives costs in the donations division. The research does not focus on social phenomena such as the reasons why donors donate blood. This view was adopted despite the contention that social phenomena could influence the number of donations received at a clinic, at a particular location. It could be argued that this phenomenon influences efficiencies of that clinic, and thereby influences the cost of collection. However, there is no reliable way of quantifying the extent to which such social phenomena influence the cost of collection. Consequently, this has not formed part of the study.

Regarding axiology, the researcher has collected data, analysed results and drawn conclusions in a way that is free of any bias, and in so doing, has maintained an objective approach throughout the research process.

The research into cost drivers at WPBTS fits into the functionalist paradigm in that, firstly, it is assumed that costs are driven by rational explanations and not social phenomena, as described previously. Secondly, the research is regulatory, seeking
explanations for what currently drives collection costs. It is not the author’s intention to criticise the various collection methods and seek radical change in collection methods but rather to gain deeper insight into the characteristics of different collection methods and what drives collection costs.

Finally, the research approach follows that of an inductive study which aims to understand what drives collection costs and thereby build a model which explains those cost drivers. Armed with such a model, WPBTS is in a position to make strategic choices regarding the collection methods that it should employ.

3.2 Research Strategy

The research strategy is that of a single case study. In line with the definition of a case study from Robson (2002), the research is an empirical investigation into the particular contemporary phenomenon of blood donation collection costs, in its real life context of the WPBTS collections division. As explained in more detail in the next sub-section, the case study strategy lends itself to exploratory and explanatory research (Saunders, Lewis, & Thornhill, 2009).

A single case study strategy was used because the phenomenon of blood donation collection costs is quite unique to the collections division of WPBTS. The South African National Blood Service (SANBS) operates the only other blood service in South Africa, which also makes use of a variety of collection methods. However, a comparative case study would not have shed any more light on what drives collection costs at WPBTS. Also, a comparative case study strategy might have diluted the focus on cost drivers at WPBTS. For example, in a comparative case study a lot more effort would have been put into designing interview questions that allow for comparison between cases. On the other hand, a single case study strategy has lent itself to less structured questions, allowing the researcher to explore the pertinent issues without being forced to adhere to a pre-conceived formula of questions. The researcher asserts that exploring the pertinent issues in that way has lead to a more accurate diagnosis of cost drivers at WPBTS.

Following the categorisation of case studies by Yin (2003), the single unit of analysis for this study is the collections division of the WPBTS. No other divisions have been
investigated since the method of operation of the collections division is quite unique. The collections division has been treated as a holistic case study.

3.3 Research Design, Data Collection Methods and Research Instruments

The design of the proposed research takes the form of a single case study which includes exploratory and explanatory aspects. The study is exploratory in that it seeks to understand what is currently happening at WPBTS in terms of blood donation collection costs. In line with the definition of exploratory studies proposed by Robson (2002), this study asks questions and assesses the collection cost phenomena in a new light. According to Saunders et al. (2009), an exploratory study is useful for reaching a clearer understanding of a problem.

The research is also explanatory in that it has established causal relationships between factors that influence the cost of collection and the operating costs of the WPBTS collections division. The emphasis is on explaining this causal relationship (Saunders, Lewis, & Thornhill, 2009).

The data collection method has followed a mixed methods approach which has seen the gathering of both qualitative data in the form of interviews as well as quantitative data in the form of historical collection costs. The qualitative data has aided in the exploratory aspects of the study while the quantitative data has helped explain the observed phenomena (Saunders, Lewis, & Thornhill, 2009). Qualitative data has been analysed qualitatively and quantitative data has been analysed quantitatively.

The research method is cross-sectional, allowing an understanding of cost drivers at this point in time. The study is not longitudinal as it has not sought to explain how cost drivers have varied over time. Collection costs spanning a relatively short a time frame has been gathered (i.e. one year), avoiding the risk of collecting information from too short a time frame and deriving distorted results caused by local variation particular to that short time frame. A justification for the sampling method and chosen timeframe can be found in the sub-section on Sampling.

Research instruments include interviews and gathering of historical, secondary operational data on collection costs incurred by WPBTS. Due to its less rigid structure, interviews were preferred over surveys in the exploratory phase, which
identified some of the pertinent issues around blood donation collection costs. Results from exploratory interviews influenced the range of quantitative financial and operational data requested from WPBTS and the following sub-section on sampling describes the technique for extracting necessary data. Data analysis methods are also explained in more detail in the Research Methodology section. Interviews have also been a key research instrument in the final phase of the study when reviewing results from the quantitative analysis in discussions with the manager of the collections division.

3.4 Sampling

The researcher made use of non-probabilistic sampling techniques for both phases of data gathering. In the initial phase of the research, interviews were held with the collections manager and the manager of promotions and public relations at WPBTS. These interviewees were chosen on the basis of a non-probabilistic, purposive sampling technique because interviews with those individuals enabled the researcher to answer the research questions and meet the objectives of the study (Saunders, Lewis, & Thornhill, 2009). As explained by Saunders et al. (2009), this sampling method lends itself to case study research.

The quantitative data gathering phase also used a non-probabilistic sampling technique. This choice of technique was driven by two considerations. Firstly, there was no need to make statistically robust inferences about the population of collections costs based on the chosen sample, since the research has not followed a deductive approach. Instead, a sample was chosen so as to be representative of the population of collections costs across the range of collection methods and classification of clinics visited. The main consideration was that the sample should be unbiased and fairly representative of the underlying population.

The second reason why a non-probabilistic sampling technique was used is because the cost of collecting relevant data. Approximately two thousand six hundred clinics were held in the year under investigation. For this size of population, to derive a ninety-five percent representative sample of that year’s collection costs through sampling would have required about three hundred and forty observations. Given the complexity of information that needed to be collected for each clinic held, this sample
size would have been prohibitively big in terms of the time that would have been required to collect the data.

A sub-category of purposive non-statistical sampling called typical case sampling was used in this study (Saunders, Lewis, & Thornhill, 2009). The intention of this sampling technique was to provide illustrative values for collections costs across the range of collection methods and classifications of clinics visited. To ensure that the study was not biased toward collection costs for a certain time of the year, a full year’s collection costs were incorporated into the study. The sampling technique saw twenty observations of collection costs associated with each collection method (fixed site, mobile, caravan and bus) and twenty observations of collection costs associated with each clinic classification (educational institution, residential, commercial, etc.), for the period 1 September 2010 to 31 August 2011.

3.5 Research Criteria

This section considers factors that may influence the reliability of the study and describes approaches taken to mitigate these threats to reliability. Participant bias was mitigated by reassuring interviewees that whatever was said off the record in interviews would be respected by the interviewer, and that the interviewer welcomed suggestions on how any sensitive issues might be tackled, without drawing attention to the individual who may have raised the contentious issue. During the interviews, no such issues arose and there appeared to be no risk of participant bias.

Observer error was minimised by recording interviews so as to transcribe them more accurately than what would be the case if only hand-written notes were taken. Other issues pertinent to reliability of the study are discussed in more detail in the sub-section on data analysis methods.

Research validity is bolstered by a second round of interviews that was conducted with the manager of the collections division, following the quantitative data collection and analysis stages. This second round of interviews allowed for the preliminary results to be scrutinised and critiqued by the collections manager, and allowed for any disagreements and objections to be factored into the study and into the final results.
As noted in the earlier sub-section on research design, the research takes the form of a single case study because of the uniqueness of the operations of the WPBTS collections division. As such, the results of the research might not be generalised to other operational settings. However, given that the scope of the research omits certain towns in which WPBTS operates satellite collections operations, the findings may be generalised to those operations since they use the same collection methods, visit the same types of locations and operate in the same institutional setting.

The findings of this study cannot be generalised to the collections function of SANBS. However, the research approach might be easily transferable to the collections division of the SANBS.

3.6 Data Analysis Methods

With the consent of the interviewees, interviews from the initial phase of the study were digitally audio-recorded. Thereafter, the interviews were transcribed in summary form. Before conducting these interviews, the intention was to transcribe these interviews verbatim. However, given that more than ten hours of interviews and meetings were held, verbatim transcription would have been time-consuming and would have yielded an only marginally more vivid portrayal of the interviews/meetings.

The initial interviews were exploratory, sourcing interviewees’ opinions on what drives collection costs. The opinions were summarised into key points and informed the data that would be collected in the second phase of the study. This method of data analysis follows an inductive approach and despite the warnings of Saunders et al. (2009), this phase of interviewing and subsequent analysis should not be time-consuming since it entails few interviewees and has a narrow focus on eliciting opinions as to what drives costs.

Quantitative analysis techniques have been used to present and describe the quantitative financial information collected in the second phase of the study. Tukey’s (1977) exploratory data analysis approach is used to graphically illustrate differences in cost drivers using, primarily, bar graphs. At the research proposal stage, it was anticipated that box plots of average collection costs would serve as a useful tool for graphically illustrating differences in costs and that other graphical techniques such as
comparative proportional pie charts and scatter plots might be used, but these have not been necessary. Differences in collection costs are adequately illustrated using bar graphs.

Descriptive statistics have been used to describe central tendency (the mean) and dispersion (standard deviation and inter-quartile ranges) of numerical data, in order to draw comparisons between collection costs of different collection methods and clinic classifications. However, more advanced statistical techniques such as significance testing, regression testing and analysis of variance have not been used in the study since the study does not take the form of hypothesis testing.

3.7 Limitations

Limitations of the study are described throughout this report. They relate specifically to the research design, methods, sampling and the implications of the results of the analysis, and particularly to the extent to which the results of this study may be generalised to other settings. Results have not been generalised to other operating divisions in WPBTS but may be generalised to the collections divisions operated by WPBTS and headquartered in Worcester, Paarl and George. Results have not been generalised to the collections function of the SANBS.
4 RESEARCH FINDINGS, ANALYSIS AND DISCUSSION

The first section of this chapter presents the research findings from the initial interviews with the manager of donor collections. The second section presents the quantitative findings of the study, along with an analysis of those findings. The third and final section discusses the earlier findings and analysis, and incorporates insights from the collections manager around the Shank & Govindarajan (1993) framework of structural and executional cost drivers.

4.1 Research Findings from Initial Interviews

A series of initial interviews were held with the collections manager. The purpose of those meetings was to give the researcher an overview of WPBTS operations, to come to a common understanding of the purpose of the study and to refine its scope. This section presents some of the insights from those initial meetings. It includes a description of the major cost areas investigated by this study, the sources of data and the initial views of the collections manager regarding what drives collection costs. Many of the findings from this section informed the structure and design of the quantitative phase of the study, which follows in section 4.2.

4.1.1 The Definition of Collection Costs

For the purposes of this study, collection costs start with the costs incurred in collecting blood from donors. This means that recruitment costs such as public relations and marketing are excluded from this study. Collections costs end at the point just before the donated blood is transported to WPBTS headquarters for testing and further processing.

Certain kinds of blood donations, such as autologous donations and aphaeresis donations, though technically falling within the donations division of WPBTS, are also excluded from this study because of their highly specialised nature and because they do not form part of the mainstream work of the collections division.

4.1.2 Major Cost Areas

Initial interviews identified a few major areas where costs are incurred by the collections division. These include the consumables costs associated with every donation received, the cost of staff who tend to donors at clinics and the capital
expenditure (capex) in setting up a new fixed site or roaming collection vehicle. These three areas of costs are the focus of the quantitative portion of this study.

Shared administrative costs of running the collections division are excluded from the quantitative portion of the study because this category of costs had no bearing on the different collection methods used or the classification of clinics visited.

4.1.3 Data Sources

A number of data sources were identified in order to portray collections costs in terms of the three major cost areas described earlier: consumables costs, staff costs and capex costs. In addition, a dataset was sourced containing the number of donations received at each clinic for the year under investigation (1 September 2010 to 31 August 2011).

4.1.4 Source of Consumables Costs

The financial software used by WPBTS reports consumables expenditure on a monthly basis, for each operating division of the organisation. The report shows a monthly total for each cost code. Unfortunately, the financial system does not itemise individual consumables expenditure on the level of clinic held or clinic classification. This practice would, understandably, be impractical and meant that monthly consumables expenditure needed to be allocated to different blood donation collection methods and clinic classifications based on the number of units collected or the number of clinics held. This methodology is consistent with the ABC classification by Horngren, Datar, Foster, Rajan, & Ittner (2009) of output unit-level costs and batch-level costs. All other costs appearing on the consumables expenditure report were deemed to be facility-sustaining costs and, as discussed earlier, were excluded from this study.

4.1.5 Source of Staff Costs

Staff costs represent the salaries and wages paid to nurses, phlebotomists, donor hosts/hostesses, drivers and assistants who run blood donation clinics and tend to donors. For each clinic held, a clinic report is compiled, showing the details of the clinic (such as name, code, date, time and location), staff on duty and information on number of donations at the clinic. An example of a clinic report is shown in Figure 1.
Details of the staff at each clinic are not captured into a computerised system. This meant that in order to ascertain staff costs for each collection method and clinic classification, staff details from a sample of clinic reports needed to be captured.

The vast majority of staff at WPBTS is permanently employed, though WPBTS does make use of a few sessional sisters and nurses who are paid on an hourly basis. The salaries of permanent employees are graded according to the Patterson Grading System and the monthly cost-to-company salaries are maintained by the Human Resources department. The collections manager provided a list of names of staff along with their respective pay grade.

Staff often works on weekends and public holidays. For these, an hourly salary rate is maintained by the finance department and staff is paid one-and-a-half times the usual hourly rate on Saturdays and twice the hourly rate on Sundays and public holidays. Sessional staff is paid purely on an hourly basis. Monthly cost-to-company data, hourly rates for sessional staff and hourly rates for work on weekends and
public holidays were combined with a sample of data collected from clinic reports to give an accurate picture of the staff cost of running various clinics.

4.1.6 Source of Capex Costs

Setup costs for fixed sites and roaming clinics include general equipment (such as furniture) and bleeding equipment (such as chairs, haemacues and shakers). Fixed sites incur venue setup costs, while roaming clinics incur vehicle purchase costs. For each of these capital expenditure items, an estimation of the useful life of the item would allow for an estimation of the average annual depreciation associated with the setup costs of each collection method.

WPBTS recently conducted an exercise to establish the costs involved in relocating their N1 City fixed site from one location in the mall to another. This meant that cost estimates for the relocation as well as the purchase of new bleeding equipment were at hand for the purposes of this study. The collections manager was also able to provide vehicle, trailer and mobile equipment costs for comparison. This data can be found in Appendix 2.

4.1.7 Initial Insights into Cost Drivers

Before the quantitative analysis phase of the study, the researcher interviewed the collections manager on what, in her experience, have been the drivers of blood donation collection costs. Many of the insights from the collection manager presented in this sub-section are referred to in the quantitative analysis section (section 4.2) which follows.

The collections manager expected that staff costs and consumables costs, such as blood packs, would be the most significant costs to collecting blood from donors. The blood packs used to draw the blood from donors feature a sophisticated multiple-chamber system that ensures that the donor’s blood is never exposed to air from the time the unit is donated, through to its testing, separation into components, storage in a blood bank and transfusion to a patient. The blood pack also features a high-quality needle and contains all the necessary supplements needed to keep the blood alive and nourished for a determined period. For these reasons, the blood packs are relatively expensive and it is a cost incurred for each donation received since blood packs are not re-usable.
The collections manager also expected that staff costs would be a major contributor to the overall cost of collection. The collections division makes use of a high complement of professional staff earning salaries commensurate with their levels of training and experience. It was felt that the most cost-effective method for collecting blood from donors would probably be through mobile clinics, which feature twelve beds, typically take many staff members to a residential clinic location and bleed a high number of donors.

The collections manager explained that when hosting clinics at schools and tertiary education institutions, the pre-donation interview, monitoring and counselling of donors are done in an intensive way, because relatively more donors are new to blood donation at these clinics. This necessitates a higher complement of nursing sisters and other staff at these clinics. For example, at a school where the bleeding target is 30-50 units for that day, one or two sisters are dedicated to screening or counselling at the front of the clinic. This translates to an additional two to three nursing sisters for such a visit, depending on the target number of units. The required staffing levels are also influenced by the length of time that the clinic is held and the rate of donations expected. The collections manager felt that these factors would translate into higher costs per unit collected at educational institutions.

The collections manager commented that many of the capex costs involved in setting up new clinics would be common to both fixed sites and roaming clinics, and that the differences between these costs for different collection methods would be relatively small.

4.2 Quantitative Findings and Analysis

This section presents the quantitative findings of the study and analyses those findings. Each of the subsections to follow focuses on one of the three major cost areas identified: consumables costs, staff costs and capex costs. The final sub-section draws together the findings from the previous three, to form an overall picture of blood donation collections costs.

4.2.1 Consumables Costs

The monthly report of costs of consumables used by WPBTS contained sixteen cost codes deemed to form part of this study, because they related to either donation unit-
level or clinic batch-level expenditure. The cost categories, along with their totals for the year from 1 September 2010 to 31 August 2011, are shown in Table 1.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Packs</td>
<td>R 8 660 890</td>
</tr>
<tr>
<td>Protective Clothing</td>
<td>R 3 558</td>
</tr>
<tr>
<td>Uniforms</td>
<td>R 121 383</td>
</tr>
<tr>
<td>Computer Communication</td>
<td>R 5 826</td>
</tr>
<tr>
<td>Computer Expenses</td>
<td>R 16 363</td>
</tr>
<tr>
<td>Clinic Equipment</td>
<td>R 26 225</td>
</tr>
<tr>
<td>Telephone &amp; Fax</td>
<td>R 20 187</td>
</tr>
<tr>
<td>Cell phone Expenses</td>
<td>R 28 579</td>
</tr>
<tr>
<td>Printing &amp; Stationery</td>
<td>R 139 932</td>
</tr>
<tr>
<td>Electricity</td>
<td>R 45 183</td>
</tr>
<tr>
<td>Water &amp; Refuse</td>
<td>R 7 710</td>
</tr>
<tr>
<td>Membership &amp; Subscript</td>
<td>R 11 748</td>
</tr>
<tr>
<td>Donor Teas</td>
<td>R 853 792</td>
</tr>
<tr>
<td>Clinic Consumables</td>
<td>R 841 911</td>
</tr>
<tr>
<td>Product Waste Disposal</td>
<td>R 46 906</td>
</tr>
<tr>
<td>Disposable Glassware</td>
<td>R 106 603</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>R 10 936 796</strong></td>
</tr>
</tbody>
</table>

Table 1  Consumables Costs for the Year

Note that the largest consumable cost is that of blood packs, comprising 79% of the total. Each of the consumables costs in Table 1 was then assigned to the cost-allocation bases shown in Table 2. For example, blood packs are a donation unit-level cost and are therefore incorporated into the “by units collected” allocation base. On the other hand, uniforms worn by staff are clinic batch-level expenditure, which are incorporated into the “by clinics held” allocation base. Some expenditure categories are attributable only to the fixed site collection method, while others are attributable only to the roaming collection method.

The cost-allocation bases allow indirect consumables costs to be allocated to different collection methods and clinic classifications.
Table 2  Cost Allocation Bases for Consumables Costs

Note: Table 1 and Table 2 should total to the same amount. However, some additional consumables costs relating to premises rental of fixed sites have been added to Table 2, resulting in a slightly higher total.

Using the table of cost-allocation bases (Table 2), along with the dataset of all clinics held in the year under investigation (a dataset which includes the number of clinics held and the number of donations received, by collection method and clinic classification, which can be found in Appendix 1), Table 3 and Table 4 summarising consumables costs by collection method and clinic classification were derived.

An example of the calculations involved is as follows: for the bus collection method, 2,957 donation units were collected. Dividing this figure by the total of 88,739 units collected across all collection methods and multiplying by the “by units collected” allocation base of R10,676,259 gives the proportion of consumables costs attributable to the bus collection method in respect of donation unit-level costs. This process is repeated for the “by clinics held” allocation base, multiplying by the number of clinics held using the bus, and dividing by the total number of clinics.

Table 3  Consumables Costs by Collection Method

In the same way, consumables costs are assigned to clinics of each clinic classification from the table of cost allocation bases (Table 2), producing Table 4.
Table 4  Consumables Costs by Clinic Classification

Table 3 and Table 4 show that consumables costs per unit do not vary much between different collection methods and different clinic classifications. The reason for this is that that 97% of consumables costs are attributed to clinics by the number of units collected. The remaining 3% of consumables costs are attributable to different collection methods and clinic classifications by the number of clinics held, attributable only to fixed sites or only to the roaming collection method.

These findings show that consumables costs at fixed sites are only slightly more expensive per unit (by 4%) than the R124 average consumables cost per unit across all collection methods. Also, the price per unit collected using any of the three roaming collection methods do not vary more than 2% from the aforementioned average.

The table of consumables costs per unit, by clinic classification displays a similar lack of variation from the average consumables costs per unit.

4.2.2  Staff Costs

Staff costs were derived from a sampling exercise that noted the staff on duty at twenty clinics of each collection method and twenty clinics of each clinic classification. Table 5 shows the average staff costs per clinic for each collection method.

1 The Other clinic classification has been excluded from this study because it contains a non-homogeneous set of clinics that are not visited on a regular basis. It is included here to ensure that the table totals to the same amount as the table for consumable costs by collection method.
Unlike consumables costs per unit, staff cost per unit are considerably more variable across collection methods. Collections using the bus show an average cost per unit 54% greater than the average staff cost per unit of R129, whereas the mobile collection method is 29% cheaper than the average cost per unit. This variability is illustrated more clearly in Figure 2.

Table 5 shows how considerably the average number of units collected varies when using different collection methods and shows that staff costs per clinic are higher where the average number of collections per clinic is higher. This illustrates that staff costs are not fixed, and that they vary by the number of units collected.

Considering the non-fixed nature of staff costs, if staff levels varied perfectly in-step with the number of units collected, then the average staff cost per unit collected
should remain constant. The following graph, however, shows that staff costs per unit collected declines as the average number of units collected increases.

![Graph showing staff costs per unit by donations per clinic.](image)

In the same way, Table 6 summarises staff cost per clinic and staff cost per unit collected for each clinic classification, based on a sample of approximately twenty clinics per clinic classification.

<table>
<thead>
<tr>
<th>Clinic Classification</th>
<th>Clinics</th>
<th>Units</th>
<th>Staff Cost</th>
<th>Cost per Clinic</th>
<th>Cost per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>24</td>
<td>654</td>
<td>R 99 324</td>
<td>R 4 139</td>
<td>R 152</td>
</tr>
<tr>
<td>Educational</td>
<td>20</td>
<td>682</td>
<td>R 115 415</td>
<td>R 5 771</td>
<td>R 169</td>
</tr>
<tr>
<td>Fixed Site</td>
<td>20</td>
<td>579</td>
<td>R 92 375</td>
<td>R 4 619</td>
<td>R 160</td>
</tr>
<tr>
<td>Hospital</td>
<td>20</td>
<td>723</td>
<td>R 93 405</td>
<td>R 4 670</td>
<td>R 129</td>
</tr>
<tr>
<td>Industrial</td>
<td>23</td>
<td>366</td>
<td>R 60 451</td>
<td>R 2 628</td>
<td>R 165</td>
</tr>
<tr>
<td>Mall</td>
<td>20</td>
<td>576</td>
<td>R 63 542</td>
<td>R 3 177</td>
<td>R 110</td>
</tr>
<tr>
<td>Residential</td>
<td>20</td>
<td>1320</td>
<td>R 115 384</td>
<td>R 5 769</td>
<td>R 87</td>
</tr>
<tr>
<td><strong>Total/Average</strong></td>
<td><strong>147</strong></td>
<td><strong>4 900</strong></td>
<td><strong>R 639 897</strong></td>
<td><strong>R 4 353</strong></td>
<td><strong>R 131</strong></td>
</tr>
</tbody>
</table>

Here too, average staff costs per unit are shown to be quite variable, with residential clinics showing markedly lower average staff costs per unit collected, and educational and industrial clinics showing markedly higher average staff costs per unit collected.
In Figure 5, a trend is observable, showing lower staff cost per unit when the number of donations per clinic are higher. Clinics at educational institutions appear to have a much higher staff cost per unit, given the average number of units collected there.

Malls are another clinic type that fall further from the trend of higher staff costs when average number of donations is low. Despite the relatively low number of donations per clinic, staff cost per unit at malls is relatively low.
4.2.3 Capex Costs

As described in the earlier subsection on the data sources for capex costs, capex costs are derived from an exercise that considered the equipment required to set up a new clinic of each collection method (a fixed site, mobile unit, caravan and bus). Dividing the cost of a capex item by the number of years of useful life of that item gives an annual capex cost for that item of equipment. Considering all of the capex items required in setting up a fixed site or roaming collection vehicle, along with their respective useful lives, gives a total annual capex cost for that collection method.

The details of each capital expenditure item, along with its useful life and the quantity of items required to set up a clinic can be found in Appendix 2. Note that these are not historical costs but current replacement costs.

The annual capex cost of setting up each fixed site, and each type of roaming clinic, is adjusted by the number of fixed sites and roaming collection vehicles currently operated by WPBTS. This allows the current year’s number of donations collected and clinics held to be related to the capex cost of the clinics where those donations were received. These capex costs, by collection method, are summarised in Table 7.
Considering that consumables costs averaged R124 per unit collected and staff costs averaged R129 per unit collected, the average capex costs per unit are relatively small at an average of R10 per unit. However, the bus incurs an average capex cost per unit about 8 times the average capex cost per unit. This big cost comes about because of the high cost of the bus and the resultant high annual depreciation on the bus. The low number of units collected with the bus exacerbates the average capex cost per unit collected.

Fixed sites show the lowest annual capex cost per unit. This appears to be caused by the fixed site having the lowest total setup cost of all collection methods, approximately R400,000. In addition, annual depreciation on the fixed site clinic is among the lowest as a percentage of total capex cost. The net result is the lowest annual capex cost per unit.

In order to calculate the capex costs per clinic classification, setup costs per collection method (Table 7) were attributed to various clinics of different clinic classifications by the proportion of times that a given clinic made use of that collection method. Appendix 1 contains a table showing the number of clinics held over the period of investigation, by collection method and clinic classification. Those counts were used to derive Table 8, showing annual capex costs by clinic classification.

<table>
<thead>
<tr>
<th>Collection Method</th>
<th>Clinics</th>
<th>Units</th>
<th>Capex per Clinic</th>
<th>Cost per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>200</td>
<td>2 957</td>
<td>R 178 483</td>
<td>R 892</td>
</tr>
<tr>
<td>Caravan</td>
<td>383</td>
<td>7 799</td>
<td>R 172 633</td>
<td>R 451</td>
</tr>
<tr>
<td>Fixed</td>
<td>661</td>
<td>18 560</td>
<td>R 87 069</td>
<td>R 132</td>
</tr>
<tr>
<td>Mobile</td>
<td>1 360</td>
<td>59 423</td>
<td>R 469 467</td>
<td>R 345</td>
</tr>
<tr>
<td><strong>Total/Average</strong></td>
<td><strong>2 604</strong></td>
<td><strong>88 739</strong></td>
<td><strong>R 907 652</strong></td>
<td><strong>R 349</strong></td>
</tr>
</tbody>
</table>

*Table 7  Setup Costs per Clinic Held and Unit Collected, by Collection Method*
Because capex cost per clinic classification is derived from capex costs per collection method, the variation in capex cost per clinic classification can be explained in terms of the extent to which they make use of that collection method. Take the example of the capex costs associated with Industrial clinics. The pie chart in Figure 6 shows that Industrial clinics mostly made use of the relatively expensive bus and caravan collection methods. Similarly, the relatively high capex cost per unit at mall clinics is explained by the extensive use of the bus and caravan at those clinics.

![Industrial Clinics Held, by Collection Method](image)

*Figure 6 Number of Industrial Clinics Held, by Collection Method*

2 The Other clinic classification has been excluded from this study because it contains a non-homogeneous set of clinics that are not visited on a regular basis. It is included here to ensure that the table totals to the same amount as the table for capex costs by collection method.
4.2.4 All Costs

Table 9 combines consumables costs, staff costs and setup costs, to show the total cost of blood donation collection. This information is also displayed graphically in Figure 7.

<table>
<thead>
<tr>
<th>Collection Method</th>
<th>Clinics</th>
<th>Units</th>
<th>Units per Clinic</th>
<th>Staff Costs per Unit</th>
<th>Consumables Costs per Unit</th>
<th>Capex Costs per Unit</th>
<th>Total Cost per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>200</td>
<td>2 957</td>
<td>15</td>
<td>R 199</td>
<td>R 125</td>
<td>R 60</td>
<td>R 384</td>
</tr>
<tr>
<td>Caravan</td>
<td>383</td>
<td>7 799</td>
<td>20</td>
<td>R 155</td>
<td>R 124</td>
<td>R 22</td>
<td>R 300</td>
</tr>
<tr>
<td>Fixed Site</td>
<td>661</td>
<td>18 560</td>
<td>28</td>
<td>R 160</td>
<td>R 129</td>
<td>R 5</td>
<td>R 294</td>
</tr>
<tr>
<td>Mobile</td>
<td>1 360</td>
<td>59 423</td>
<td>44</td>
<td>R 92</td>
<td>R 122</td>
<td>R 8</td>
<td>R 221</td>
</tr>
<tr>
<td><strong>Total/Average</strong></td>
<td><strong>2 604</strong></td>
<td><strong>88 739</strong></td>
<td><strong>34</strong></td>
<td><strong>R 129</strong></td>
<td><strong>R 124</strong></td>
<td><strong>R 10</strong></td>
<td><strong>R 263</strong></td>
</tr>
</tbody>
</table>

*Table 9 All Collection Costs by Collection Method*

![Figure 7](image)

The bus carries the highest total cost per unit of blood collected, R384 per unit, which is 46% more than the average of R263 per unit. The high cost is composed of relatively high staff costs and capex costs. These high costs are attributed to the low number of donations received at the locations visited by the bus.
The mobile collection method carries the lowest staff costs per unit, lowest consumables costs per unit and relatively low capex costs per unit, resulting in the lowest overall cost per unit of R221. This cost is 16% lower than the average collection cost per unit of R263. Again, these dynamics can be explained by the number of donations received at the clinic. For mobile clinics, the number of donations per clinic (44) is the highest of all collection methods and is 29% greater than the average of 34 units per clinic.

Table 10 shows all collection costs by clinic classification and is followed by Figure 8 which shows the same graphically.

<table>
<thead>
<tr>
<th>Clinic Classification</th>
<th>Clinics</th>
<th>Units</th>
<th>Units per Clinic</th>
<th>Staff Costs per Unit</th>
<th>Consumables Costs per Unit</th>
<th>Capex Costs per Unit</th>
<th>Total Cost per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>414</td>
<td>11 920</td>
<td>29</td>
<td>R 152</td>
<td>R 123</td>
<td>R 15</td>
<td>R 290</td>
</tr>
<tr>
<td>Educational</td>
<td>199</td>
<td>8 469</td>
<td>43</td>
<td>R 169</td>
<td>R 122</td>
<td>R 9</td>
<td>R 300</td>
</tr>
<tr>
<td>Fixed Site</td>
<td>661</td>
<td>18 560</td>
<td>28</td>
<td>R 160</td>
<td>R 129</td>
<td>R 5</td>
<td>R 294</td>
</tr>
<tr>
<td>Hospital</td>
<td>73</td>
<td>2 471</td>
<td>34</td>
<td>R 129</td>
<td>R 122</td>
<td>R 11</td>
<td>R 262</td>
</tr>
<tr>
<td>Industrial</td>
<td>425</td>
<td>7 900</td>
<td>19</td>
<td>R 165</td>
<td>R 124</td>
<td>R 26</td>
<td>R 315</td>
</tr>
<tr>
<td>Mall</td>
<td>195</td>
<td>5 881</td>
<td>30</td>
<td>R 110</td>
<td>R 122</td>
<td>R 19</td>
<td>R 252</td>
</tr>
<tr>
<td>Residential</td>
<td>547</td>
<td>32 717</td>
<td>60</td>
<td>R 87</td>
<td>R 121</td>
<td>R 6</td>
<td>R 215</td>
</tr>
<tr>
<td><strong>Total/Average</strong></td>
<td><strong>2 514</strong></td>
<td><strong>87 918</strong></td>
<td><strong>35</strong></td>
<td><strong>R 129</strong></td>
<td><strong>R 124</strong></td>
<td><strong>R 10</strong></td>
<td><strong>R 263</strong></td>
</tr>
</tbody>
</table>

*Table 10  All Collection Costs by Clinic Classification*
Residential clinics show the lowest total cost per unit of blood collected because they incur the lowest staff costs per unit, lowest consumables costs per unit and relatively low capex costs per unit. This results in a collection cost per unit that is 18% lower than the average collection cost across all collection methods. In the year under investigation, 99.8% of residential clinics were serviced by the mobile collection method and the average number of collections received through residential clinics, was 71% more than the average number of units collected per clinic, across all collection methods.

Mall clinics also show a relatively low total cost per unit, 4% lower than the average across all clinic classifications. Given that lower costs per unit have generally been associated with higher-than-average numbers of donations collected per clinic, it is interesting to note that Mall clinics received a slightly lower-than-average number of donations per clinic of 30, which is 14% lower than the average of 35 donations per clinic. Probing deeper into this anomaly, Figure 8 shows that staff costs per unit are lower at Mall clinics, resulting in lower overall donation costs per unit. High donation volumes cannot be said to cause this lowering of average costs.
Figure 9 shows that Mall clinics are serviced in equal measure by the bus, caravan and mobile collection methods. Using the relatively expensive bus and caravan collection methods, one would expect average collections costs at Mall clinics to be higher. However, the average number of units collected at Mall clinics using only the bus is 19 units per clinic, which is 27% more than the average of 15 units per clinic for the bus at all clinics. Similarly, the average number of units collected with the caravan when visiting Mall clinics is 29 units per clinic, 24% more than the average of 20 units per clinic using the caravan across all clinic classifications. This shows that at Mall clinics, the bus and caravan are used more efficiently than at other locations.

Industrial clinics incur a high cost per unit collected, mainly because of its high staff costs and capex costs per unit. As explained in section 4.2.2, Industrial clinics make extensive use of the bus and caravan collection methods, which both carry the highest annual capex costs. This is exacerbated by the relatively low number of donations received at Industrial clinics, even by bus and caravan standards. The bus collected an average of 10 units per clinic at Industrials clinics over the year under investigation, which is 36% lower than its average of 15 units per clinic. Similarly, caravans collected an average of 18 units per clinic at Industrials clinics over the year under investigation, which is 12% lower than its average of 20 units per clinic.
4.3 Discussion

This section discusses the earlier quantitative findings in the context of the Strategic Cost Drivers framework of Shank and Govindarajan (1993). It incorporates the perspectives of the collections manager on both the quantitative results and the cost drivers.

Each sub-section to follow is dedicated to one of the structural or executional cost drivers of the Strategic Cost Drivers Framework.

4.3.1 Scale of Operations

According to the collections manager, the scale of operations is important to the collections division because a fine balance is needed in how many units are collected on an ongoing basis. Adequate stock levels are essential. And yet, the collections division is not free to collect large volumes of units from donors since blood expires and it would cause waste if too many units were collected. For these reasons, the challenge of managing costs within the collections division is not overcome by simply sending out cheap mobile units to collect large volumes of blood donations from donors at residential clinics.

The scale of operations is considered to be a major cost driver and is discussed in more detail in conjunction with capacity utilisation in sub-section 4.3.8.

4.3.2 Scope of Operations

The WPBTS has a number of divisions, which fulfil a number of functions along the blood transfusion value chain. There are divisions for marketing and donor recruitment, donation collections, testing and transport to hospitals. The WPBTS also operates a blood bank. Therefore, the collections division operates within a broader scope of operations. However, the scope of the collections division itself is quite narrow and it does not have much leeway to change the scope of its functions. For these reasons, Scope is not of strategic relevance to the collections division and is not a cost driver.

4.3.3 Experience of the Firm and Employees

The WPBTS has operated for 73 years and is experienced in delivering blood transfusion services, including collections from donors. The firm is not
inexperienced in what it does, and therefore it is not a cost driver. On the other hand, its immense experience cannot necessarily be said to lower costs. Regardless, the experience of the firm is not something that can be changed by WPBTS; it is a given. As a result, the experience of the firm is not a strategically relevant cost driver for the purpose of this study, since WPBTS has no control over this aspect of its operations.

According to the collections manager, levels of staff experience within the collections division vary. The division employs a number of experienced registered nurses and team leaders, who tend to be long-standing staff members and earn higher salaries. However, it also employs younger donor hosts and hostesses, especially having recently set up a new collections team. For these reasons, the level of experience of employees is a cost driver for the collections division of WPBTS.

In terms of donor hosts and hostesses, there is a preference toward having more mature people fill these roles, given the high levels of responsibility expected of them. There is no explicit strategy in terms of the preference for more or less experienced nursing staff. As a result, the experience of employees is a cost driver and is of strategic relevance to the collections division. However, this study has not probed the levels of experience of staff in its quantitative investigations and, as a result, is not in a position to comment on the levels of staff experience as a cost driver.

4.3.4 Technology Used

The WPBTS makes use of technologically advanced equipment in its testing division. However, the collections division is not technology-driven. Until a few years ago, WPBTS made use of an old technique for measuring the haemoglobin levels in a donor’s blood before allowing them to donate. Only recently has a more modern Haemacue machine been adopted for this purpose, and it does not come at a high price.

Another example of the use of technology is the shaker, which is used to keep the blood in the bag moving while it is being extracted from the donor. The collections manager recently evaluated the purchase of a sophisticated item of equipment for this purpose which would have come at a high cost of R20,000 each, while not being as
rugged as the existing equipment used for the same purpose. It was decided to not purchase the new technology shaker.

The example of the Haemacue and the shaker shows that the collections division does not over-invest in technology, especially since it is not a technology-driven division. For these reasons, technology is not of strategic relevance to the collections division and is not a significant factor in this study.

4.3.5 Complexity of Products and Services

A single product is derived from the work of the collections division: a unit of blood. However, complexity lies in the number of different methods used by the division to collect blood from donors. The largest proportion of donations is collected from roaming units. Roaming units seek out donors in the neighbourhoods they live, their places of work, hospitals or educational institutions. In this way, WPBTS collects repeat donations from existing donors as well as finding new donors, particularly through visiting educational institutions.

WPBTS caters for donors who have different needs and constraints in terms of personal mobility and availability of time. Roaming units bring clinics closer to the donor, while fixed site clinics operate every day of the week, allowing for time flexibility.

To cater for fluctuations in the demand for blood and to efficiently service different sized clinics, WPBTS operates a number of collection methods: a bus, caravans, mobiles and fixed sites, each with different maximum capacities for simultaneous donations.

The complexity of the operations of the collections division is considered a major cost driver and more is said on this in the subsection on capacity utilisation in subsection 4.3.8.

4.3.6 Workforce Involvement

The work of the collections division is not as highly-creative as a team of software developers or similar knowledge workers. For this reason, WPBTS may not need to invest in top talent or ensure that staff is highly engaged in their work. However, donor hosts and hostesses play a crucial role in engaging with donors and the public.
For this reason, it is essential that they are adequately trained and are kept engaged in their work and motivated to maintain the image of the publicly-facing division of the organisation. Donors are upset if they are not met with the friendliness and courtesy that they expect from WPBTS.

According to the collections manager, workforce involvement is essential to the running of the service. The collections division currently does a good job of maintaining workforce involvement and training in this regard is ongoing. In fact, ongoing training is part of the organisation’s ethics policy on recruitment and retention.

For the purposes of this study, however, workforce involvement did not represent a strategically-relevant driver of costs since high levels of workforce involvement are not a choice but a given. At the same time, high levels of workforce involvement are not anticipated to have a major impact on the cost structure of the division or the recruitment/retention of donors.

4.3.7 Total Quality Management

The WPBTS is accredited by the South African National Accreditation System (SANAS) and maintains high levels of quality within the organisation, particularly within the testing laboratories and the blood banks. For the collections division, the highest levels of quality are maintained in ensuring the safety of the donor and the blood during the donation process. However, donors are likely to consider quality levels a hygiene factor: Quality is absolutely essential, but raising quality levels will not result in more donations received. A high level of quality in safety is a given in the mind of the donor. Therefore, total quality management is not a strategic choice for the purposes of this study.

4.3.8 Capacity Utilization

The collections division has the ability to scale the size of its clinics by altering the number of staff assigned to a clinic and choosing a collection method with an appropriate capacity relative to the number of units expected at that clinic. This ability to manage capacity is important since staff costs make up a large proportion of the cost of collecting blood from donors. Assigning too many staff members to a
clinic that yields a low number of donations impacts the overall cost-effectiveness of that clinic.

At the opposite end of the spectrum, if a clinic receives more donors in a short time-frame than what it can accommodate, donors will need to wait before having their donation taken. This can result in a donor leaving the clinic, deferring donation to another day. The experience of the WPBTS has been that donors often take a long time to return because their personal circumstances may change, they travel; get a mild illness and many such little hindrances keep them away.

Regarding the earlier findings on costs per unit using different collection methods, the collections manager found it surprising that the average staff cost per unit on the bus was considerably more than that of the caravan, given the similarities between these collection methods. Both are self-contained roaming units that are not dependent upon a venue and, whereas the bus has the capacity to bleed five donors simultaneously, the caravan is able to bleed a similar four donors simultaneously.

The collections manager explained that the bus tended to be used at newly-established collection sites and that the number of donations received at those sites may be relatively low. There is a trend toward more donations being received at well-established clinics because it takes a while before potential donors at a given location become aware of the roaming clinic and its visiting schedule at that location. With time, more donors will attend the clinic, resulting in lower staff costs per unit collected.

Clinics held at Hospitals also show a low average staff cost per unit, attributed to the relatively high number of donations received there while keeping staff costs per clinic at a similar level to fixed site clinics. According to the collections manager, Hospitals enjoy a captive audience with an elevated sense of the need for blood donations. Hence, many donations are received at Hospitals. Capacity utilisation at Hospital clinics is managed efficiently.

Industrial clinics showed the highest overall cost per unit across all clinic classifications, owing to the high staff costs per unit. At Industrial clinics, the staff cost per clinic is the lowest across all clinic classifications, proving that the collections division is aware of the need to lower staffing levels at these clinics.
Despite this, the average number of donations per clinic received is so low that the resultant staff cost per unit is still among the highest. This highlights the need to either lower staffing levels at Industrial clinics even further or raise the average number of donations received at Industrial clinics. According to the collections manager, the low number of donations at Industrial clinics is partly attributed to employers at the clinic sites not allowing their staff the necessary time off to donate. Another reason is that Industrial clinics are not open to the public, meaning donations can only be received from staff at that organisation at that clinic. This lowers the number of donations received there and results in under-utilised capacity.

4.3.9 Layout Efficiency

Blood donation is not a high-volume operation featuring many steps. A donor typically completes a form, has their haemoglobin levels checked, sits down in a chair and has their blood pressure checked before the needle is inserted. Layout efficiency, for the purposes of being able to process more donors per hour is not a strategic focus for WPBTS. Having said that, an initiative is underway to have a donor’s blood pressure checked earlier in the process so as to minimise time wasted in completing the earlier steps before finding out that the donor’s blood pressure is not what it should be. Despite this, layout efficiency is not a cost driver for the collections division since minor process tweaks such as these do not have major cost implications for the service. As such, layout efficiency is not a cost driver for the purposes of this study.

4.3.10 Product/Service Configuration

Following on from the example of blood pressure checks in the context of layout efficiency discussed under sub-section 4.3.9, the collections division has an ongoing programme of up-skilling its donor hosts/hostesses to become phlebotomists. This will allow for a re-configuration of the blood donation process at the clinic, whereby the registered nurse on duty will be able to spend more time with donors during the screening phase, as well as taking blood pressure readings. This improved configuration will be of benefit to donors, who will be made to feel more secure in the phase leading up to the donation. However, as for the arguments under sub-section 4.3.9, these minor process and layout tweaks do not drive costs or fundamentally change the division’s ability to collect blood from donors.
4.3.11 Linkages with Suppliers and Customers

As described in the sub-section 4.3.2 on scope of operations, the collections division operates within a narrow band of the value chain of blood transfusion. From this perspective, the supplier that the collections division should foster linkages is the promotions department, which is responsible for donor recruitment and arranging venues for the roaming clinics. This is an area in which the two divisions have worked closely in recent years and where more work needs to be done. Fostering better linkages and synergies between the promotions and collections divisions is essential to a more effective operation.

The customer of the collections division is the testing division. An example of downstream linkage with the testing division is when the collections division screens donors. The collections division is performing a function associated more with testing, which ensures the safety of the blood. Another area of downstream linkage is the choice of bag used to collect the donation. The bag features a multiple-chamber sealed system that helps in the production of blood products. It is also of a high quality to ensure that no breakage occurs in latter phases of freezing, which are also steps not associated with the collections division.

Linkages with suppliers and customers, therefore, do impact the cost structure of the collections division. However, in light of the defined scope of this study, which considers only costs incurred directly by the collections division, the lack of focus on this strategic cost driver is a limitation of this study.

4.3.12 Conclusion

Following the Shank and Govindarajan (1993) framework, the factors that have been found to drive collections costs are as follows:

- Scale of Operations
- Experience of Employees
- Complexity of Services
- Workforce Involvement
- Total Quality Management
- Capacity Utilization
- Linkages with Suppliers and Customers
However, given that the collections division does not have a choice in the extent to which it is able to influence various cost drivers (i.e. the cost driver is accepted as a given), only a few of the cost drivers mentioned above are of strategic relevance to the collections division. The list of strategically-relevant cost drivers is as follows:

- Scale of Operations
- Experience of Employees
- Complexity of Services
- Capacity Utilization
- Linkages with Suppliers and Customers

A limitation of this study is that levels of experience of employees as well as linkages with suppliers and customers were not investigated quantitatively. Therefore, this study delivers conclusions on only the following strategically relevant cost drivers:

- Scale of Operations
- Complexity of Services
- Capacity Utilization

The three strategically relevant cost drivers are inter-related. The need for flexibility in the number of units that the service collects on an ongoing basis drives the need for scalable operations, scalable in the capacity of its collection methods, the number of staff it utilises and the ways in which donors are sourced. The net result is that the service makes use of a complex array of collection methods and clinic classifications. Across this complex array of collection methods and clinic classifications, capacity utilisation is of paramount importance in running a cost-effective service.

Residential clinics, making use of the mobile collection method, showed the lowest average cost per unit collected because of its high number of donations received. High staff costs per clinic are counter-balanced by the high number of donations, such that staff costs per unit are the lowest across all collection methods and clinic classifications. This is an example of effective capacity utilisation through high number of donations received while controlling staff costs.

The bus displayed high collection costs per unit because of the low number of donations received on the bus. The impact of the low number of donations received is that staff costs per unit and capex costs are the highest across all collection methods. The high capex cost per unit is exacerbated by the high purchase price of
the bus which results in the bus having highest annual depreciation cost of all collection methods. Evidently, the capacity of the bus is not utilised effectively.

Clinics held at Hospitals showed a low average staff cost per unit, because of its relatively high number of donations received there, while keeping staff costs per clinic at a similar level to fixed site clinics. This is an example of effective capacity utilisation through high number of donations received while controlling staff costs.

Industrial clinics showed the highest overall cost per unit across all clinic classifications due, in part, to high staff costs per unit collected. Despite Industrial clinics having the lowest staff cost per clinic, the low number of donations received at these clinics results in a relatively high staff cost per unit. This is an example of ineffective capacity utilisation through low number of donations received while being unable to lower staff costs to a point that does not result in high staff costs per unit.
5 RESEARCH CONCLUSIONS

5.1 Research Area and Problem

The cost of collecting blood from donors makes up a substantial portion of the cost of running the Western Province Blood Transfusion Service (WPBTS). Thus, collection costs make up a substantial proportion of the price paid by recipients of blood and blood products at hospitals. Understanding what drives the cost of collecting blood contributes significantly to understanding what can be changed in order to reduce that cost and ultimately influence the price of blood.

5.2 Cost Drivers

Using the Shank and Govindarajan (1993) framework of structural and executional cost drivers, this research explored factors affecting the cost of collecting blood donations by the WPBTS. The following factors were found to drive collection costs:

- Scale of Operations
- Experience of Employees
- Complexity of Services
- Capacity Utilization
- Linkages with Suppliers and Customers

The list above addresses the first research question into the key factors that drive collections costs.

5.3 Cost Drivers by Collection Method and Clinic Classification

In order to assess cost drivers by collection method and clinic classification, this research focused on three of the cost drives identified in section 5.2, through interviews and a quantitative appraisal of costs:

- Scale of Operations
- Complexity of Services
- Capacity Utilization

The need for flexibility in the number of units that the service collects on an ongoing basis drives the need for scalable operations; scalability in the capacity of its collection methods, the number of staff it utilizes and the ways in which donors are sourced. The net result is that the service makes use of a complex array of collection methods and clinic classifications. Across this complex array of collection methods
and clinic classifications, capacity utilization is of paramount importance to running a cost-effective service.

The quantitative analysis phase of the study explored capacity utilization through consumables costs, staff costs and capital expenditure (capex) costs associated with clinics of various collection methods and clinic classifications. By comparing those costs to the number of clinics held and the number of donations received at various clinics, the differences in capacity utilization across collection methods and clinic classifications were evident.

Residential clinics, making use of the mobile collection method, showed the lowest average cost per unit collected because of its high number of donations received. High staff costs per clinic are counter-balanced by the high number of donations received, such that staff costs per unit are the lowest across all collection methods and clinic classifications. This is an example of effective capacity utilisation through high number of donations received while controlling staff costs.

The bus displayed high collection costs per unit because of the low number of donations received on the bus. The impact of the low number of donations received is that staff costs per unit and capex costs are the highest across all collection methods. The high capex cost per unit is exacerbated by the high purchase price of the bus, which results in the bus having the highest annual depreciation cost of all collection methods. The capacity of the bus is not utilised effectively.

However, the bus and caravan collection methods are not inherently expensive. The example of clinics held at Malls show that effective capacity utilization is pivotal. If the bus and caravan could be utilised in more locations that yield high numbers of donations, such as Malls, then they would reflect as more cost-effective.

Clinics held at Hospitals showed a low average staff cost per unit, because of the relatively high number of donations received there, while keeping staff costs per clinic at a similar level to fixed site clinics. This is an example of effective capacity utilisation through high number of donations received while controlling staff costs.

Industrial clinics showed the highest overall cost per unit across all clinic classifications due, in part, to high staff costs per unit collected. Despite Industrial
clinics having the lowest staff cost per clinic, the low number of donations received at these clinics results in a relatively high staff cost per unit. This is an example of ineffective capacity utilisation through low number of donations received while being unable to lower staff costs to a point that does not result in high staff costs per unit.

The second research question is answered by the extent to which clinics adopting different collection methods and clinic classifications display different cost behaviour, showing that the cost drivers do vary by collection method and clinic classification.

5.4 Research Limitations

This study did not explore in depth the cost driver of linkages with suppliers and customers. Regarding linkages, there may be synergies with the promotions division and the testing division that drive collections costs. For this reason, additional cost drivers may be significant to the operations of the collections division.

This study also did not consider administrative overhead costs. Shared administrative costs of running the collections division are excluded from the quantitative portion of the study because they had no bearing on the different collection methods used or classification of clinics visited. However, there may be strategic choices that can be made as regards the administration of the collections division, but these have not been explored in this study.

The experience of employees was discussed as a cost driver and was found to be of strategic relevance to the collections division. However, this study has not probed the levels of experience of staff in its quantitative investigations and, as a result, is not in a position to comment on the levels of staff experience as a cost driver.

5.5 Future Research Directions

This study highlighted areas of possible improvement in the cost-effectiveness of blood donation collection. Continuing on this theme, a number of future research directions are proposed.
Staff costs per clinic could be benchmarked against the capacity of the collection method used. This would enable WPBTS to identify clinics that are over-staffed or under-staffed relative to the capacity of the clinic.

WPBTS should investigate the specific Industrial clinics that produce consistently low numbers of donations. These locations could potentially be visited less often or be removed from the clinic schedule all-together.

WPBTS should investigate ways in which the bus could be utilised more effectively, at locations that yield higher numbers of donations. Existing locations such as Malls could potentially be visited more often, while other clinics could be visited less often or be removed from the clinic schedule all-together.
REFERENCES


## Appendix

*Appendix 1: Count of Clinics Held, by Collection Method and Clinic Classification*

<table>
<thead>
<tr>
<th>Collection Method</th>
<th>Clinic Classification</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>Hospital</td>
<td>1</td>
</tr>
<tr>
<td>Bus</td>
<td>Residential</td>
<td>1</td>
</tr>
<tr>
<td>Bus</td>
<td>Educational</td>
<td>8</td>
</tr>
<tr>
<td>Bus</td>
<td>Commercial</td>
<td>55</td>
</tr>
<tr>
<td>Bus</td>
<td>Industrial</td>
<td>62</td>
</tr>
<tr>
<td>Bus</td>
<td>Mall</td>
<td>73</td>
</tr>
<tr>
<td>Caravan</td>
<td>Educational</td>
<td>8</td>
</tr>
<tr>
<td>Caravan</td>
<td>Hospital</td>
<td>10</td>
</tr>
<tr>
<td>Caravan</td>
<td>Mall</td>
<td>59</td>
</tr>
<tr>
<td>Caravan</td>
<td>Commercial</td>
<td>74</td>
</tr>
<tr>
<td>Caravan</td>
<td>Industrial</td>
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</tr>
<tr>
<td>Fixed</td>
<td>Fixed Site</td>
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</tr>
<tr>
<td>Mobile</td>
<td>Hospital</td>
<td>62</td>
</tr>
<tr>
<td>Mobile</td>
<td>Mall</td>
<td>63</td>
</tr>
<tr>
<td>Mobile</td>
<td>Other</td>
<td>90</td>
</tr>
<tr>
<td>Mobile</td>
<td>Industrial</td>
<td>131</td>
</tr>
<tr>
<td>Mobile</td>
<td>Educational</td>
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</tr>
<tr>
<td>Mobile</td>
<td>Commercial</td>
<td>285</td>
</tr>
<tr>
<td>Mobile</td>
<td>Residential</td>
<td>546</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>2,604</strong></td>
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### Appendix 2: Capex Costs and Useful Life

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Fixed Site</th>
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<th>Caravan</th>
<th>Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qty</td>
<td>Total Cost</td>
<td>Useful Life (yrs)</td>
<td>Qty</td>
</tr>
<tr>
<td>Reception chairs</td>
<td>6</td>
<td>R 5 000</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Refreshment tables</td>
<td>1</td>
<td>R 2 500</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Donor chairs</td>
<td>10</td>
<td>R 60 000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Mobile cases</td>
<td></td>
<td>R 72 000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Shakers</td>
<td>10</td>
<td>R 25 000</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Urn</td>
<td>1</td>
<td>R 200</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Microwave oven</td>
<td>1</td>
<td>R 2 000</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Television</td>
<td>1</td>
<td>R 5 000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>DVD player</td>
<td>1</td>
<td>R 2 000</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Air conditioner</td>
<td>2</td>
<td>R 45 000</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Computer</td>
<td>2</td>
<td>R 10 000</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Printer</td>
<td>2</td>
<td>R 3 500</td>
<td>3</td>
<td></td>
</tr>
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<td>R 2 700</td>
<td>3</td>
<td></td>
</tr>
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<td>Fridge</td>
<td>1</td>
<td>R 15 000</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Haemacue</td>
<td>2</td>
<td>R 6 000</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Vehicle *</td>
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<td>R 303 100</td>
<td>6</td>
<td></td>
</tr>
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<td>Trailer/Caravan</td>
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<td>R 35 000</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Other equipment</td>
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<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Shop front – doors, windows etc</td>
<td>R 20 400</td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Bulkhead</td>
<td>R 7 800</td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Branding – windows only</td>
<td>R 10 000</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Cost (R)</td>
<td>Year</td>
<td></td>
<td></td>
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<tr>
<td>------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>Ceilings</td>
<td>35 100</td>
<td>20</td>
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</tr>
<tr>
<td>Fire Sprinklers</td>
<td>4 800</td>
<td>20</td>
<td></td>
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</tr>
<tr>
<td>Floors</td>
<td>63 000</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plumbing</td>
<td>15 000</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry walls</td>
<td>15 000</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Painting</td>
<td>10 000</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td>15 000</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woodwork including shelving for storeroom</td>
<td>9 000</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminium doors</td>
<td>2 000</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bases for recliners</td>
<td>5 000</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff room, office and interview cubicle</td>
<td>15 000</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Capex per Site/Vehicle</strong></td>
<td><strong>403 500</strong></td>
<td><strong>20</strong></td>
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</tr>
<tr>
<td><strong>Annual Cost per Site / Vehicle</strong></td>
<td><strong>48 372</strong></td>
<td><strong>7</strong></td>
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<tr>
<td><strong>Number of Sites/Vehicles</strong></td>
<td><strong>1.8</strong></td>
<td><strong>2</strong></td>
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<tr>
<td><strong>Annual Capex Consumption</strong></td>
<td><strong>87 069</strong></td>
<td><strong>172 633</strong></td>
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<tr>
<td><strong>Annual Capex Consumption</strong></td>
<td><strong>178 483</strong></td>
<td><strong>178 483</strong></td>
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