IMPROVING THE PRODUCTIVITY AND COMPETITIVENESS OF SMALL-SCALE SUGARCANE CONTRACTORS IN KWAZULU-NATAL

BY

BRENDON WASLEY NOTHARD

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PIETERMARITZBURG

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DECLARATION

I hereby certify, that unless specifically indicated to the contrary in the text, this dissertation is the result of my own original work and has not been submitted for a degree at any other university.

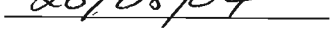
Brendon W Nothard

Date

I hereby certify that the statement is correct.

Prof Gerald F Ortmann

Supervisor



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ABSTRACT

The productivity of small-scale sugarcane contractors affects not only their own profitability and sustainability, but that of other stakeholders as well, such as the small-scale sugarcane farmers they contract to and the sugar mills these farmers supply in the form of improved services to growers and a steady flow of sugarcane to mills. This study firstly illustrates the organisational structures of the sugar industry. It then aims to identify constraints that inhibit the performance (such as timely haulage operations and cost effectiveness) of small-scale sugarcane contractors in the small-scale sugar industry of KwaZulu-Natal (KZN). To obtain this information, interviews were conducted with 124 randomly selected contractors from 11 mill group areas in KZN between September 2002 and July 2003. Case studies (concerning institutional issues such as organisational structures) of contractors, sub-committee members, and development officers were also conducted in eight mill group areas of KZN between September 2002 and February 2004. Sample statistics and case study results show that contractors face institutional constraints (work allocation limitations, lack of performance incentives and high transaction costs, such as negotiation costs, the risk of losing work and contract default risk), cash flow problems, poor physical infrastructure and a lack of labour. It is concluded that the promotion of a more competitive small-scale sugarcane contractor sector will alleviate many of the problems (such as work allocation limitations) faced by small-scale contractors, while providing incentives for the provision of higher quality and cheaper services to small-scale sugarcane growers.

The study also examines the attributes of small-scale sugarcane contractors that affect their quality of service as perceived by small-scale sugarcane growers (SSGs) within current institutions. Information is drawn from the same sample survey, although ten observations from the Umfolozi area are excluded because they were not part of the sample drawn from population lists. Further interviews were conducted in the same time period with SSGs for information on contractor service quality (transport and general service timeliness, meeting of daily ratable delivery requirements, low downtimes, good staff management, and minimal disagreements on service terms). Results show that factors affecting a contractor's perceived service quality include gender, training, the quality of information used (industry focused information sources such as the South African Sugar Association Experiment Station (SASEX) and the Ingede magazine, or general sources such as the radio), and sugarcane tonnage transported (size of business). Being a male contractor and having a larger business positively influence service rating as perceived by SSGs. The importance of the quality of information used and increased training levels highlights the need for the continual provision of relevant information and training for sugarcane contractors by extension services (government, SASEX and milling companies).

The study also identifies the need for further research on the issue of contractor machinery costs. In a competitive sector contractors would need to have adequate information on own costs in order to compare these with contract rates in the market. Further guidance by extension staff and other industry advisors (e.g. development officers) in the accessing of adequate finance may also be necessary.

Government has a role in strategising the creation of land markets to promote efficient use of resources (land), while providing improved rural infrastructure (mainly district roads). Government also needs to ensure unbiased tribal court rulings, review the impacts of minimum wage legislation on contractors sourcing labour, and provide protection for those competing for work.

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LIST OF ACRONYMS

APR	-	Annual percentage interest rate
FAF	-	Financial Aid Fund
HIV	-	Human Immune Deficiency
HP	-	Hire purchase
KZN	-	KwaZulu-Natal
LGC	-	Local Grower Council
MCC	-	Mill Cane Committee
R&M	-	Repairs and maintenance
RCDF	-	Regional Cane Delivery Forum
RV	-	Recoverable value
SACGA	-	South African Cane Growers' Association
SASA	-	South African Sugar Association
SASEX	-	South African Sugar Association Experiment Station
SASMAL	-	South African Sugar Millers' Association Limited
SERV	-	Service quality of the contractor
SSG	-	Small-scale sugarcane grower
UAF	-	Umthombo Agricultural Finance
USA	-	United States of America

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INTRODUCTION

For many years the South African Sugar Association (SASA) has given attention to small-scale farmers who consist primarily of previously disadvantaged black farmers. SASA's efforts are largely responsible for the existence of approximately 48 000 small-scale sugarcane growers, who currently form the bulk of 50 000 independent sugarcane growers in South Africa (SASA, 2000; Davis, 2003). SASA's contribution to this number is evident with the existence of Umthombo Agricultural Finance (UAF), previously known as the Financial Aid Fund (FAF). FAF first started in 1973 and UAF is now South Africa's largest private sector programme dedicated to funding agricultural development in South Africa (SASA, 2002). Other contributors have been the 1996 empowerment initiatives of Ithala Development Finance, Illovo Sugar Limited and the Tongaat-Hulett Group via innovative financing schemes to gain access to land, although these are primarily aimed at promoting the development of previously disadvantaged medium-scale farmers (Mashatola, 2003: 1).

The small-scale sugarcane growers (SSGs) form an integral part of the sugar industry and contribute an estimated 15 percent of the total sugarcane crop in South Africa, with the remaining 85 percent coming from commercial farmers (72 percent) and miller-cum planters (13 percent) (Mashatola, 2003: 10). The viability of SSGs is important from both a rural development and economic perspective. Firstly, SSGs comprise primarily of previously disadvantaged black farmers who contribute to rural economic growth through the use of local contractor and labour services. Secondly, mills such as Amatikulu

receive a high proportion of their sugarcane (approximately 25 percent) from SSGs (Le Gal & Requis, 1999). However, a serious drawback of the small-scale grower sector is the farmers' inability to efficiently plant, grow, cut and deliver cane to mills, considering the small size of their farms with a cutting average of between 1.5 and 2 hectares of sugarcane (Le Gal & Requis, 1999). A collapse of the SSG sector is expected to have marked effects on the flow of sugarcane to these mills.

Small-scale sugarcane contractors are generally described as SSGs, who provide essential mechanical (land preparation, crop maintenance and cane haulage tasks) (Wiseman, 2003) and/or labour (sugarcane cutting) contracting services to fellow SSGs. However, the productivity (timely haulage operations, low downtimes, competitive charge-rates) of these contractors has been low with costly delays in transportation of sugarcane and unreliability of the service (Sokhela, 1999). An improvement in the productivity of contractors in providing the services farmers need is expected to benefit contractors (lower costs and higher profitability) and growers (higher quality services at competitive prices). Milling companies would also benefit through a more stable supply of higher-quality sugarcane to their mills.

This study attempts to provide recommendations on how to improve the productivity and viability of small-scale sugarcane contractors in KwaZulu-Natal (KZN) from analysing survey data, case study information and own observation. It also includes a review of transport methods and methods of tractor acquisition regarding finance types and

financial sources. In addition, it attempts to estimate depreciation and repair and maintenance (R&M) costs for small-scale contractor machinery.

Firstly, it is hypothesised that the institutional framework in which contractors currently operate hinders their performance, which is reflected in widespread inefficiencies (under-utilised equipment, low quality/slow haulage operations) found in the sector. Contractors are likely to face high transaction costs (e.g. *ex ante* costs such as contract negotiation costs, and *ex post* costs such as risk of contract default) and other constraints (e.g. cash flow problems, a lack of infrastructure), which have a negative impact on their operations. Good institutions (i.e. those that reduce uncertainty and other transaction costs) are critical to promoting contractors' productivity, and a need for institutional reform in the small-scale sugar industry has been identified (Wiseman, 2003; Le Gal & Requis, 1999).

The study examines institutions that are perceived by contractors, sub-committee members (organised groups of SSGs in local small-scale sugarcane growing areas) and development officers to have a negative influence on the productivity of contractors in the small-scale sugar industry. It discusses the formal entry requirements of a potential contractor sourcing work, while highlighting traditional or informal institutional impacts. Various factors (such as financial constraints, lack of competition and incentives, and poor infrastructure) that currently have a negative impact on a contractor's performance are also evaluated.

Data for the study were collected between September 2002 and July 2003 on 124 contractors, who were randomly selected from eleven sugar mill areas in KwaZulu-Natal. Contractors interviewed were all haulage contractors who practice direct haulage (sugarcane haulage from field to mill), indirect haulage (sugarcane haulage from field to loading zone) or both. In addition to the survey data, information concerning institutional issues was drawn from case studies conducted between September 2002 and February 2004. The case studies include interviews with contractors, sub-committee members and development officers from eight mill group areas of KZN.

Secondly, the study identifies attributes of contractors that have a significant effect on the quality of their service as perceived by SSGs (transport and general service timeliness, meeting of daily ratable delivery requirements, low downtimes, good staff management, and minimal disagreements on service terms). This can assist sugar industry extension services in promoting these attributes through advice and training. It is in a SSG's best interest to have his/her sugarcane delivered to the mill on time by way of little conflict with contractors. All listed attributes are expected to impact either directly or indirectly on the quality of service received by SSGs. Information for this analysis was based on a sample of 114 contractors and on information regarding the quality of service provided by contractors through interviews with some of their clients (SSGs).

Lastly, for contractors information on machinery costs is extremely important from a charge-rate setting perspective. With the promotion of a competitive sector, contractors will need to know their own machinery costs, which would enable them to charge rates at

a competitive level. The study also examines depreciation forecasting and comments on the lack of information on maintenance and repairs within the industry. Policy recommendations are provided in an attempt to alleviate the constraints placed upon contractors, and suggestions are made to promote a more competitive industry and contractor productivity.

In summary, the dissertation is structured as follows: Chapter 1 deals with the organisation of the South African sugar industry and the small-scale sugarcane sector, while Chapters 2 and 3 present the theory on contracts and institutions, and characteristics of sample contractors and local institutions respectively. Factors inhibiting small-scale contractor performance in KwaZulu-Natal are evaluated in Chapter 4. A contractor service quality model is presented and analysed in Chapter 5, while Chapter 6 presents small-scale sugarcane contractor machinery costs and financing possibilities. The study concludes with a discussion of the results obtained and policy recommendations.

CHAPTER 1

ORGANISATION OF THE SOUTH AFRICAN SUGAR INDUSTRY AND THE SMALL-SCALE SECTOR

This chapter gives a brief overview of how the South African sugar industry and small-scale sugarcane sector are structured. It also includes information on the demand for, and supply of, small-scale sugarcane contractors in KwaZulu-Natal.

1.1 Organisation of the South African Sugar Industry

The South African sugar industry consists of two core groups involved in producing sugarcane and manufacturing sugar. These are the growers and millers who are represented by the South African Cane Growers' Association (SACGA) and the South African Sugar Millers' Association Limited (SASMAL) respectively. The affairs of the entire sugar industry are administered by the South African Sugar Association (SASA) which includes a council made up of an equal distribution of representatives from both SACGA and SASMAL (Sokhela, 1999). An outline of the South African sugar industry organisational structure is shown in Figure 1.1.

In South Africa, sugarcane is produced in three main areas, namely the KwaZulu-Natal (KZN) Coast (comprising 68 percent of the total sugarcane area), the KZN Midlands (comprising 17 percent of the total sugarcane area), and Mpumalanga (comprising 15 percent of the total sugarcane area) (Le Gal and Requis, 1999). The total amount of sugar

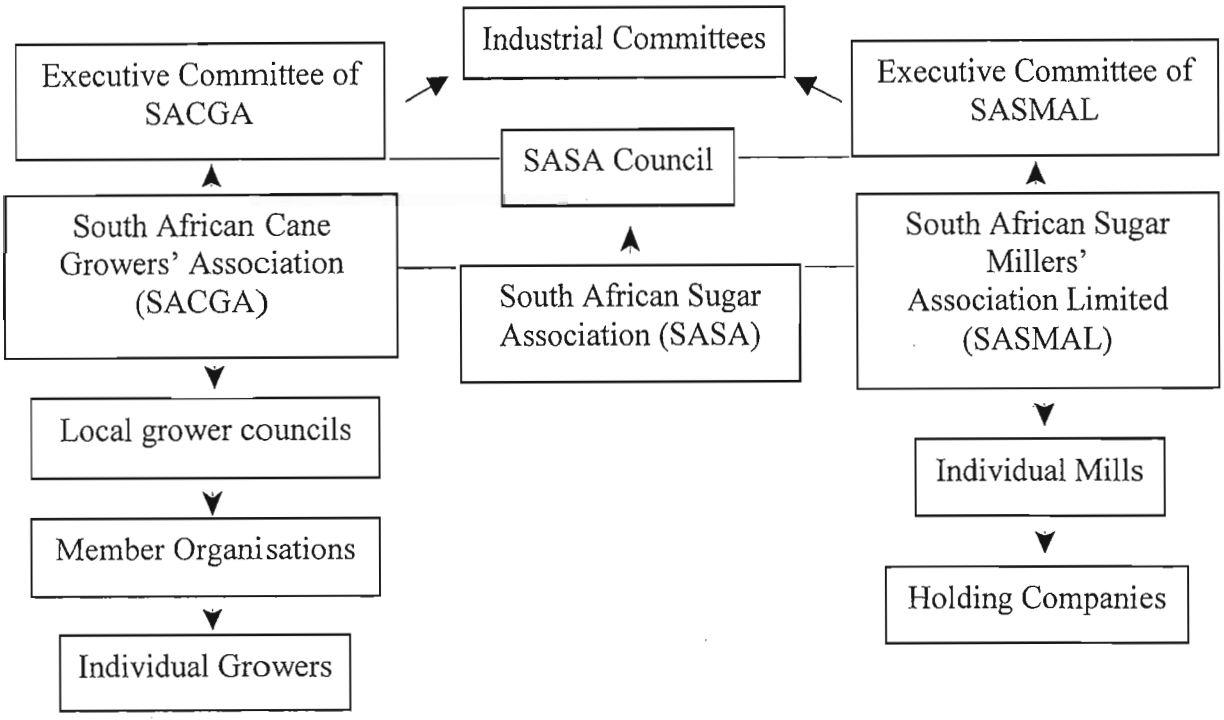

Figure 1.1: Organisation of the South African sugar industry

(Source: adapted from Sokhela, 1999: 16)

produced has varied between 1.5 and 2.5 million tons a year, with 15[1] mills (see Figure 1.2) being responsible for processing sugarcane into sugar and associated saleable products (e.g. syrup, molasses). Seven of these mills belong to Illovo Sugar Limited, five to the Tongaat-Hulett Sugar Group, two to Transvaal Sugar Limited, and one to Union Co-operative Limited (Le Gal and Requis, 1999). The proportion of small-scale sugarcane growers to larger or commercial growers differs from one mill area to the next. For example, the Umzimkulu and Noordsberg mill areas consist of relatively few small-scale sugarcane growers. In contrast, small-scale growers are responsible for 20 to 40

[1] This includes Entumeni Mill which was still in operation at the time of the survey. It closed down at the end of the 2002/03 milling season.

SOUTH AFRICAN SUGAR INDUSTRY

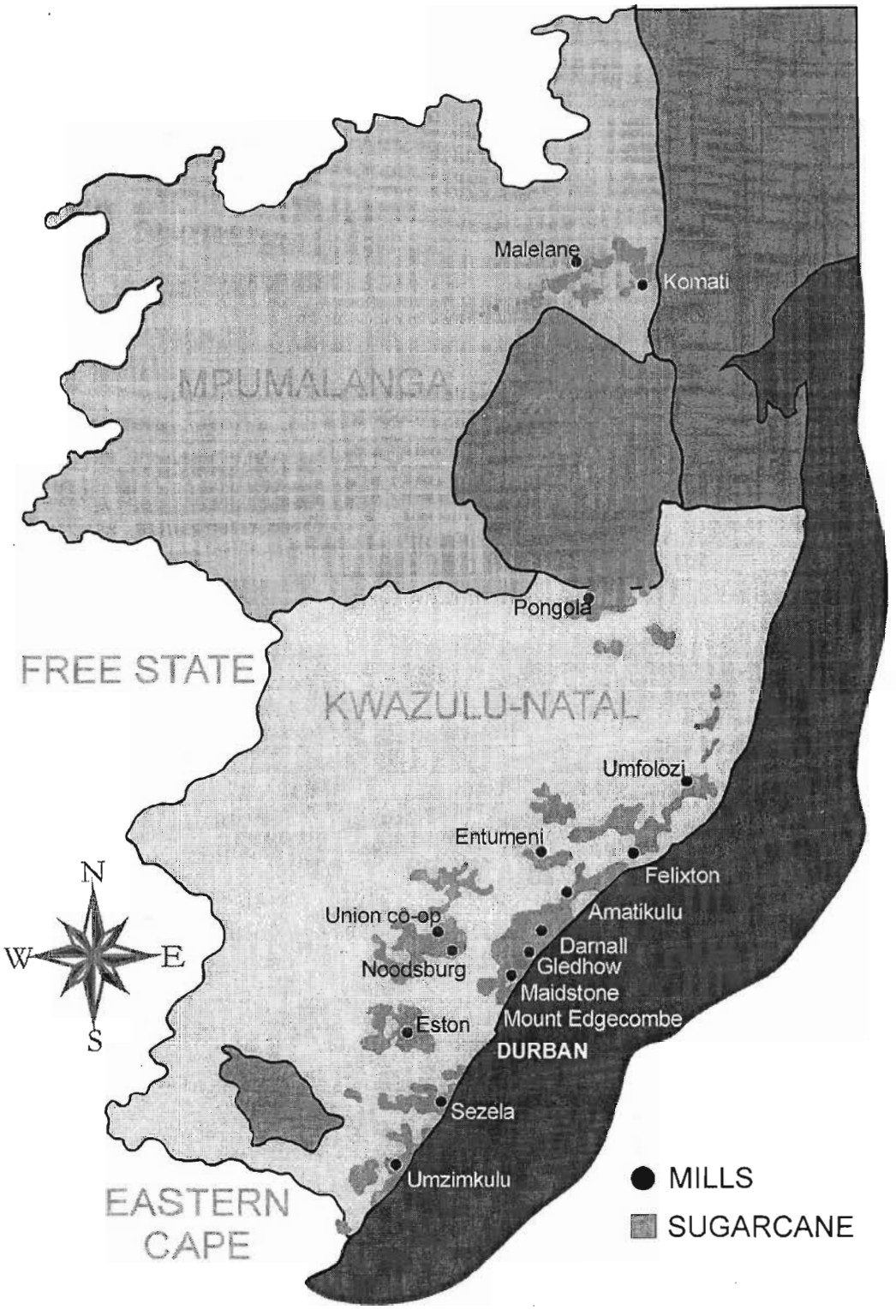

Figure 1.2: South African sugarcane production and mill areas

(Source: SASRI, 2004)

percent of sugarcane delivered to the Glendale[2], Entumeni, and Amatikulu mills (A'Bear *et al.*, 1997).

1.2 Organisation of Small-Scale Sugarcane Farmers and Contractors

The structure of small-scale growers and their contractors is different to that found in the large-scale commercial farm sector. Where commercial sugarcane growers are in direct contact with the local grower council (council established in each mill supply area representing the interests of local growers), the small-scale growers operate via a different channel, namely through their respective sub-committees (committees established in sub-locations of milling areas that represent the interests of SSGs in these locations), local associations (recognised associations in mill areas with which SSGs and contractors are registered) and mill cane committees (committees that are made up of members from the various local associations in each mill area). The general organisational structure for the small-scale sugarcane grower and contractor sector is shown in Figure 1.3.

Figure 1.3 shows that SSGs are in contact with their respective sub-committees and contractors, not the local grower council. The sub-committees are made up of, and represent, SSGs from sub-locations within each mill area, while the contractors are individuals that serve the SSGs. Not all areas have the same organizational structures, as

[2] Discontinued its operations at the end of the 1997/98 milling season.

some do not acknowledge local associations as having a right of influence over the sub-committees. The various institutions will be discussed in greater detail in Chapter 2.

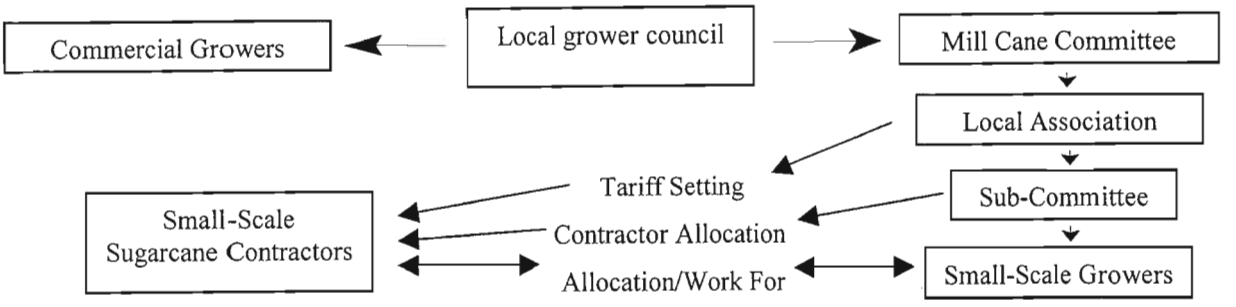

Figure 1.3: Organisation of small-scale sugarcane growers and contractors

(Source: adapted from Le Gal & Requis, 1999: 4)

1.2.1 Background to small-scale sugarcane farm contractors

In past studies that have primarily focussed on sugarcane growers, mention is often made of the role contractors play in farming activities (Sokhela, 1999; Bates, 1979). An early example of such a study was that done by Bates (1979), who referred to the existence of contractors in the 'Zulu Cane Grower' Sector. Bates found that due to the high demand for, and price of, contractor services - as well as the distance of contractors from farms - such services were difficult to obtain. He also pointed out that the unreliability of contractors, such as high machinery downtimes, was the main reason for large quantities of cut sugarcane being left rotting in the fields, while increasing the harvest-to-crush period. The main operations for which growers made use of contractors were land preparation and sugarcane transport. Further operations done by contractors were planting, fertilizing and harvesting.

Today, small-scale sugarcane contractors are still used for similar operations but they exist in an increasingly deregulated sugar market where competitiveness is becoming more important for industry players including SSGs (O'Reilly, 1998, cited in Le Gal & Requis, 1999). Sokhela (1999) gives a 'rough' estimate of between 600 and 1200 contractors in the industry. He stated that the difficulty in estimation was due to the informal nature of small-scale farm contractors. Sokhela's results showed that more than 80 percent of contractors in the industry during 1996 were involved with harvesting and field-to-loading zone transport of cane. Land preparation, weed control and field-to-mill transport of cane were further operations some contractors performed. Furthermore, most contractors were found to be growers. Sokhela (1999: 98) says an "improvement in the efficiency of contractors, will have a multiplier effect on the communities they serve", i.e. the small-scale sugarcane growers. The efficiency of contractors is related to the timeliness of their services, being low-cost service providers (i.e. 'wide' spreading of fixed costs, and monitoring and control of variable costs enabling lower charge-rates), the quality of their services provided, their management capabilities, etc. A'Bear *et al.* (1997: 33) also add, "in most supply areas, contractors have emerged as the 'real' growers, irrespective of whose land they are operating on. Their success, and therefore the success of the industry, depends on the operation of their machines". Table 1.1 shows estimates of total contractors in the industry per mill area, where available. Included are types of haulage done, the number of growers hauled for and the total tonnage hauled in each area.

Table 1.1: Industry Statistics for Small-scale Sugarcane Contractors, 2001/2002

Mill Area	Total Contractors	Indirect Haulage	Direct Haulage	Direct/ Indirect	Total Growers	Total Tonnage
Amatikulu	96	89	6	1	6 109	199 040
Entumeni	43		43		1 859	111 928
Eston	14	14			3 050	91 085
Felixton	75	75			4 486	269 939
Gledhow	39	38		1	7 682	218 447
Maidstone	55	55			2 994	109 636
Noodsberg	17	1	13	3	1 676	27 443
Pongola	6	5	1		224	98 000
Sezela	22	22			5 055	185 412
Umfolozi	150*				6 000*	350 000*
Umzimkulu	11	7	4		235	42 634
Total	528	456	67	5	39 370**	1 703 565

Source: Illovo Sugar Ltd. and Tongaat-Hulett Group representatives, 2002.

*Degree of accuracy may be questionable as population information was unavailable at the time of sampling.

**This is not the total for the industry as small-scale growers are also found in areas where small-scale contractors do not operate, e.g. Malelane and Komati.

1.2.2 Demand for contractors in the small-scale sugar industry

Continuing technological advancement of farming in the form of more expensive and complex machinery and equipment has played a large role in increasing the need for contractors worldwide by raising the break-even point at which growers are able to justify their machinery purchase (Errington & Bennet, 1994). This effect has been compounded by small farm sizes found in the small-scale sugarcane farm sector and has

made it infeasible for growers to do their own machinery-requiring tasks. For the small-scale sugarcane grower it often makes financial sense not to invest in relatively expensive machinery, but to rather make contractual arrangements with contractors who will provide a more 'cost effective' source of machinery and even labour.

Farmers have increasingly sought out cheaper sources of labour and machinery operations. Goedecke (1994: 385) maintains, "A contractor should be able to save the farmer repair costs, management time, labour training and housing, the cost of idle machinery, and improve cash flow." In doing so, the contractor would have to take on most of these costs himself. In the United States of America (USA), studies have found that wages paid by contractors are negotiated lower than those paid by farmers through direct hiring (Vandeman *et al.*, 1991). A contractor's ability to negotiate lower wages and manage other costs (e.g. transaction costs) explain some of the reasons why contractors are better able to save on costs relative to farmers.

1.2.3 Supply of contractors to the small-scale sugar industry

Wiseman (2003) states that most contractors are themselves SSGs and become contractors for two main reasons. The first is a need to diversify, while the second is the existence of low quality contractor services (untimely haulage operations), a major cause of frustration for growers relying on them. A grower, who is unwilling to depend on another for his machinery tasks, will need to purchase the required machinery himself. Following the purchase of machinery, full utilisation will only be met by contracting out

(considering the small-size of growers' farms), thus resulting in an increase in the supply of contractors. Another factor increasing the number of contractors is the higher social standing contractors receive in their communities. Although some of the younger contractors in the sugar industry (between 30 and 40 years of age) were found to be more profit motivated (Le Gal & Requis, 1999), many contractors are hypothesized to be unprofitable and inefficient, or unproductive (Eweg, 2002b; Wolhuter, 2002; Meyer, 2002). "Unprofitable and inefficient" contractors remain in the sector due to tonnage allocation procedures based on egalitarian rather than performance principles. Thus, the excess number of contractors has become a problem, and Sokhela (1999) points out that even deaths have occurred due to the fierceness of competition.

1.2.4 Problems of timeliness and high charge-rates for SSGs

To date, productivity problems with the small-scale sugarcane contractors relate to the poor timeliness of their operations (Sokhela, 1999) as well as their relatively low management skills (Le Gal & Requis, 1999). Timeliness is important with respect to customer satisfaction (Eggers, 1998), and for growers it becomes extremely costly if delays occur in their cane transportation to mills. Le Gal and Requis (1999) maintain there are four management capabilities the contractors need to have, namely management of equipment and employees, management of customers, financial management, and management of information. They further state that management problems often occur relating (1) to machinery - old machinery has a high potential to break down; (2) to customers - with a lack of time to search for new customers and to organise work for the

entire season; (3) to finances - the lack of tax collections means no operating accounts or depreciation calculations are required and are therefore not recorded, and (4) to information because without records or accounting there is an inability to monitor and evaluate activities, thus no support is provided for decisions in future investments or business planning.

Market forces normally determine contractor rates in the commercial sector. This, however, does not apply for small-scale sugarcane contractors as all contractors in a specific area charge the same rates. These rates are set at the beginning of the season. These fixed rates are calculated by local associations in the area and are based upon the previous season's figures that are adjusted for inflation (Le Gal & Requis, 1999). Commercial contractors, i.e. large-scale contractors mainly providing services to commercial farmers, tend to charge far lower rates than those set for small-scale sugarcane contractors. This may reflect the higher unit costs that the average small-scale sugarcane contractor faces when performing similar operations as a commercial contractor. For some, these set rates still remain too low considering that they continually incur losses (Eweg, 2002b; Wolhuter, 2002), which is an indication of the productivity problems of small-scale sugarcane contractors. Nevertheless, this may be explained by the conditions under which the contractors work: for example, they usually contract work that covers far less area or tonnage than what large farmers and contractors regard as necessary to break even (cost spreading by large contractors), and road infrastructure in the small-scale farming areas is relatively poor, thus contributing to high repair and maintenance costs (Sokhela, 1999).

1.3 Need for Research on Contractors in the Small-scale Sugar Industry

Problems of timeliness and high charge-rates have already been highlighted (Le Gal & Requis, 1999; Sokhela, 1999). These still exist despite their recognition. Further problems associated with low tonnages, field access, poorly maintained roads (Rau, 1988; Meyer, 1988), a lack of contractor organisational structure, a lack of business skills and poor equipment (Institute of Natural Resources, 1998) have also been documented, yet continue to exist.

While there have been various published articles concerning commercial contracting operations in South Africa (Porter & Phillips-Howard, 1997; Newman & Ortmann, 1996; Goedecke & Ortmann, 1993), few studies, including unpublished articles, have made mention of small-scale contractor operations in the South African sugar industry (Sokhela 1999; Le Gal & Requis, 1999; Institute of Natural Resources, 1998; 1999; Meyer, 1988; Rau, 1988). The lack of information on small-scale sugarcane contractors and the problems linked to their operations is evidence of a need for further research in this field. Peer-reviewed articles need to be published and more informative documents made available to the industry, in the hope that helpful answers are found in solving these and other problems of the small-scale contractor sector. This study intends to make a contribution towards such solutions.

CHAPTER 2

THEORY ON CONTRACTS AND INSTITUTIONS

Contract theory, including contracting alternatives and the benefits of contracting, is examined in Chapter 2. Institutional and competition theory are also discussed with special reference to induced institutional innovation.

2.1 A Review of Contract Theory

The broad range of agricultural contract types (custom farming, contract farming, etc.) shows the diverse needs of unique farms with respect to their different characteristics and situations. A farmer can consider any of a selection of contracting types ranging from entering into a custom farm agreement to providing contracting services himself. Dorward (2001) maintains there are three critical dimensions that affect the choice of a contracting arrangement. These are (1) uncertainty (i.e. contract enforcement), (2) asset specificity, and (3) the frequency with which transactions recur. Furthermore, Dorward classifies contracts into three classes of intensity. The first extreme class of contracts are those at the "neo-classical spot market" level. These exist when the contracts are extremely short-term in nature and develop due to lower levels of transaction risk exposure or lower costs of transacting on an open market (these costs are closely examined later in the chapter). The second extreme class of contracts occurring are those of vertical integration (inclusion of up and down-stream firms in a single firm) (Gillespie *et al.*, 1997) when open market transaction risk exposure is higher. The final and

medium-term contract class include bilateral contracts, where transaction risk exposure lies between the extremes. Each class of contracts is associated with different forms of governance with different co-ordinating and control mechanisms, contract law, disturbance and adaptive abilities. Each contract class is therefore applicable to transactions with different characteristics. Contracts between SSGs and contractors are not voluntary and may reflect the Coasian approach, where sugar industry authorities insist on contractual arrangements between the two parties with the aim of reducing transaction and information costs (Coase, 1937). The following section provides a few examples of contract types available to the farmer and/or contractor.

2.1.1 Contracting alternatives

Firstly, there is a contracting form referred to as custom farming. This involves a situation where landowners, although retaining close control of the farm business, are not actively involved in day-to-day activities. The landowner is involved in most farming decisions (e.g. arranging for input purchases) and receives all income from output sales. The contractor provides equipment and labour to perform all crop production activities and is paid a lump sum for his/her services. Further payments may also be a percent of the profits (Outlaw, 2002). A less constraining or specific custom farming type is contract farming. Contract farming is more representative of the South African sugar small-scale contractor sector and will be dealt with in more detail following this section.

Sub-contracting is a type of contract within a contract where a contractor, normally large in business size, sub-contracts tasks to others. This occurs in order to assist the larger contractors with timeliness (Goedecke, 1994). In other words, a contractor could contract out a task for which he has been contracted to perform when that specific task is unable to be done in time without a sub-contractor's help. Improvement in efficiency (lower transaction costs such as labour negotiations) may also be found where sub-contractors do specialised tasks, e.g. a sugarcane contractor may sub-contract labour sourcing operations to another contractor who has good relations with local labour and more experience in labour management.

Farmers, where necessary, may sell contract services where it will pay them to do so. This usually is the case when farmers have excess machinery capacity due to the small size of their farm business. The decision by a farmer to be either a buyer or seller of contract services depends not only on the size of his business but also on the availability of labour on the farm, i.e. as found on dairy farms where there is a need for flexible labour (Errington & Bennett, 1994).

Although not a direct type of contracting, share farming could be a useful alternative with respect to farming for individuals having limited capital resources. Share farming is the provision of capital by two parties, where costs and returns are generally shared in the same proportion as the share of capital given (Wright, 1990); in other words, a partnership. Instead of contracting in services where there is a lack of machinery, for example, a farmer could form a partnership with another who has access to the required

machinery. In this case both share the risks associated with farming as both are paid out by profits. This has the advantage that both partners' interests are in alignment, i.e. farm profit is the incentive for both parties (farmer and machinery owner) as neither is guaranteed a fixed payment (e.g. a haulage rate per ton) as is the case with contracting. This type of arrangement in the small-scale sugar industry may prove difficult from a contract enforcement perspective, as legal uncertainty exists for lower status individuals (e.g. women).

Contract farming

Drescher (2000: 395) defines contract farming as "the production of legally independent firms for a future market that includes arrangements to the periodicity of services, time of services, and quantities and qualities that can have an influence on structure, organisation, and disposition of the farm-firms." Such contracts are diverse in nature due to duration, authority and investment differences. Wright (1990: 177) simply states that, "contract farming can be defined as a joint venture between two parties, normally a landowner and a farm contractor", where the landowner provides the land and fixed capital, and the contractor provides machinery, labour and management. Although the latter definition seems to class contracts into a single category, this is not so where contracts are found to differ from agreement to agreement, such as in the South African small-scale sugarcane contractor sector. This is because the division of resources tends not to be rigid, i.e. some contractors provide only cane cutting services, others may only

transport the sugarcane, a few may primarily involve themselves with land preparation tasks, and many may do all, or provide a mix, of the services mentioned.

Some advantages of contract farming for the landowner are that the burdens and expenses of employing and buying machinery are removed. Also, contractors associated with contract farming provide a channel through which new farmers can enter the agricultural sector without the need of a large capital base. Although, to many farmers, this would not be the ideal route to take, new entrants are often constrained by the high capital requirements in farming (Stubbs & Williams, 1997). Also, another advantage to farmers would be that labour contractors can provide casual labour needed for seasonal farm work (Vandeman *et al.*, 1991). A disadvantage of contract farming for landowners is that operations are not always completed on a timely basis or when it best suits them. Contractors will often provide services to several landowners which spreads them 'thinly', thus making it impossible to cater for the needs of all those to which they contract. Further disadvantages for landowners are their payment responsibilities for seed, fertilizer, other production inputs and payments to the contractor, with cost responsibilities being specific to each contract. Because each of these costs are sunk or irretrievable, while returns are variable, contract farming from the landowner's point of view is risky (Outlaw, 2002).

There are several advantages for the contractor. Firstly, contracting can offer a fixed return. This is found in the sugar contracting sector where the contractor is paid a previously agreed upon rate for performing his services. Secondly, little additional

capital is required above that of machinery already purchased. Some additional costs are those of fuel, lubrication and repairs. Potential high repair bills are important contracting risks to be aware of. However, this risk is of much less concern compared to the risks attached to price and yield fluctuations faced by the farmer (Outlaw, 2002; Eggers, 1998). Lastly, labour contractors can spread their recruitment costs over a number of short-term contracts thus giving them an advantage in recruiting labour for seasonal tasks (Vandeman *et al.*, 1991). A disadvantage for custom operators (contractors) is that in a good farming year they will earn less than if on a conventional lease (where the landowner leases land to another who performs all operations and receives all income from the crop); this is one trade-off for risk faced by the farmer (price and yield fluctuations) being avoided by the contractor (Outlaw, 2002).

Currently, non-contracting farmers who face high financial stress (i.e. high debt), may find entering into a contractual agreement a viable option. The farmer would then be able to sell off machinery, thus raising capital that could be used to reduce borrowings. Further, operating and labour costs can be saved, thereby decreasing short-term working capital requirements although contractors would still need to be paid once tasks (cutting, haulage) were completed (Wright, 1990).

2.2 Transaction Costs and the Benefits of Contracting

There are various reasons why contractual arrangements are chosen over open market transactions. Most of these are linked to the costs of negotiating on an open market.

These costs are best described as transaction costs which are linked to information costs as well as uncertainty or moral hazard, asset specificity and risk (Frank & Henderson, 1992: 941). All of these play a role in determining the extremity of the costs when participating in open markets. Coase (1937) highlights a solution to this, namely to allow some authority to direct resources moving through markets, as in the small-scale sugarcane contractor market in KwaZulu-Natal. In other words, this allows for the control and alignment of resource flows by a single authority while eliminating the transaction costs arising if more than one authority were involved. Not only is contracting a means of doing this (the authority being the law responsible for enforcing the contract), but more extreme methods of coordination can be adapted, e.g. vertical integration. Although most small-scale contractors are integrated into farming, of more importance is the relationship between contractors and SSGs. Furthermore, the tonnage of sugarcane grown by each contractor is relatively small compared to the total tonnage hauled and would have very little bearing on their operations as a contractor. The following sections take a closer look at transaction costs and the factors influencing these costs.

2.2.1 Transaction costs

Transaction costs are often contrasted with the costs of production and processing (Dorward, 1999). Nevertheless, it should be noted that transaction costs form part of the overall cost of production. Total production costs include inputs, such as land, labour, and capital, which are used in changing the attributes of goods, as well as those involved

in transacting, i.e. defining, enforcing and protecting the property rights of goods (North, 1990). In other words, the sum of basic production costs and transaction costs equal the total cost of production.

Transaction costs are the costs, including risk, of negotiating and concluding a separate contract for each exchange transaction that takes place in the market. Also included are intangibles (e.g. searching for a SSG with whom to contract), and contract monitoring and enforcement (North, 1990). Arrow (1970, cited in Dorward, 1999: 480) defines transaction costs as "the costs of running the economic system". Transaction costs include *ex ante*, mostly fixed costs (e.g. drafting and negotiating agreements) and *ex post*, mostly variable (e.g. moral hazard) costs (Eggertson, 1990, cited in Zylbersztajn, 2003).

A problem in including transaction costs in economic analysis is the difficulty of estimating them empirically as most transaction costs are unobservable. This is because transaction costs are varied, most often intangible, are not measured by standard businesses, are never included in national statistics, and involve risk which is itself intangible (Dorward, 1999). Nevertheless, transaction cost economics has in the past been successfully used in economic analysis to explain patterns in the organisation of agricultural production, in particular where it has been applied to problems of tenancy and labour contract choice (Vandeman *et al.*, 1991).

2.2.2 Information costs

Key assumptions of perfect competition are perfect information and costless exchange. However, in the real world information is most often costly and asymmetrical (Dorward, 2001). The main costs arising out of incomplete or asymmetric information relevant to transaction costs are those of establishing contact and relations with other parties, screening both the commodity transacted and the other party, negotiation, monitoring and enforcement (North, 1990). These costs are incurred in an attempt to reduce risks that are endogenous to transactions (Dorward, 1999). Coase (1937) points out that the cost of information can be reduced by the entry of specialists who can sell such information on the market. However, he adds that the costs could never be completely eliminated in this way.

Costs, such as the lack of information, are sometimes specific to production processes or methods of production. Farmers need to keep up with the times and a way to survive in today's highly competitive markets would be through the use of appropriate technologies. The only way to effectively utilise such technologies would be through the use of information on them, such as what they are, how to apply or use them, etc. "Practical examples of the increased use of information and control systems are irrigation scheduling and moisture level monitoring systems, electronic individual ration balancing and feed dispensing systems in dairy production, building utilization and flow scheduling systems in livestock production, equipment sequencing and scheduling in crop

production, and quality assessment and assurance systems including feed additive use and fat/lean content in hog production" (Boehlje, 1993: 8). These examples show the importance of acquiring information and why the attached costs are necessarily incurred. However, specifically to contractors, these fixed information costs can be spread over many farmers. For example, if a sugar industry machinery contractor has the necessary information on how to adopt a technology that decreases the delay between harvest and crushing of the sugarcane, he could apply his knowledge over a number of farmers - an example of economies of scope where the information costs are spread.

2.2.3 Less risk and uncertainty

There are two main categories of risk, namely operating risk and financial risk (Boehlje, 1993). Operating risk in using the pricing mechanism may involve the risk of not being supplied some article or service needed in production as well as others such as low yield risk, price risk, etc. Contracting is one method to counteract such risk, i.e. it guarantees the supply of a service by having a contractor bound in an agreement to do so. However, such risk reduction may be "offset by the increased risks of contract breach, contract terms, contract negotiation, and limited ability to alter production plans and enterprise mixes to take advantage of other opportunities" (Barry, Sonka, & Lajili, 1992, cited in Featherstone & Sherrick, 1992: 1233).

Financial risk (adverse selection) refers to the risk between lenders and borrowers (Boehlje, 1993). Risk relating to moral hazard for the lenders and fixed debt repayment

risk for the borrowers are the most common examples. Moral hazard risk could be substantially decreased if lenders were to be more closely involved with the borrowers, thus enabling them to monitor any chances of the borrowers misusing the money lent to them. This is therefore linked to information for lenders regarding their borrowers.

Uncertainty, which is related to the scope for opportunism (moral hazard) by the other party in a transaction and a lack of information, is an important factor increasing information gathering costs and risk (Dorward, 2001). Uncertainty, however, does not by itself lead to the risk of financial loss in a transaction. The loss is incurred through a firm investing in specific assets or fixed costs that are unable to be recovered following the failure of a transaction. Therefore, both uncertainty and asset specificity are key transaction characteristics that affect a firm's exposure to risk and thus play a role in determining what type of contractual arrangement can be used to reduce transaction costs (Dorward, 2001). It could be said that in a world of uncertainty an optimum distribution of contracts is observed rather than there being one single optimum contract because agents have different levels of risk aversion (Vandeman *et al.*, 1991).

2.2.4 Improved scale and size economies

Not only are there benefits in contracting with regards to lowering transaction costs, but economies of size and scale are also important benefits to both the landowner or farmer, as well as the contractor. Economies of size are obtained by spreading the fixed costs of a firm (including fixed transaction and information costs) over a larger output, thus

resulting in a lower cost per unit output. Economies of scale are the combined impact of increases in all factors of production on farm revenue increases. The extent of economies of scale are measured by what proportional increases or decreases there are with respect to farm profit increases over factor of production increases (Pindyck & Rubinfeld, 1995: 212-219).

The main advantage of contracting for farmers would be when they have a small farm or limited borrowing capacity, because they would still be able to manage their farm and make most of the production and marketing decisions without investing in a full line of machinery (Ball, 1987; Outlaw, 2002; Eggers, 1998). This is of vital importance to the small-scale farmers of the South African sugar industry, as farming would become extremely costly with the purchase of all equipment needed. Contractors have the advantage of serving a number of farmers. For example, with the purchase of a tractor and plough they are not limited to the land preparation tasks of a single farm, but are able to contract their services to a number of farms, hopefully utilising the acquired machinery to its full capacity. In doing this the contractor takes advantage of economies of size, i.e. spreading the fixed cost of the tractor and plough over a larger area of land prepared.

Ball (1987: 482) states that "agricultural contractors can achieve economies of size beyond the reach of individual farmers by the use of sophisticated and expensive machinery". In other words, contractors are able to access technologically advanced machinery, make the necessary investments and improve output, while more than

proportionally increasing profitability with respect to the increased set of factors of production.

2.2.5 Effect of labour unions

Of increasing importance with regard to labour employment are the high costs associated with union activity. The worldwide struggle for and success of unionisation has challenged management's exclusive control of the labour process. This has also increased the costs of hiring labour, where improvements in working conditions, higher wage rates and other benefits for labour have become evident (Vandeman *et al.*, 1991). Goedecke and Ortmann (1993) state that labour contractors are often employed in South Africa where they have the ability to help farmers in avoiding union activity. Vandeman *et al.* (1991) show that there is a higher probability of contract employment for undocumented workers and non-union workers, which reveals the preference of employing workers that pose less of a threat to management control.

2.2.6 Trust, negotiation, monitoring, authority and enforcement

For a long time, farmers have been suspicious of contractors doing their work for them and so trust is always a concern in contractual agreements, even to the extent that some farmers have refused to deal with contractors (Goedecke & Ortmann, 1993). Trust is a very important aspect in any type of joint venture as it reduces *ex post* transaction costs. The closer the relationship between parties, the more likely is a joint venture (Wright,

1990). Close communication between the landowner and contractor is essential and since the objectives of the two are different, each must have a clear understanding of the other's position and expectations, i.e. number of hectares to be cut and tonnage carted. These should be agreed upon before any contract is drawn up. A contract should be designed to significantly reduce the conflict between the farmer and contractor, and should outline the responsibilities of both with a negotiated payment rate that is spelled out clearly (Outlaw, 2002). However, there is no need for an elaborate contract, but rather one that notes the most important points in avoidance of misunderstandings later during performance of the tasks set forth in the contract (Eggers, 1998). Trust is a substitute for an elaborate control and therefore reduces transaction costs.

Neilson (1986: 75) defines negotiation as "dialogue between parties in order to reach an agreement. The starting point is a difference which needs to be bridged by movement or compromise. The outcome is a deal, contract or arrangement which both parties are committed to fulfil". He states that the process of negotiation should include a time of preparation, discussion, bargaining, and an agreement. Refining these skills has become evermore important for successful farming and agribusiness related firms (Boehlje, 1993), such as contracting businesses. This will enable a party to either obtain products and services in a cost effective manner, or sell products and services at an attractive price. Within an agreement, the degree of authority concentrated in the hand of one contract party represents the rights of that individual to issue directives. This authority will increase for the contractor with an increase in the influence he has on the management

decisions of the farmer. In contrast, it will decrease as fewer rights are conceded by the farmer (Drescher, 2000).

To allow for both efficient transactions (low transaction costs regarding moral hazard or uncertainty) and adequate investment there is a need to enforce contracts. Sometimes public institutions responsible for enforcement fail, especially when they are weak, as found in some developing countries. Alternative mechanisms of enforcement are those of external or internal private contract mechanisms (Gow *et al.*, 2000). External mechanisms are of third party 'mafia-type' agents, who, however, often come with unwanted externalities (crime). Alternatively, there are those mechanisms that are internal in nature, i.e. self-enforcing contractual agreements. This is done by increasing the costs of contract breaches for the party who is most likely to breach, i.e. the party that incurs less of a cost following the breach of a contract. With a lower chance of a contract breach and therefore a relatively lower cost for the other party, the now 'more enforced' contract may provide an incentive for further contract-specific investments. An example of internal enforcement is that of the input provision and investment facilitation programme introduced by Juhocukor, a Slovakian sugar processor, for its producers of sugar-beet. With Juhocukor's increased investment at the farm level, the processor had an interest not to breach because its own costs of a breach had been substantially increased. Also, the breaching costs for producers were lower, thus facilitating an increased investment into sugar-beet production. In the event of a breach by the processor, producers would not have to pay for their inputs and would only lose returns to their labour and personal capital (Gow *et al.*, 2000).

2.2.7 Bargaining power and asset specificity

Bargaining power is a similar concept to that of authority, except that its degree is not conceded by the farmer or decided upon in an agreement by those involved in a contractual arrangement. Rather, bargaining power is evident through, and brought on by, the specific situation surrounding the contract, i.e. many or few contractors, as well as the characteristics each contracting party has. For example, the larger a farm, the more bargaining power the landowner will have. This is because the contractor who is in a contractual arrangement on that farm will value the continuation of the contract higher than if the farm was small and offered less business. It has, therefore, been found that larger farms receive better deals with regard to the contractual arrangements they enter into (Goedecke, 1994).

Again, as with transaction costs and related uncertainty, asset specificity also has an effect on the bargaining power of a contracting party. As shown by Hendrikse and Veerman (2001), the unforeseen problems that may occur with a contract will not leave the remaining surplus equally distributed between the parties, but will rather adversely affect the party who has invested the most in specific assets as his bargaining power would be weak. However, if both parties were to make contract specific investments that would not be useful with a premature end to the contract, a 'locked-in' situation will occur (Katz, 1989, cited in Drescher, 2000). This may protect both parties from each other's opportunism as long as none of the parties maintain several contractual agreements that are homogenous in nature, i.e. if a contractor maintains a similar contract

with more than one farmer the contractor has an ability to neglect the 'locked-in' situation (Drescher, 2000).

2.3 Institutions and Competition

New Institutional Economics (NIE) combines economic theory with institutional economics. Previous analyses were conducted separately by neo-classicists and institutionalists (Langlois, 1986: 5). Although the term NIE originated from Oliver Williamson (Coase, 2000), the original theory came from Coase's (1937) paper, *Nature of the Firm*. Now, "under NIE, some of the unrealistic assumptions of neo-classical economics (such as perfect information, zero transaction costs, full rationality) are relaxed, but the assumption of self-seeking individuals attempting to maximise an objective function subject to constraints still holds" (Kherallah & Kirsten, 2002: 112).

The theory of New Institutional Economics highlights transaction costs and the institutions promoted to lower them (Coase, 1937; Williamson, 1985). It also explains the evolution of institutions and assesses their economic performance, efficiency, and distribution impacts (Kherallah & Kirsten, 2002). These same institutions can, however, impact negatively on individuals by forming constraints on potentially positive human interaction, e.g. dissuading otherwise healthy competition in an economy. North (1990: 27) states that the existence of institutions can be explained through a joint understanding of human behaviour and transaction costs, with the costliness of information being the key to transaction costs. Institutions are seen as the "rules of the game" that shape human

interaction and are put in place in order to reduce uncertainty by organizing this interaction.

There are both formal and informal institutions. Formal institutions are the rules devised by policy makers (laws, markets, contracts, etc.), while informal institutions are merely conventions and codes of behaviour (traditions, customs, etc.). Policy makers have limited ability in influencing informal institutions but play a major role in deciding upon formal institutions or the rules by which individuals need to interact (North, 1990: 8). North says that institutional theory and development begins with the individual human being for whom institutions are created. In the small-scale sugarcane sector in KwaZulu-Natal (KZN) insight into, and development of, institutions may only be possible by firstly understanding the relationships between contractors and SSGs within their environment.

Beghin and Fafchamps (1995: 288) state that "good governance relates to government policies and institutions which promote markets and efficiency, by defining the rules of the game which allow transaction costs to be reduced and so enlarge the effective flow of goods and services." Furthermore, Hay (1993) says that the promotion of economic efficiency is one intention of competition. Sandmo (2000: 7) defines this economic efficiency as an "achievement of efficient resource allocation" or capital flow to sectors of production where the rate of return is highest. He further states that the aim of policy makers should be to reduce prices to competitive levels, something that is only possible through the promotion of a competitive market.

Porter's five-forces model (Porter, 1985) highlights five forces that can be adopted to identify what affects a contractor's competitive state in a free market system: suppliers of key inputs (sources of finance, equipment, fuel, repairs, all coupled with the bargaining power or ability of contractors in accessing these), substitute products (for those offering hand loading services it may be mechanical loading operations), potential new entrants (currently entry of contractors to the SSG market in KZN is at the discretion of groups of SSGs/sub-committees and is normally granted), customers (bargaining power with the SSGs they serve), and rivalry between competitors (jockeying for a competitive advantage over other contractors). Another important aspect to consider in a competitive market is the role of consumer (SSG) demand linked to product value. Kennedy *et al.* (1997) define customer value as the perceived value of a product's "bundle of benefits" relative to the price paid for the product. For a contractor to be competitive, this ratio needs to exceed that of his rivals. In the small-scale contracting sector in KZN there may be limited options for differentiation (hauling other products such as timber or water), and low-cost leadership may prove to be the defining factor for determination of a contractor's competitive advantage. Kennedy *et al.* (1997) maintain that cost competitiveness depends on variable costs (fuel, repairs and maintenance), sunk costs (larger investments such as specialised capital, e.g. cane carting equipment), and transaction costs (uncertainty or risk). Good institutions, in part, are those that facilitate a competitive market by aiding a reduction in transaction costs.

2.3.1 Induced institutional innovation

The benefits of good institutions are obvious. However, bringing about institutional change may not be as simple. Ruttan and Hayami (1984) highlighted an endogenous theory of institutional innovation from a demand point of view with a brief explanation of the supply of institutional change. Bardhan (1989), however, better explains the supply of institutional change through highlighting resistance to change in the form of vested interests and power struggles within collective action and the cost of collective action itself. In the small-scale contracting sector there may be a demand for institutional change regarding contractors sourcing their own work, and organisations such as SASA and SASEX may see benefits in promoting such change (supply). However, power interests within local associations and sub-committees may prevent this from happening. Unless potential losers are identified and compensated, changing the institutional environment may prove difficult because potential losers have the power to resist such change.

CHAPTER 3

CHARACTERISTICS OF SAMPLE CONTRACTORS AND LOCAL INSTITUTIONS

Sections 3.2 and 3.3 explain the institutional environment in which small-scale sugarcane contractors operate. The information used in these sections is derived from sample survey data and case study interviews. Data sources and characteristics of the sample contractors are presented in the next section.

3.1 Data Sources and Characteristics of Sample Contractors

The data include the responses of a survey conducted by Joint Venture[3] and mill extension staff who interviewed 124 small-scale contractors between September 2002 and July 2003 (see Appendix 1A for the questionnaire used). The study area includes eleven of the main small-scale sugarcane grower areas, namely Umzimkulu, Sezela, Eston, Maidstone, Noodsberg, Gledhow (including Glendale), Amatikulu, Entumeni, Felixton, Pongola and Umfolozi. Two small-scale sugarcane areas, Malelane and Komati, were omitted because no small-scale contractors were active there. Large-scale contractors service the small-scale growers in these two areas (Eweg, 2002b).

[3] Staff from both the South African Sugar Association Experiment Station and the KwaZulu-Natal Department of Agriculture and Environmental Affairs who are currently working in partnership.

Contractors that were interviewed included those randomly selected, with replacement[4], from population lists supplied for each mill area. However, due to the lack of information on the contractor population, the data gathered from ten Umfolozi area contractors did not form part of the original random sample. These contractors were randomly selected by extension staff operating in this area and were included in the descriptive statistics.

The population was stratified in two ways, namely by topography and whether a contractor conducted direct or indirect haulage tasks. The sample was drawn using a constant sampling fraction across the strata. Three levels of topography were chosen due to the impact hauling on steep slopes is expected to have on contractor costs[5]. Furthermore, due to the low occurrence of contractors transporting high tonnages, all those contractors who were listed as transporting more than 10 000 tons of sugarcane per year were included in the sample (the intended sampling fraction for this stratum was 100 percent, although three observations were lost reducing the sampling fraction to 77 percent). This was done to allow for an adequate spread of tonnage in the data. Also, Mashatola (2002) observed that the average tractor usage break-even point lies close to the 10 - 12 000 ton range. Table 3.1 presents the eventual strata sampled at constant sampling fractions (See Appendix 2 on how each haulage area was categorised). Although the original sampling fraction was 34 percent, nine observations were lost which brought the sampling fraction within the 31 and 33 percent range for five of the

[4] This method was used so that the population list need not be re-numbered following the selection of every contractor.
[5] Failure to calculate contractor costs due to a lack of information made inclusion of topographical information in the study unnecessary.

strata. Also, the sampling fraction for the Direct/Flat stratum was 100 percent due to the population including only one observation. Contractors either missing or those that had stopped contracting were replaced by randomly selected individuals from the same stratum. Fifteen replacements were made; however, due to time constraints, nine missing contractors were not replaced. According to initial analyses, the tonnage distribution of the population and sample were very similar, which indicates adequate representation of the population by the sample regarding tonnage hauled.

Table 3.1: Sampling Fractions For Strata (n/N)

	Undulating & Undulating to Flat	**Steep & Steep to Flat**	**Flat**
Indirect	48/147 (33%)	11/34 (32%)	17/55 (31%)
Direct	9/27 (33%)	18/58 (31%)	1/1 (100%)
Those transporting more than 10 000 tons			10/13 (77%)

Table 3.2 presents the number of contractors interviewed in each mill area while Table 3.3 summarises the characteristics of respondents. Firstly, the contractors hauling more than 10 000 tons only influenced the tonnage mean and so are included in calculating the other characteristics. The mean age and years of contracting experience for contractors are 52 and ten, respectively. Just over 13 percent of the sample contractors are female while 77 and 53 percent have other sources of income and skills, respectively. Other sources of income include 31 different types such as farming, taxi operations, and various public employments (teaching, Department of Health service, Department of Agriculture service). There are 30 skills listed, such as crop maintenance, land preparation,

mechanical servicing, various management skills, and other entrepreneurial skills (block laying, painting, boiler making, panel beating, trading, welding).

Table 3.2: Contractors Interviewed in Each Sugar Mill Area, 2002/03

Area	Observations	Percent of Total Sample
Amatikulu	10	8.1
Entumeni	18	14.5
Eston	9	7.3
Felixton	25	20.2
Gledhow	9	7.3
Maidstone	19	15.3
Noodsberg	7	5.6
Pongola	5	4.0
Sezela	10	8.1
Umzimkulu	2	1.6
Umfolozi	10	8.1
Total	124	100

An average of 4 757 tons of sugarcane is transported by sample contractors per year (excluding purposively selected contractors transporting more than 10 000 tons), which is about 1 500 tons less than the mean which includes contractors transporting more than 10 000 tons. About 17 percent of the sample contractors have no educational qualifications. Thirty–nine percent achieved a grade 8 or less, while 38 percent of

respondents have educational levels ranging from grade 9 to 12. Only six percent have a tertiary education.

Table 3.3: Characteristics of Sample Small-scale Sugarcane Contractors in 11 Areas of KZN, 2002/03 (n=124)

Characteristic		Education Distribution	
Age in Years (mean)	52.4	No Education (%)	17.1
Experience in Years (mean)	9.9	Grade 8 or less (%)	39.0
Proportion of Females (%)	13.1	Grade 9-11 (%)	18.7
Other Sources of Income (%)	77.4	Grade 12 (%)	19.5
Other Skills (%)	53.2	Tertiary (%)	5.7
Tons Transported Annually	6 295.2		
Tons Transported Annually*	4 756.6		

*Excluding those contractors transporting more than 10 000 tons.

Note: Contractors transporting more than 10 000 tons only influenced the tonnage mean and are therefore included in calculating all other characteristic means.

It is important to distinguish between the infield loading methods as very different methods of loading are used, which may markedly affect a contractor's profitability or service quality as perceived by SSGs with respect to time and cost. Table 3.4 firstly shows the proportions of loading types in each mill area. "Tons stacked" is a method of cutting and stacking sugarcane by hand into piles of sugarcane that are pulled by and onto self-loading trailers. "Tons windrowed or mechanically loaded" refers to the method whereby sugarcane is cut and laid in rows so as to allow sugarcane loaders to pick up the

sugarcane and place it onto trailers (normally box-type trailers). "Tons hand-loaded" refers to cutting and loading of sugarcane directly onto trailers left in the fields. These trailers are then carted to the loading zones or mills when fully loaded. Mill areas that have contractors predominantly cutting and loading stacks are Maidstone, Eston, Sezela, Felixton, Amatikulu, and Gledhow. Mill areas where the bulk of sugarcane is windrowed or mechanically loaded include Umzimkulu, Pongola, and Noodsberg. At Entumeni most sugarcane is hand-loaded.

Direct haulage refers to the haulage of sugarcane from fields to mills, while indirect haulage refers to sugarcane haulage from fields to loading zones. Table 3.4 also shows the different haulage types per mill area. Only two mill areas have the bulk of their cane directly hauled, namely Noodsberg and Entumeni. The remaining mill areas use predominantly indirect haulage methods. Overall, 56 percent of sugarcane transported by respondents is stacked and 87 percent is indirectly hauled.

Table 3.5 shows the total number of tractors, trucks, trailers, and loaders owned by contractors in the sample. Two contractors did not respond to this question, thus the average number of vehicles or machines owned is calculated for 112 contractors. The ratio of tractors to trailers is expected to be less than one but is in fact equal to one, as there may be a large number of unreliable tractors which necessitate employment of standby tractors.

Table 3.4: Sample Small-scale Sugarcane Contractor Infield Loading and Haulage Methods, 2002/03, n=114

Mill Area*	Tons Stacked	Tons Windrowed/ Mech. Load	Tons Hand-Loaded	Tons Directly Hauled	Tons Indirectly Hauled	Sample Total, Tons (2002/2003)	Population Total, Tons (2001/2002)*
Amatikulu	15 682 (77%)	0	4 600 (23%)	1 850 (9%)	18 432 (91%)	20 282	199 040
Entumeni	0	2 000 (5%)	36 194 (95%)	38 194 (100%)	0	38 194	111 928
Eston	24 955 (53%)	22 560 (47%)	0	0	47 515 (100%)	47 515	91 085
Felixton	83 468 (87%)	12 913 (13%)	0	0	96 381 (100%)	96 381	269 939
Gledhow	103 895 (100%)	0	0	0	103 895 (100%)	103 895	218 447
Maidstone	43 807 (100%)	0	0	0	43 807 (100%)	43 807	109 636
Noodsberg	0	14 852 (100%)	0	14 852 (100%)	0	14 852	27 443
Pongola	0	145 000 (100%)	0	30 000 (21%)	115 000 (79%)	145 000	98 000**
Sezela	104 008 (74%)	0	36 062 (26%)	0	140 070 (100%)	140 070	185 412
Umzimkulu	300 (2%)	17 500 (98%)	0	0	17 800 (100%)	17 800	42 634
Total	376 115 (56%)	214 825 (32%)	78 856 (12%)	84 896 (13%)	582 900 (87%)	667 796	1 310 930

Source: Illovo Sugar Ltd. and Tongaat-Hulett Group representatives, 2002.
*Information for Umfolozi area unavailable.
**Potentially an incorrect population figure (reason unknown).
Note: Figures in parenthesis denote percent out of total sample tonnage.

Table 3.5: Number of Machinery Items Owned by Sample Contractors, 2002/03 (n=112)

Machinery Type	Tractors	Trucks	Trailers	Loaders
Total Number	183	10	180	37
Machine to Contractor Ratio	1.63	0.09	1.61	0.33

Case studies to get the views of contractors, sub-committee (locally organised groups of SSGs in small-scale sugarcane growing areas) members and development officers on institutional issues were conducted in eight small-scale grower areas. The areas are distributed over KwaZulu-Natal coastal and inland regions, including four Illovo mill areas (Eston, Sezela, Gledhow, and Glendale) and four Tongaat-Hulett mill areas (Amatikulu, Maidstone, Entumeni, and Felixton). Included in the interviews were contractors, sub-committee members and development officers. Case study interviews, both in person and by phone, were conducted between September 2002 and February 2004. The main questions asked during these interviews are listed in Appendix 3. Furthermore, due to the informal nature of the interviews, further insight was gained through informative discussions beyond the confines of the set questions.

3.2 Institutions Influencing Small-scale Contractor Entry[6]

In each study area, contractors enter the industry by way of similar methods. Differences in contractor entry do occur across areas, but the following sections highlight the common channels. Authorities and influential bodies within the industry (sub-committees, local associations, milling companies) do not formally recognize contractors who source work through channels that do not involve the sub-committees and local associations. However, only 41 percent of sample contractors had either sub-committees or local associations involved in their hiring. Fifty-three percent indicated grower involvement alone, while six percent of the sample contractors indicated both grower and sub-committee/local association involvement. This indicates that 53 percent of contractors do not view sub-committee and local association involvement in contractual matters, such as the signing of contracts/cessions, as significant as grower involvement, even though sub-committees allocate the tonnages for haulage by contractors. In some areas the sub-committee has no involvement in the signing of cessions although cessions still need to pass through sub-committees to local associations or milling companies.

Organisational structure influences the extent to which channels through which potential contractors enter the industry are formed. The organisations in the small-scale grower sector differ from those found in the commercial farming sector (discussed in section 1.2). The following sections present the organisations governing small-scale growers and contractors in greater detail.

[6] Section 3.2 includes information from sample survey and case study observations. Referencing is excluded from the text due to many individuals providing similar information.

3.2.1 The local association

Formation

Local associations represent the interests of all SSGs in their local mill areas and comprise of members from the numerous local sub-committees (one to two members are voted onto the local association from each sub-committee, depending on its size). The development of a local association often depends on the area's tribal structure (e.g. Felixton, Gledhow, and Glendale) where each local association is representative of a single chief's area. This is done to minimise conflicts between different tribal members. Furthermore, two members of the local association are elected to sit on the MCC. In areas where less emphasis is placed on the local association, chairmen from most sub-committees may be elected directly onto the MCC (e.g. Sezela). There are approximately six or seven sub-committees per local association, depending on the size of the area over which the local association presides.

General function

Local associations oversee the functioning of sub-committees with limited authority (i.e. ensure cane haulage and allocation operations run correctly), the extent of which depends on the MCC. When problems arise that the sub-committee cannot solve (e.g. allocation conflicts between growers and contractors), local associations will take over the mediator's role in resolving the conflict. In areas where local associations are divided

according to tribal structures, all dealings with the tribal authorities are done through the local associations.

Role in contractor registration and setting charge-rate guidelines

Local associations are recognised by the industry as authoritative bodies and it is compulsory for contractors to register with them (Harding, 2003). Although direct contact with contractors is limited, the associations will receive applications from contractors for registration purposes. The associations will then need to register them, after which the contractors become part of the local association (most contractors are already registered as SSGs). Registration aids payment whereby contractors are given contractor numbers that are used to identify the contractors responsible for hauling every load of SSG sugarcane. The contractor numbers are forwarded to the respective mills that pay accordingly (i.e. each SSGs load sent to the mill includes his contractor's number; the contractor is then paid by the mill out of the SSG's proceeds). The local association also provides contractors with charge-rate guidelines for hauling SSG sugarcane. They are assisted in this matter by milling companies and regional economists. Rates are not set according to supply and demand for contractor services, but are estimates (not dependent on contractor costs). In some areas rates are merely increased by accounting for inflation (e.g. Amatikulu).

3.2.2 The sub-committee

Election

Sub-committees are locally organised groups of SSGs in each grower area. The election of sub-committee members, held every one to three years, are initiated and overseen by various bodies (e.g. South African Sugar Association Experiment Station (SASEX), South African Cane Growers' Association (SACGA), the KwaZulu-Natal Department of Agriculture and Environmental Affairs, Mill Cane Committees, milling companies, and development officers provided by the local associations), depending on the region. All SSGs in their respective sub-committee areas are invited to nominate candidates and to cast confidential ballots to elect sub-committee members (for some areas only 30 to 50 percent of SSGs are said to attend the electoral meetings). Five to nine members are elected per sub-committee (often past members are re-elected), including a chairman and vice-chairman who are normally appointed to the local association. It should be noted that due to most contractors being SSGs themselves, they are not excluded from sub-committee nomination.

General function

Sub-committees communicate grievances from SSGs to those of higher influence when resolution is beyond the sub-committee's control or ability, i.e. involvement in settling disputes. Information, e.g. new industry developments such as harvesting improvements or new cane varieties, a change in sucrose or recoverable value price, also filters down

from higher authorities (South African Sugar Association (SASA), the local grower council) to SSGs via the sub-committees. They also channel information from SSGs to local associations, which then forward the information to the mill cane committees (MCCs) who in turn communicate it to the local grower councils. The MCC is the main representative of growers in an area, and its function varies from area to area (e.g. the Gledhow MCC directs most resources (development officer extension) in cane development).

Role in sugarcane allocation to contractors

The first responsibility of the sub-committee is to ensure that contractors entering the industry have the necessary equipment (tractors, trailers), and that there is available tonnage to haul. They also need to ensure that contractors operating in their area are registered with the local association. Secondly, they act on behalf of all SSGs in the area, and will allocate contractors to individual SSGs (the number of SSGs greatly exceeds the number of contractors). A facilitator, appointed in each sub-committee, is the individual who takes charge in the allocation of work. The sub-committee also mediates cession forms signed by SSGs and contractors. Following the signing of cessions, the sub-committees will send them to the mill or local association. In 2003, SACGA and Tongaat-Huletts began a programme in the Maidstone area whereby the Regional Cane Delivery Forum (RCDF) adopted the function of SSG cane allocation to contractors, previously administered by sub-committees. The Maidstone RCDF includes SSG, contractor and Sukumani Management (subsidiary of Tongaat-Huletts Sugar)

representatives. The RCDF has a code of conduct to be followed by all contractors operating in the area. Many sub-committees do not have a code of conduct, so poor-performing contractors continue to be a part of the local associations.

3.2.3 The contractor's role in sourcing work

Wiseman (2003) states that most contractors (many being SSGs) become contractors for two main reasons, namely to diversify, and because of the existence of low quality contractor services (untimely haulage operations), which causes frustration for growers relying on them. Although different mill areas use slightly different methods, the basic steps taken by potential contractors to be recognised and receive work are as follows. Firstly, potential contractors need to approach the sub-committee to which they want to be affiliated (in some areas, local associations are approached first). This would normally be a sub-committee in their own communities, but contractors have also been found operating in other areas. These are normally close, or adjacent, to their own areas. At this stage, the sub-committee checks a contractor's machinery and available tonnage is totalled to see if work is available. Sub-committees expect potential contractors to purchase machinery only after the acceptance of their applications to do contract work. However, this rarely occurs, and contractors normally purchase their machinery before any consultation with the sub-committee is made in the hope of getting contract work.

Once potential contractors are recognised by their sub-committees (through word of mouth) they need to register as contractors and get a contractor number (this finalises

registration of the contractor with the local association). This is done through the local association in conjunction with the milling company. The milling company will then use the numbers to identify those contractors hauling sugarcane to the mills or zones for each grower. Registered contractors will be allocated SSGs to haul for, and both parties will sign cessions (the cessions remain binding for a single season and signing of cessions re-occur every year even if the grower uses the same contractor). This normally occurs at least once a month (as found in the Sezela area), but varies according to the preference of the sub-committee. The signing of cessions can re-occur randomly for some SSGs when their contractors have breakdowns and haulage has to be reallocated. Some mill areas have alternatives to cessions - for example, at the Gledhow mill, cessions are not required, as contractors and corresponding SSGs are entered directly onto computer.

Once a contractor has work (this is allocated by the sub-committee) he is expected to complete that to which he has agreed. Work, however, is not always completed due to reasons both beyond (e.g. rain delays and mill breakdowns) and within (e.g. equipment downtime) the control of the contractor. When contractors have completed their allotted work, they receive a guaranteed payment from the milling company in the form of a deduction from the SSG's proceeds.

3.3 Customary Institutions Influencing Small-Scale Sugar Farming in KwaZulu-Natal

Customary law and tradition have great influence on the "rules of the game" in the small-scale sugarcane industry sector. Firstly, the origin of many small-scale sugar industry problems is believed to be the land tenure situation in tribal areas of KZN (Wynne, 2003). The SSGs need to employ contractors because it is not feasible to invest in the necessary tractors or machinery, due to the small size of their farms. The small farm size is the product of tribal land being allocated to those people in the area without extending secure tenure rights. Land purchase or rental markets therefore are imperfect for rural area land-users. This places a restriction on, for instance, more productive SSGs because they cannot rent in or purchase land. Thus, SSGs remain small despite the associated constraints, such as diseconomies of size. Also, much land lies idle and uncultivated, which is the result of an imperfect rental market (Fenwick & Lyne, 1999). Many SSGs are exiting the sugar industry (Wiseman, 2003), and the voluntary rental of their land to other, more productive SSGs may consolidate land in SSG areas and promote their long-run viability.

A further problem associated with the lack of land rights is the inability of landowners to use their land as collateral for loans because tribal owned land cannot be repossessed or sold (Fenwick & Lyne, 1998). Land would only have collateral value under a sale market or long-term lease market. Furthermore, title-deeds do not solve the land tenure problem except when they assist market transfers (Fenwick & Lyne, 1999). With the

land issue being of great importance, it remains an issue lying beyond the control of those directly involved in the sugar industry, namely the milling companies, SASA, and SACGA. Although involvement by sugar industry players is necessary, overall responsibility rests with both the government and tribal authorities, highlighting a need for institutional change (tribal land market institutions) that could promote the viability of small-scale contractors beyond the "confines" of the sugar industry.

Thomson (1996) highlights potential steps in addressing the land tenure problem. These are (1) to gain support from the tribal authority by communicating potential advantages of a land market; (2) to identify what market constraints exist and then address each of these individually, i.e. insecure tenure, risk perceptions, or a combination of both; (3) to adapt local institutions to strengthen tenure security and provide extension to facilitate land transactions, helping to reduce transaction costs faced by lessors and lessees; and (4) to provide institutional support in the form of monitoring the growth of the rental market and disputes between vested interest groups. Thomson also states that traditional councillors must agree to uphold rental contractors and that clear procedures be established for dispute settlement in traditional courts. This type of legal precedent removes risk, and would therefore improve tenure security and lower transaction costs.

Another impact of customary law is the method of settling disagreements. The sample of contractors suggests that only 36 percent settle disagreements privately, while 61 percent indicate that some form of group settlement is necessary (i.e. through sub-committees, associations, mill extension). Individuals are often either afraid, or do not have the status

or authority within their community, to state their grievances with effect. For example, Bruce (1989) indicates that over diverse cultural settings, women, specifically widowed or single women, have a substantially lower social status than men. Wiseman (2003) confirms this for KZN by adding that, due to tradition, societies in the rural areas of KZN are patriarchal in nature. It is therefore expected that women would face greater legal uncertainty and thus higher transaction costs. Lyne (1996) also identifies this issue, stating that individuals having weak social status, in this case women, often face greater legal uncertainty when compared to the rural elite.

Because contractors live in the same communities as both their growers/clients and competitors, promoting a competitive industry may prove difficult. This has also greatly influenced work allocation by sub-committees, as some have indicated that their work allocation is not dependent on the service quality of a contractor, but rather on work allocation equality for contractors from the sub-committee's perspective. Due to the influence that traditional authorities (chiefs, elders) have in the small-scale sugarcane areas of KZN, it may be prudent that these authorities be included in any institutional change process. Thomson (1996: 83) found the inclusion of credible leaders, such as chiefs and tribal councils, extremely important in bringing institutional change to the tribal areas. Good leaders may play important roles in upholding contractual obligations and enforcing land rights where government intervention may fail (enforcement in remote areas may be difficult for government officials due to a lack of personnel and legal infrastructure, such as rural courts).

The next chapter presents factors inhibiting contractor performance in the small-scale sugar industry. Examining organisational structures, contractor work sourcing channels, and customary influences from the sample survey and case studies, identifies these factors.

CHAPTER 4

FACTORS INHIBITING SMALL-SCALE CONTRACTOR PERFORMANCE IN KWAZULU-NATAL

Institutions of the small-scale sugar industry influence an individual contractor's exchange and production costs by giving some structure to their interaction with SSGs, competitors, and authoritative bodies such as sub-committees and local associations. The following are factors that constrain contractor performance in the industry. Coming from both the sample survey and case studies, factors are not ranked and are therefore not listed in any specific order.

4.1 High Transaction Costs

Observations show that *ex ante* transaction costs faced by contractors, with respect to sourcing contract work, are high. The involvement of both sub-committees and local associations leave contractors with much "red tape" and costs to manage (negotiation costs that include application for membership, approval and contract arrangements) over and above those faced by commercial contractors. Furthermore, due to the small size of growers, contractors need to find approval for many cessions, which adds to their transaction costs (sample average was 121 SSGs per contractor). Nevertheless, there are savings for contractors as they are assigned SSGs/clients, and therefore do not have to search for them. The risk of losing haulage work is also relatively high for contractors (even though 60-70 percent are normally assigned into the next year), as work allocated

in one year is not necessarily allocated in the next. This not only creates uncertainty regarding work for the future, but also limits access to current loans, as lending institutions generally view contractors as short-term, and therefore high-risk clients that cannot service long-term debt. Contractors have also mentioned the decreased amount of work allocated over recent years. This may be attributed to the recent drought, although, as with preceding drops in allocation, it could be the joint result of a declining number of SSGs and an over-supply of contractors (more contractors than would survive in a free market, where contractors have enough haulage work to make use of economies of size, allowing for competitive charge-rates). *Ex post* transaction costs are increased through the risk of contract default in the presence of legal uncertainty, especially for female farmers and contractors.

A New Institutional Economics approach endeavours to reduce transaction costs faced by contractors through institutional reform and would look for incentive compliant arrangements for improving contractor performance. This would not only involve decreasing the number of channels through which contractors need to go in order to attain work, but may also include provision of physical (roads) and legal (ensure similar standards for lower status individuals) infrastructure, information and education (Matungul *et al.*, 2001).

4.2 Limited Access to Medium-Term Finance

With cessions being limited to one year, formal lending institutions see contractors as temporary entities. This is understandable, as contractors are never guaranteed work for the following season and although commercial contractors face the same problem, their historical records reflect performance, which is not the case for small-scale contractors. This situation strengthens the perception of contractors as high-risk clients, since uncertainty is heightened in the minds of lenders regarding a contractor's ability to service medium-term debt. With contractors sourcing loans for specialised equipment such as cane loaders and cane trailers, lending institutions doubt whether even a movement to another agricultural sector is possible in the event of a loss of sugarcane contracting work. Nevertheless, a good credit history may prove useful for contractors having sourced finance in the past.

4.3 Business Cash Flow Problems

The inability to use land as collateral by SSGs operating in the tribal communities is a major limitation to raising loans. Furthermore, for current contractors, cash flow problems, due to payment delays, amplify an already precarious financial situation. For example, Mkhize (2002) says that repairs done by mechanics or garages are paid for in cash, as credit payments are seldom granted to contractors, due to their reputation as

high-risk clients. Wiseman (2003) states that contractors may have to wait up to two months to receive payment for their services. This causes cash flow problems, particularly at the beginning of the cutting season. Cash flow problems may also be attributed to injudicious financial planning, as funds should be saved from the previous season. This problem could be alleviated, as it is believed that payment within seven days to SSGs and therefore contractors is possible (Wiseman, 2003).

4.4 Differences in Relative Bargaining Power, and Lack of Customer (SSG) Contact

Women in rural KZN have less bargaining power than men within their communities, due to their relatively lower social status. A large proportion of SSGs are women, while most contractors are men. Therefore, a problem may arise in competitive markets if contractors have greater bargaining power, which is amplified through the high SSG to contractor ratio. Wiseman (2003) indicates that this already influences price setting, as the stronger bargaining power of contractors also carries through to these negotiations. Weak social status would not be limited to women, but also to men through the traditional hierarchical system, i.e. those with more authority are chiefs, traditional council members, elders, and long-standing community members (Berry, 1993; Fenwick & Lyne, 1998). For example, Norton (2003) stated that an authoritative figure from an undisclosed community posed a threat to the lives of other contractors who had entered his area seeking to expand their contracting business. Although community members acknowledged that the other contractors were better performers, the bulk of available work remained with the authoritative figure due to allocations being subjective.

Regarding grower contact, the first step formally taken by contractors is not to approach the SSGs whom they are to serve, but rather the sub-committees. The sub-committee may consist of one or more SSGs whom the contractor may serve, but would exclude the majority of his customers. Throughout the entire process, from industry entry to payment, formal contact between contractors and their customers (SSGs) is limited, except for when cessions are signed. Customer preferences are not signalled through these administered transactions which highlights a need for contractors to compete for clients and thereafter provide services of higher quality (i.e. timely services, acceptable charge-rates). It can be expected that a competitive relationship between contractors would improve the performance or service to growers.

4.5 Limitations on Growth of Business Size

Ninety-one percent of the sample contractors said that they wanted to increase the tonnage they transport (Table 4.1). However, 72 percent indicated that this would be possible. Only 52 percent said that they needed more machinery to do so, which indicates that there are other constraints on business growth, such as the work limitations placed upon contractors through tonnage allocation. One-third of the 91 percent of respondents who wanted to increase their tonnage transported also indicated that they needed more machinery to do so. This indicates the low quality of machinery currently in use by contractors. Although many contractors are hauling low tonnages, additional tractors are needed on standby to ensure haulage continues in the event of a breakdown. If contractors do not have the necessary replacement tractors they would have to forfeit

the already low tonnage allocated to them to another contractor operating in their area until they are again operational.

The administrative allocation of work by sub-committees shows immediate problems with regard to work limitations for contractors and with no exit mechanism for inefficient contractors, quotas are getting smaller. Furthermore, the guarantee of work, although limited, would be a contributing factor to the lack of performance incentives and competition. Given that machinery utilization would be a key factor for successful contracting, the ability to expand or grow such business becomes extremely important if size economies are to be achieved.

Table 4.1: Potential for Increased Work Tonnages of Contractors, 2002/03 (n=124)

Response	Can Increase Tonnage (%)	Would Like to Increase Tonnage (%)	Need More Machinery (%)
Yes	72	91	52
No	28	9	48

4.6 Lack of Competition and Performance Incentives

Institutional barriers currently inhibit competition in the small-scale sugarcane contractor sector in KZN. One barrier is the control of work allocation exercised by sub-committees. Work allocation not only inhibits business growth but also prevents competition. Furthermore, charge-rate guidelines, normally followed closely by contractors (most of whom lack own cost information), also inhibit competition.

Wiseman (2003) states that rates are determined allowing for contractor viability, i.e. all operating contractors, including those hauling low tonnages, regardless of actual contractor costs or service quality. Small-scale growers are then faced with higher than market charge-rates and in some cases charge-rates are nearly double those charged by commercial contractors (90 percent higher in some cases). Although not to the current degree, higher rates may be expected as small-scale contractors would face higher costs due to hauling over inferior roads and higher transaction costs of managing numerous small contracts. Wiseman further states that restructuring needs to take place in order to ensure that contractors entering the industry do not exceed the number needed, i.e. the number determined by the principle of economic survival. Some contractors are lured to contracting for reasons of status or recognition rather than money. With competition this would end as poor-performing businessman would be "squeezed" out.

The potential sources of a contractor's competitiveness need to be identified. Firstly, diversification may be an option in that contractors may also offer other services (e.g. hauling timber and water), which would improve economies of size and, therefore, overall returns. Improved services may be a second option, such as consistently providing a reliable haulage service. An important benefit from contractor competition for SSGs would be lower cost services. However, contractors are faced with a limited customer target market, due to the high costs associated with the delivery of services outside of their own area (high cost of transporting their tractors). This may only prove profitable if size economies are larger than increases in transaction costs. Although under

a fixed-price situation there is still incentive for non-price competition, this incentive falls away when work allocations are not directly related to service quality.

4.7 A Lack of Labour

Labour shortages pose a problem for some small-scale contractors. Few labourers are needed for machinery operations (driving tractors, cranes, cane loaders etc.), but a large number of labourers are required for sugarcane cutting tasks (approximately one cutter per three tons sugarcane cut/day stacked, or per six tons sugarcane cut/day windrowed, (Nothard, 2004)). Many haulage contractors are involved in cutting sugarcane, which allows for diversification of their business. Although only 17 percent of sample contractors directly referred to a low availability of labour, there is a concern about the relatively more attractive wages in the commercial sector (now paying minimum wages of R 650 per month in lower income areas and R 800 per month in higher income areas (Craven, 2002), that far exceed those paid by small-scale labour contractors, sometimes as much as 58 percent higher) and the impact of the HIV/Aids virus, which negatively effects labour productivity. Some contractors travel up to 20 kilometres to source labour.

4.8 Poor Rural Infrastructure

Although institutions in the small-scale contractor sector encompass the "rules" by which contractors interact, adequate physical infrastructure needs to be in place for market forces to function effectively, i.e. with lower transaction costs (Timmer,1992; and Sahn

& Sarris, 1994; both cited in Fenwick and Lyne, 1999). The sample survey suggests that 76 percent of contractors see the lack of infrastructure as a problem that increases not only transaction costs (Fenwick and Lyne, 1999) but also their basic haulage costs, via increased wear and tear on machinery and increased fuel usage. Further losses occur through decreased access to available tonnages in secluded fields. Wiseman (2003) calls for urgent intervention by government to improve road infrastructure in the small-scale sugar industry. Furthermore, adding to the severe affects of poor infrastructure, sugarcane fields in remote areas of the industry add to the costs faced by contractors. Observation shows that fields are often inaccessible due to harsh terrain (steep slopes).

The next chapter deals with a contractor service quality model that determines which small-scale sugarcane contractor attributes affect their service quality as perceived by their customers (SSGs). Based on the literature reviewed and observations made, all the variables included in the model are expected to have some influence on a contractor's service quality.

CHAPTER 5

A CONTRACTOR SERVICE QUALITY MODEL

The focus of this chapter is to identify those attributes of contractors that have a significant effect on the quality of their service as perceived by SSGs (transport and general service timeliness, meeting of daily ratable delivery requirements, low downtimes, good staff management, and minimal disagreements on service terms). It is in a SSG's best interest to have his/her sugarcane delivered on time without conflict with contractors. All listed attributes impact either directly or indirectly on a SSG's service quality received (i.e. meeting their daily ratable deliveries ensures that contractors deliver the correct amounts of a SSG's sugarcane per day. Although this benefit accrues mostly to the milling companies, a constant amount of cane being delivered by contractors is expected to give SSGs peace of mind).

The Institute of Natural Resources (1998) identifies many problems that are associated with, for example, contractor management (lack of business skills), finance (lack of capital), and operations (inappropriate equipment). The primary focus of this chapter is to identify those attributes of contractors that have a significant effect on the quality of their service as perceived by SSGs. This can assist sugar industry extension services in promoting those attributes through advice and training. Data for this study were collected between September 2002 and July 2003 on 114 small-scale contractors, who were randomly selected from ten sugar mill areas in KwaZulu-Natal. Contractors interviewed were all haulage contractors who practice direct haulage (sugarcane haulage from field to

mill), indirect haulage (sugarcane haulage from field to loading zone) or both. In addition, data on contractor service quality were collected through interviews with each of the sample contractor's client/s or SSGs.

5.1 Data Sources

The sample data used in this chapter are derived from the survey mentioned in chapter 3. However, for this section the ten contractors from Umfolozi are excluded because they were not part of the sample drawn from population lists provided for each mill area; inclusion may have introduced bias. This gives a sample size of 114 contractors. There are no significant changes in the characteristics of respondents as shown by a comparison of Table 3.3 and Appendix 4.

5.2 Contractor Attributes Affecting Service Quality

It is postulated that a number of contractor attributes affect a contractor's service quality as perceived by SSGs (transport and general service timeliness, meeting of daily ratable delivery requirements, low downtimes, good staff management, and minimal disagreements on service terms). These are discussed in the next sections. The importance of these attributes was determined in discussions with industry members and by examining past research.

5.2.1 Owner's experience, education, and gender

Various studies have established the positive impact of an owner's experience level on firm success (Dyke *et al.*, 1992). Dyke *et al.* (1992) also highlight the positive link between owner's experience and small firm success. They conclude that certain types of experience are important, such as previous experience in general management and management in the industry in which an individual is currently operating. Hence, it is expected that the longer a contractor has operated in the sugar industry the more experience he would have gained in the industry regarding management practices and decision-making. Greater experience of a contractor in the sugar industry could thus have a positive impact on firm success and therefore on a contractor's service rating.

Robinson and Sexton (1994, cited in Lee and Heck, 2001) found that higher levels of education lead to higher success rates for new business ventures. Furthermore, they show that education has a positive impact on business growth rates. Lee and Heck (2001) conclude that education has a marked impact on business owners and that their businesses are more successful in terms of financial and size-scale measurements. This relationship is due to the link between higher education and an increasing use of information, collected data (i.e. financial records), computer technologies, and assistance (extension services, development officers, and other organizations). It has also been found that education improves a businessman's decision-making ability by improving his/her understanding of the industry environment and business changes, therefore adjusting more rapidly and accurately to them (Huffman, 1974). Bates (1990) shows that

higher educated entrepreneurs remain in operation for longer than lower educated entrepreneurs. Welch (1978) makes the additional point that educated people face lower information costs because they are better able to assemble and interpret information. A higher level of education is hypothesised as being important in a contractor's role as a decision-maker and would, therefore, have a positive impact on his service quality.

Muntemba and Blackden (2001) show that females in Sub-Saharan Africa have limited access to and control of assets and other resources such as land, technology, financial services and labour, compared to males. Some of these assets or resources (labour, financial services) are critical in the running of a sugar industry contractor business. Lyne (1996) states that an individual having weak social status often faces greater legal uncertainty when compared to the rural elite. Bruce (1989) indicates that widowed or single women have a substantially lower social status than men in LDC's. It is therefore expected that women, probably facing higher transaction costs (limited access to resources such finance, technology, and labour, and having a lower social standing) because they face greater legal uncertainty, would be perceived as contractors providing a service of lower quality.

5.2.2 Contractor business record keeping

Woodburn *et al.* (1994) reported that commercial farmers in KwaZulu-Natal regard their own farm records as the most important source of information for production, marketing, and financial decisions. However, they also found that own farm record-keeping and

budget preparation were the most time-consuming information gathering activities. Penn *et al.* (1989) maintain that record management concerns the management of information and that businesses operating in both the public and private sectors need this information to make decisions. They argue that if this type of information is either mismanaged or not available, organizations may cease to exist. The sample indicates that contractors only keep between two and three types of records (mainly records on tons transported and labour costs), which are inadequate - either receipts only or poorly organized documentation. This may negatively affect their quality of service. Availability of easily accessible and up-to-date financial records would be information the contractor could use in, for example, financial planning.

5.2.3 External information sources

The link between information, decisions, and firm performance has been well established (Ford & Babb, 1989). The process of making production and management decisions in agriculture by evaluating and using information has been studied for more than 80 years (Boone *et al.*, 2000, cited in Tucker & Napier, 2002). Information has been identified as a significant business input, having a positive effect on production (Muller, 1974). Farmers are likely to pay for more information as long as the expected marginal benefits exceed the extra costs. Considering that only 59 percent of small-scale contractors had information on labour costs, while only 71 percent had any records, external sources of information are important. The contractors were requested to rank their three most important information sources used (see Table 5.1).

Seventy-eight out of 97 responding contractors (80 percent) rank milling companies as their most important source of information. Out of 94 respondents, 29 percent and 21 percent, respectively, ranked local associations and the Ingede, a magazine published by the South African Sugar Association, as their second most important source of information, while 36 percent of respondents indicated the Ingede and SASEX as their third most important sources of information.

Table 5.1: Frequency of Important Information Sources as Ranked by Sample Contractors, 2002/03 (n = 114)

Information Source	Most Important	Second Most Important	Third Most Important
Milling Company	78	6	3
Local Association	6	27	6
The Ingede	0	20	16
SASEX*	3	10	16
Other Contractors	4	14	11
Radio	1	5	11
Others (14 sources)	5	12	28
Total	97**	94	91

**The South African Sugar Association Experiment Station.*

***Seventeen missing cases.*

It has been found that there is increased success with information provision, if information is targeted towards a specific need (Tucker & Napier, 2002). A similar

situation may be evident in the small-scale contractor sector, which varies with respect to operation types (i.e. indirect versus direct haulage). In this study a positive relationship is hypothesised between the use of more important information sources and the quality of service provided by contractors. The more relevant the information to a contractor, the more aware he will be with regard to quality service requirements. The type of information would relate directly to running the contractor business, e.g. new methods of haulage and changes in haulage rates.

5.2.4 Contractor training

Hussain *et al.* (1994) found that more extension contact through a training and visiting extension programme in Pakistan increased a farmer's technical knowledge and induced earlier adoption of technology (chemical weed control). Brush *et al.* (1997) found that participation in training for agrichemical use is positively dependent on problem recognition or recognition of a need or desire. Recognition of training needs, specifically linked to numeracy, bookkeeping and marketing, have in the past been highlighted by small-scale growers (Eweg, 2002a). Although there is currently no distinct programme aimed at assisting contractors, most contractors are themselves growers and have therefore benefited from relevant grower training programmes like those offered by Joint Venture Extension provided in partnership by SASEX and the KwaZulu-Natal Department of Agriculture and Environmental Affairs. It is expected that increased training of contractors would improve their service quality. Training received by respondents is presented in Table 5.2.

Table 5.2: Training Received by Sample Small-scale Sugarcane Contractors, 2002/03 (n=112)

Training Type	Financial/Book Keeping	Mechanical Servicing	Mechanical Repairs	Planning	Implement Setting	Any Type
Trained (%)	15.5	26.8	15.5	10.7	11.6	34.8*

*Percent of contractors that had any type of training, i.e. at least one of the five listed types.

5.2.5 Machinery repairs and maintenance (R&M)

Morris (1988: 433) defines repair and maintenance (R&M) costs as "those expenditures necessary to restore or maintain the technical soundness and reliability of the machine following wear and tear, random failure, and accidents." Repair costs differ not only between machine types but also between owners due to different management policies and operator skills; furthermore, repair costs tend to increase with an increase in hours of machine use (Iowa State University Extension, 2001a). Small-scale sugarcane contractors generally own old machinery and thus are expected to have both high downtimes and repair costs.

The unreliability of small-scale sugarcane contractors is a problem (Sokhela, 1999) and is often the result of machinery downtime. Cut sugarcane is left rotting in fields with high losses in Recoverable Value[7] (RV) occurring for SSGs. Contractors need to deliver cut

[7] Recoverable Value (RV) is a measure of cane quality including sucrose, fibre, and other non-sucrose content (Bamber, 2002).

sugarcane within 48 hours to ensure no significant drop in RV (Stranack, 2002). Sokhela (1999) also reported that 50 percent of grower respondents in his study viewed contractors as being unreliable. In the present study, 31 of the 114 contractor respondents (27 percent) expressed their concerns about breakdowns and repair problems, while another 12 percent had similar concerns but had solved these by, for example, using savings to pay for repairs, giving the remaining work to other contractors or asking for their help, repairing their own machinery, receiving assistance from local garages, having standby tractors and trailers, or getting a mechanic to assist. However, it has been stated by individuals that assistance was often too slow or too expensive (Mkhize, 2002; Njapha, 2002). The survey revealed that 61 percent of respondents did not comment on problems concerning infield loading or haulage, probably because there are no problems or simply due to apathy in response to the questions. It is hypothesised that better access to repair and service facilities, both internal (carrying own spares) and external (workshops, garages, dealers), would improve a contractor's service quality via reduced downtime. Improved access may entail external service facilities being closely situated to contractor areas, or having quick access to spares on hand.

5.2.6 Increased tonnage transported

An increase in the tonnage contractors' transport is extremely important from a size economies perspective. Hallam (1991: 157) defines returns to size as "the change in output relative to costs for variations along the expansion path (cost minimising input combinations) where the input price ratio is held constant." For a contractor, economies

of size are experienced when an increase in the output or tonnage transported reduces fixed costs per ton. In section 2.2.4 the benefits of both size and scale economies are discussed in greater detail under "Improved scale and size economies".

5.3 Specification of a Contractor Service Quality Model

An empirical regression model (Gujarati, 1995) is formulated to include variables that may influence a contractor's service quality (rating) as perceived by SSGs. Service rating (SERV) is a score made up of six different service qualities and functions that contractors (not sample contractors) and growers interviewed perceived were important. Qualities and functions of contractors hypothesised as being important were listed through an interview with a local commercial contractor (Lusso, 2002). The service qualities were then finalized through an interview with several contractors and growers from the Umbumbulu small-scale grower area situated near the Eston Mill in KwaZulu-Natal (see Appendix 1B for the questionnaire used).

The first service quality regarded as important by respondents is the relative time taken to transport cut sugarcane to either loading zones (for indirect haulage contractors) or mills (for direct haulage contractors). A second quality is the overall capability of contractors to ensure that cane is cut, carted and delivered to mills within three days. Another is the ability of a contractor to meet his daily ratable delivery, the agreed upon amount of sugarcane that a contractor is required to deliver per day to ensure a steady flow of cane to mills (this would also give SSGs peace of mind regarding a predictable/reliable

service). The fourth service quality deals with the ownership of low downtime machinery, which would ensure that cut sugarcane is not left rotting in the fields. A further quality is staff management and the corresponding level of performance. The last quality includes a rating of client conflict or level of disagreement regarding service provision. Each quality is assumed to carry the same weight, as there is no basis to weight some service qualities differently, e.g. management, client conflicts. Information on contractor service quality was then collected through interviews with each of the sample contractor's client/s or SSGs. Each contractor had either one or two SSGs answering questions on the level of service quality they had provided (e.g. whether the contractor moved the SSG's sugarcane quickly to loading zones or mills). Growers were asked to rank contractors via a score for each of the six qualities ranging from one (poorly rated) to four (highly rated). These were totalled, giving contractors an overall score within the range of six to 24. The frequency of SERV broken down into the six qualities is shown in Table 5.3

Due to a lack of information on grower per contractor populations, interviewers (Joint Venture and milling company extension staff) were asked to randomly select one to two growers per sample contractor to answer questions regarding the quality of the contractor's service provision. Random sample selection of SSGs per contractor is difficult as contractors are often allocated to SSGs during the season, from month to month, at the discretion of the sub-committee. Fifty-five percent of sample contractors received evaluations from two growers while 45 percent of contractors each received one evaluation. With six questions asked per questionnaire, a comparison was made between

the two questionnaires completed for the same contractor. Results of this comparison show that 67.5 percent of the questions had the same rating, while 30.3 percent were rated by a difference of only one point. Only 2.2 percent of the questions had significantly different ratings (i.e. a difference of two or more points). Furthermore, 82 percent of the totals had a difference of two or less points, which indicates that SSGs had very similar views of their contractor's service quality. In conclusion, it is assumed that SSGs gave adequate ratings regarding their contractor's service quality.

Table 5.3: Frequency of SERV (Service Quality) Questions as Ranked by SSGs, 2002/03 (n=114)

Service Quality	Strongly Disagree (%)	Disagree (%)	Agree (%)	Strongly Agree (%)
Moves cane quickly to mill/loading zone	10.4	11.3	49.6	28.8
Ensures cane is cut, carted and delivered within 3 days	8.6	17.6	50.9	23.0
Meets daily ratable delivery (DRD) requirements	3.2	27.9	47.3	21.6
Machinery does not often break down	6.3	24.8	38.3	30.6
Is a good manager of his staff	1.8	22.7	50.5	25.0
Seldom has disagreements with clients	2.7	18.6	57.7	20.9

The hypothetical model postulated for a contractor's service rating as perceived by growers is as follows:

SERV = f(EXP, EDUC, GENDER, TRAIN, RECORDS, FCSINFO[8], GENINFO[8], EXMACHMGT[9], INMACHMGT[9], LNSIZE). (5.1)

Table 5.4 presents these variables with their definitions and expected relationships with SERV. The EXP variable is expected to have a positive sign in that more experienced contractors are expected to be more knowledgeable of business issues and understanding customer needs, therefore increasing their service quality. The level of a contractor's education, EDUC, is quantified as follows: 1 for no formal education, 2 for grade 8 or less, 3 for grades 9 to 11, 4 for grade 12 (matriculation pass), and 5 for a tertiary education. EDUC is also expected to have a positive sign due to education benefits linked to business practices such as bookkeeping and record-keeping. However, there was no significant correlation between EDUC and RECORDS which may indicate that the education benefits may be linked to other positive factors such as decision making and understanding of business operations. GENDER is expected to have a positive sign as females probably face higher transaction costs (limited access to resources such finance, technology, and labour, and having a lower social standing) due to greater legal uncertainty with respect to conflict resolution.

[8] External information sources.
[9] Relates to the ability to maintain and repair machinery.

Table 5.4: Determinants of Contractor Service Rating

Variable	Definition	Expected Relationship
EXP	Contracting experience in the sugar industry (years).	+
EDUC	Level of contractor education (ordinal, 1=no education; 5=tertiary education).	+
GENDER	Gender of contractor (male=1; 0=female).	+
TRAIN	Level of training received by contractor (ordinal, 0=none; 5=high).	+
RECORDS	Level of records kept by contractor (ordinal, 0=none; 6=high).	+
FCSINFO	Focused information sources used by contractor (highly rated source=1; 0=otherwise).	+
GENINFO	General information sources used by contractor (highly rated source =1; 0=otherwise).	-
EXMACMG	External machinery management ability.	+
INMACMG	Internal machinery management ability.	+
LNSIZE	Natural log of tons hauled by a contractor/annum.	+

TRAIN is a score ranging from 0 to 5 (a value of one unit added for each additional training type received) that includes five types of training, namely training in financial management, in mechanical servicing, in mechanical repairs, in implement setting, and in planning ahead or business foresight (e.g. budgeting, machinery replacement cycles,

profit targeting). Each training type is given equal weighting within the TRAIN score as there is no obvious reason to attach different weightings. The more training a contractor has (e.g. in machinery management, financial management, customer focus), the higher his ability to deliver a better service to his clients. RECORDS is a score for record-keeping consisting of six types of records, namely records on hours worked, distances travelled, fuel and oil usage, maintenance and repairs, tons transported, and labour costs. RECORDS has a range of 0 to 6 with each record keeping type contributing a value of one to the score. Keeping records provides valuable information and assists in management practices. RECORDS is therefore expected to have a positive influence on the service rating of contractors.

FCSINFO includes those information sources that are geared towards, or focused on, the sugar industry. A total of 16 focused information sources are known to be available[10], such as: SASEX (INFOSASE), milling companies (INFOMILL), the South African Sugar Association (SASA), the South African Cane Growers' Association (SACGA), various sugar industry extension services, other contractors (INFOCONT) or farmers, local associations (INFOLOA), and sugar industry literature (e.g. the Ingede (INFOINGE) and The Link). A 1 is allocated if a contractor rated any of the listed information sources as one of his top three sources, and 0 otherwise. FCSINFO is expected to have a positive influence on SERV as this type of information source is expected to be up-to-date and relevant concerning sugar industry issues and advice (e.g. information on sugarcane industry technologies such as new trailers or loading methods).

[10] There may be other focused sources of information available; however, these were unknown to the author.

GENINFO are other information sources not involved directly with information linked to the sugar industry. It includes information from the radio (INFORADI), television, newspapers, and machinery agents. Again, a 1 is allocated if a contractor rated the use of a general information source as one of his top three sources, and 0 otherwise. A negative sign is expected for GENINFO because contractors who rely on this type of information source are not expected to be accessing relevant information and would therefore not be taking advantage of information more useful to their contracting businesses. Out of both the focused and general information sources a total of three information sources are ranked by respondents.

Of the 20 information sources considered, 14 were excluded from the regression as they scored less than ten positives (scores of one). This decision was based on the lack of variability in these variables (i.e. the average number of positives for these 14 variables was 3.2). Thus, five information sources are included as proxies for FCSINFO (INFOMILL, INFOCONT, INFOSASE, INFOLOA, and INFOINGE) and one information source is included as a proxy for GENINFO (INFORADI). This does not imply that those left out are "worse" or irrelevant sources of information but rather lower accessed sources.

EXMACMG is the machinery management of a contractor dependent on external factors such as the existence of local dealers or agents, close workshop facilities, readily available compressed air, and the distance to the closest fuel supply. All these variables influence a contractor's ability to properly maintain and manage his machinery, therefore

minimising downtime and haulage delays. EXMACMG, which is included as a principal component (see Appendix 6), is expected to have a positive sign in that availability of external machinery service facilities and access to these facilities are expected to impact positively upon the contractor's business and therefore his or her service quality. INMACMG is a principal component (see Appendix 6) accounting for an internal machinery management variable, namely keeping popular spares on hand (e.g. fan belts, filters, etc.). This would allow for short-term maintenance of machinery and therefore could reduce machinery downtime. INMACMG is also expected to have a positive sign, as contractors who keep popular spares on hand would be better able to reduce machinery downtime in the short-run, therefore improving their service quality. Both EXMACMG and INMACMG are principal components that are weighted representations of the five original machinery management variables (see Appendix 5 for a summary of Principal Component Analysis theory). The need for these principal components arose from both a need to reduce the number of variables in the regression and to remove the high level of collinearity among some variables (e.g. a correlation coefficient of 0.663 between Wkshp (existence of a workshop in the area) and Dealer).

Lastly, LNSIZE (natural log of the total tonnage transported per annum) is included as a proxy for the business size of a contractor. A positive relationship with SERV is expected because the contractors hauling more sugarcane, and therefore taking advantage of economies of size, would face lower costs per ton of sugarcane transported and may thus be able to invest in more modern and reliable machinery, thus improving their

service rating. Also, size economies increase returns to management and therefore create a stronger incentive to provide a good service.

5.4 Empirical Analysis and Results

This section presents the results and interpretations of the regression model (for the reliability of the model see Appendix 7). Table 5.5 presents the OLS (Ordinary Least Squares) regression results for the estimated model. Six coefficients were significant at least at the ten percent level, including three information sources (INFORADI, INFOSASE, INFOINGE) and GENDER, TRAIN, and LNSIZE. The non-significant coefficients include EXP, EDUC, RECORDS, EXMACMG, INMACMG and three information sources, namely INFOMILL, INFOCONT, and INFOLOA. EDUC and RECORDS are not correlated.

GENDER has a positive coefficient, as expected, that is significant at the five percent level of probability. This suggests that male contractors are providing a higher quality service as perceived by SSGs. On average, if a contractor is male he will have a 2.3-point higher perceived service rating out of 24 than a female, *ceteris paribus*.

The TRAIN coefficient is significant at the five percent level of probability, and indicates the positive impact of training on a contractor's service rating, i.e. the more training contractors receive, the more likely they are to improve their service quality as perceived by SSGs.

Table 5.5: Contractor Service Quality Model

Variable	Regression Coefficient	Standardised Coefficient	t-Statistic	Significance Level	VIF[11]	Definition
Constant	9.960		2.824	***		Constant
EXP	0.018	0.033	0.320	ns	1.339	Contracting experience
EDUC	-0.435	-0.142	-1.413	ns	1.271	Level of education
GENDER	**2.268**	**0.204**	**2.065**	**	1.231	Gender of a contractor
TRAIN	**0.579**	**0.231**	**2.238**	**	1.346	Training received
RECORDS	-0.082	-0.045	-0.397	ns	1.622	Level of records kept
INFOMILL	-0.528	-0.045	-0.417	Ns	1.490	Information from milling companies
INFOCONT	0.587	0.076	0.594	Ns	2.056	Information from contractors
INFORADI	**-1.829**	**-0.195**	**-1.728**	*	1.603	Information from the radio
INFOSASE	**1.924**	**0.243**	**2.139**	**	1.621	Information from SASEX
INFOLOA	-0.287	-0.040	-0.343	ns	1.688	Information from the local assoc.
INFOINGE	**2.037**	**0.279**	**2.188**	**	2.047	Information from the Ingede
LNSIZE	**0.714**	**0.214**	**1.915**	*	1.578	Log of tons transported annually
EXMACMG	-0.224	-0.061	-0.617	ns	1.229	External machinery management
INMACMG	0.509	0.140	1.416	ns	1.237	Internal machinery management
Number of Observations			86			
F-Statistic			3.847	***		
R^2			0.428			
Adjusted R^2			0.317			

Note: *** indicates significance at the 1% level, ** significance at the 5% level, and * significance at the 10% level of probability.

[11] See Appendix 7 for interpretation of Variance Inflation Factor (VIF).

Three further significant coefficients relate to information sources. SASEX (INFOSASE) and the Ingede magazine (INFOINGE) had positive estimated coefficients. The standardised coefficients show that INFOINGE and INFOSASE are the two most influential variables affecting SERV. Information from the radio (INFORADI) has a negative estimated coefficient that is significant at the ten percent level of probability. INFORADI is a more general source of information, and so might not be a source of incorrect information, but rather a source of lower quality less focused information. A higher quality information source would provide more up-to-date and relevant information useful to contractors in the management of their business. It should also be mentioned that, although information from the mill was highly rated by most contractors, it lacked variation and therefore had no impact on distinguishing between high and low quality service contractors.

LNSIZE has, as expected, a positive coefficient that is statistically significant at the ten percent level of probability. The positive effect of LNSIZE on service quality as perceived by SSGs may be due to the advantage that size economies would provide to larger contractors via lower costs per ton of sugarcane transported, thus creating stronger incentives to perform and enabling them to acquire more modern and reliable machinery.

The coefficients of EDUC and INMACMG have absolute t-statistics greater than one. The negative coefficient for EDUC indicates a negative influence of education on service quality. This negative relationship does not follow *a priori* expectations and may be due

to EDUC not capturing the total effects of other influences, such as time constraints linked to "out of contracting" work done by higher educated contractors. For the more educated contractors involved in other "out of contracting" activities, the contracting business may not be the only source of income and so less management time would be invested in their contracting business. The contractors may therefore deliver a lower quality service under these time constraints. Furthermore, the keeping of popular spares on hand (INMACMG) coefficient was positive and significant at the 16.1 percent level of probability. The result shows that internal machinery management practices may have a positive impact on contractor's service quality rating as perceived by SSGs.

The management and policy implications of the results are discussed in more detail in the section on "Conclusions and Policy Recommendations". The next chapter deals with the estimation of machinery costs in the small-scale contractor sector.

CHAPTER 6

SMALL-SCALE SUGARCANE CONTRACTOR MACHINERY COSTS AND FINANCE

Where crop farming is concerned, farmers' demand for contracting services is primarily determined by the level of their machinery needs, as well as the inability to purchase the machinery themselves (Errington & Bennet, 1994). Contractors can do land preparation, spraying, planting, harvesting, transport, and anything else that may require investments in expensive machinery. Ball (1987: 484) states that one reason for using contractors in modern agriculture is "the quest for adequate mechanisation levels". This also applies to the sugar industry and for the contractors - a complete line of machinery is one of the largest investments a contractor can make. Furthermore, machinery has to be *continuously* maintained (especially second-hand machinery), monitored, and eventually replaced. This chapter attempts to estimate depreciation for small-scale contractor tractors and also comments on repairs and maintenance (R&M) costs, alternative loading and haulage methods, and types and sources of machinery finance in the small-scale contractor sector.

6.1 Machinery Cost Theory

Contractors, as all businessmen, need to know their machinery and/or labour costs linked to the operations they perform (Eggers, 1998). Although total costs to the contractor involve more than pure operation costs, such as additional information costs (e.g. the cost

of gathering information on how best to use contractor machinery) and risk, the operation costs are those with the potential to be recorded and calculated by the contractor. Examples of costs linked to small-scale sugarcane contracting are fuel, repair and maintenance costs, wages and depreciation on new or second-hand machinery.

6.1.1 Fixed and operating costs of machinery

The contractor costs of running machinery consist of fixed costs and operating costs. Fixed costs include machinery accessories, interest on capital borrowed to buy the machinery, insurance and depreciation (Booysen & de Beer, 1977). Further fixed costs are the housing of machinery and opportunity costs (potential interest earned elsewhere), if cash is used to purchase the machinery (Iowa State University Extension, 2001a). Such costs are considered fixed in that whether the equipment is used or not they remain the same. Booysen & de Beer (1977: 12) show the importance of using machinery and state that "the more it (machinery) is used, the more it produces, the lower the rate of ownership" cost of machinery per hour. A relationship between tractor fixed costs and hours used per annum is shown in Figure 6.1.

Operating costs vary directly with the level of machinery use and are also known as variable costs. These costs include fuel, lubrication or oil, wear-and-tear, maintenance and repairs, and operator costs (Booysen & de Beer, 1977). If the machinery is not used, variable costs will be zero and so will not affect the overall costs to the contractor. Important to consider are the fluctuations that may occur in the variable costs, such as

changes in the fuel price or access to fuel. It is then important to consider what effect such an event will have on the operating costs to the contractor and if any necessary adjustments need to be made. The costs to the small-scale sugarcane contractor are largely made up of machinery costs with a balance of labour and management costs. Fixed and operating costs add up to give total costs in tractor use (see Figure 5.1).

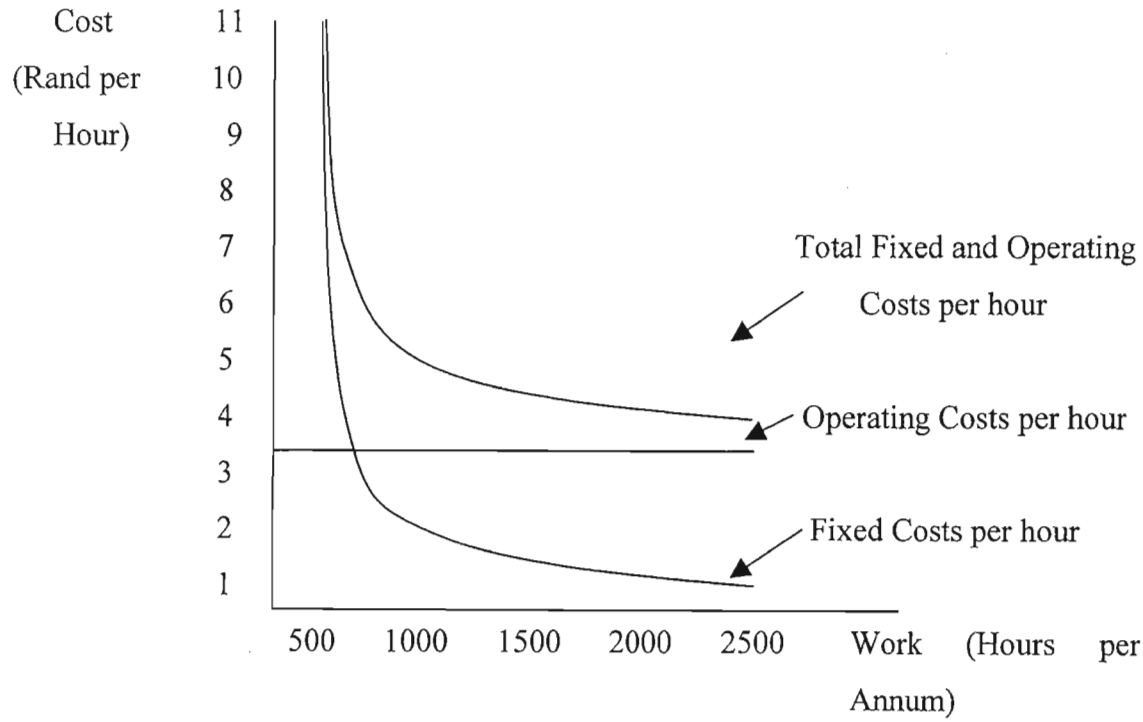

Figure 6.1: Theoretical cost of tractors per hour

(Source: Booysen & de Beer, 1977: 13)

6.1.2 Machinery replacement strategies

To put together an adequate machinery system is difficult in that a system working well in one year may not meet the performance needs of the next. The need for machinery replacement may then arise. Large differences in production costs are dependent on how and when machinery is replaced (Iowa State University Extension, 2001b). Most

replacement strategies are to minimise the present value for a future stream of costs (Perrin, 1972, cited in Perry & Nixon, 1991), and have, in the past, been largely concerned with taxes and tax policies. For example, as Reid and Bradford (1983: 326) point out, the most important factors in the replacement of tractors are "(a) the tractor's remaining market value, and (b) income tax incentives". However, important variables on which little emphasis has been placed must also be considered. Perry and Nixon (1991: 119) maintain that some of these include the "annual hours of use, annual repair costs, and changes in repair costs and hours of downtime as equipment ages". Perry and Nixon have further stated that additional research is needed on the effects of repair and availability (reliability) cost relationships, on what non-monetary transaction costs exist, and on the importance of technological change regarding replacement strategies.

6.1.3 Financing machinery purchases

In financing machinery purchases, contractors should not only compare different sources of finance, where available (e.g. commercial banks, Ithala Bank, Umthombo Agricultural Finance, etc.), but also compare different types of finance. Crabtree (1984) compares four different types of finance used in machinery purchases, namely bank overdraft facilities, term loans, hire purchasing (HP), and leasing. Machinery can also be purchased with cash when available to the contractor. The choice is usually based on which type of finance will eventually cost the contractor less. Overdraft, term loan, and HP costs can be compared on an annual percentage interest rate (APR) basis. Crabtree found bank overdraft usually to be the cheapest source in such a comparison, with HP a

close second. However, it is further stated that this conclusion may be inconsistent over different time periods.

6.2 Estimating Small-scale Contractor Tractor Costs

Information on small-scale contractor tractors regarding depreciation and repairs and maintenance costs is limited because contractors do not keep adequate records. With both types of cost being critical components needed in calculating annual average machinery costs, their accurate estimation becomes extremely important where precise or documented figures do not exist. From the survey (see Chapter 2) it was quickly determined that contractors did not know their own operating costs. From the limited data available (the sample survey data; AGFACTS (AGFACTS, 2003)) a depreciation trend is forecast for tractors up to 24 years of age.

6.2.1 Estimated depreciation trend for small-scale contractor tractors

Although current tractor depreciation information is available for new tractors (Troy *et al.*, 2003), information on older tractors, i.e. those found in the small-scale sugarcane contractor sector, is lacking. Tractor information collected in the survey included the make/model and/or age of the tractor, engine power (kilowatts), purchase price (nominal), purchase year and drive system (two or four wheel drive). Information on the original purchase price (nominal) was collected from AGFACTS documentation (AGFACTS, 2003). In estimating an average depreciation curve, at constant 2002 prices,

information on tractor make, engine power and drive system was omitted due to a lack of observations. Only 39 cases had information on both prices and age. Although distinguishing between engine power and drive system is important, it was not possible due to the low number of cases. Engine power of tractors in the 39 cases ranged between 45 and 72 kilowatts; all were two-wheel drive except one. A further problem with the available data was that no information on the number of hours tractors are used per year could be obtained.

Average depreciation per year for tractors of ages five to 18 are shown in Figure 6.2 and a downward trend, as expected, is shown. This, however, is average depreciation per year over the life of a tractor, e.g. on average a six-year-old tractor depreciates by R27 135 per year.

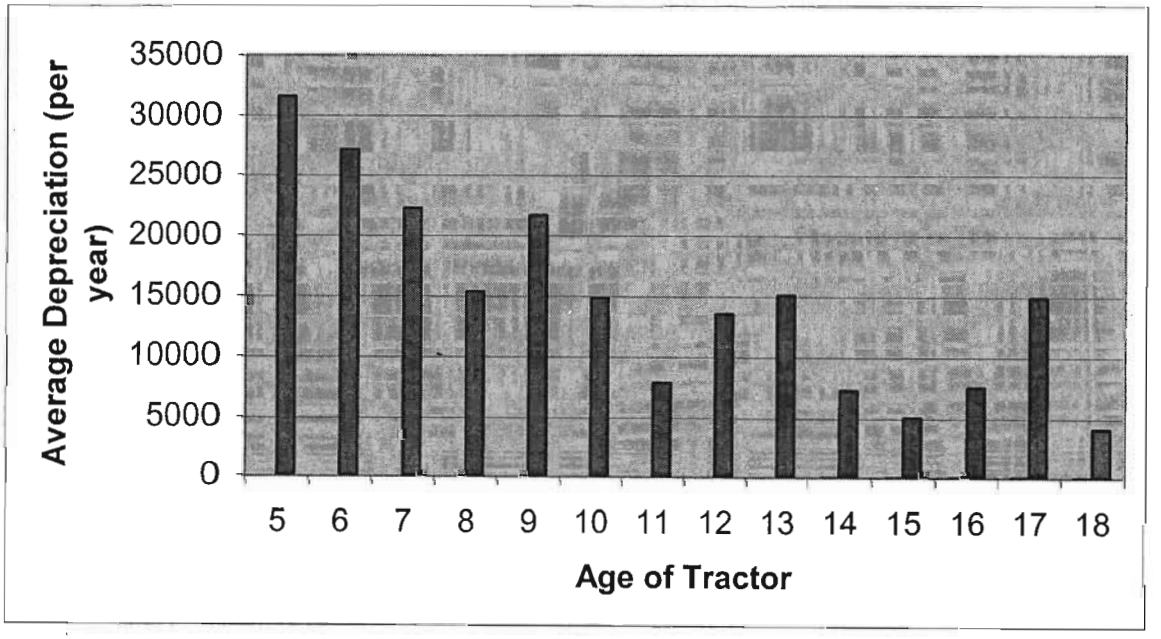

Figure 6.2: Average depreciation of tractors according to age

(2002 prices, 45-72 kilowatt tractors)

For predictive purposes, a trend needs to be determined whereby depreciation is calculated into the future. A semi-logarithmic function, i.e. Depreciation per Year as a function of Age, (Dep/Yr) = f ln(Age), is fitted to the data from Figure 6.2. It was found that a logarithmic function best fits the data with an R of 80.1 percent, and a R^2 of 64.1 percent. New data are created that fit the logarithmic curve from the following function:

$$\text{Dep/Yr} = 61\,274.037 - 19\,427.5*\ln(\text{Age}) \qquad (6.1)$$

Figure 6.3 shows that tractors beyond the age of 23 will have zero average depreciation per year; however, in practice tractors would never have zero depreciation as depreciation would remain at a low constant until the tractor's life has ended (Lyne, 2004). From the graph this may be within the range of two and four thousand Rand (i.e. within the range of 19 and 21 year old tractors).

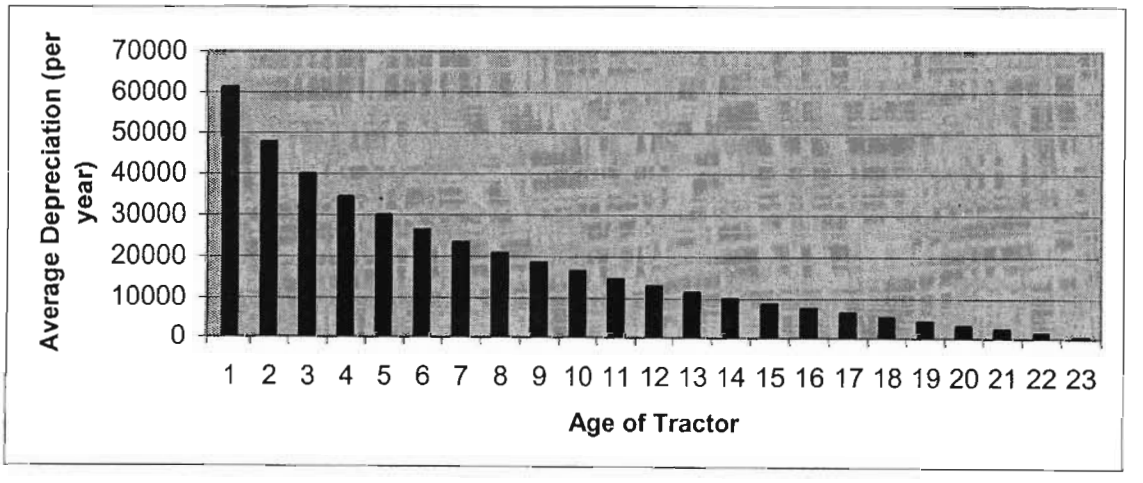

Figure 6.3: Logarithmic function of average depreciation of tractors

(2002 prices, 45-72 kilowatt tractors)

6.2.2 Estimating repairs and maintenance (R&M) costs for small-scale contractor tractors

Concerning R&M, older tractor information was gathered by SASEX on tractors from commercial sugarcane growers in Swaziland and the KwaZulu-Natal South Coast. Tractors showed constant R&M costs in the later years, which is unexpected as R&M costs are usually expected to rise as tractors age. Small-scale contractors have no records and minimal knowledge of their R&M costs. Through observation of current maintenance practices in the small-scale contractor sector, almost no preventative maintenance of tractors occurs. It appears as if maintenance costs remain relatively low for some time (due to inadequate maintenance practices) but would increase exponentially later in the tractor's life until, at some stage, it becomes unaffordable to repair the tractor. It has been stated that many contractors exit the market once tractors have reached this level of disrepair. Figure 6.4 provides possible R&M scenarios for commercial and small-scale contractors.

6.3 Alternative Loading and Haulage Methods

It has been stated that a machinery system working well in one year may not necessarily meet the performance needs in the next. It is assumed that small-scale contractors purchase second-hand haulage tractors and use current loading and haulage methods because they see these as the best systems within their financial and information constraints.

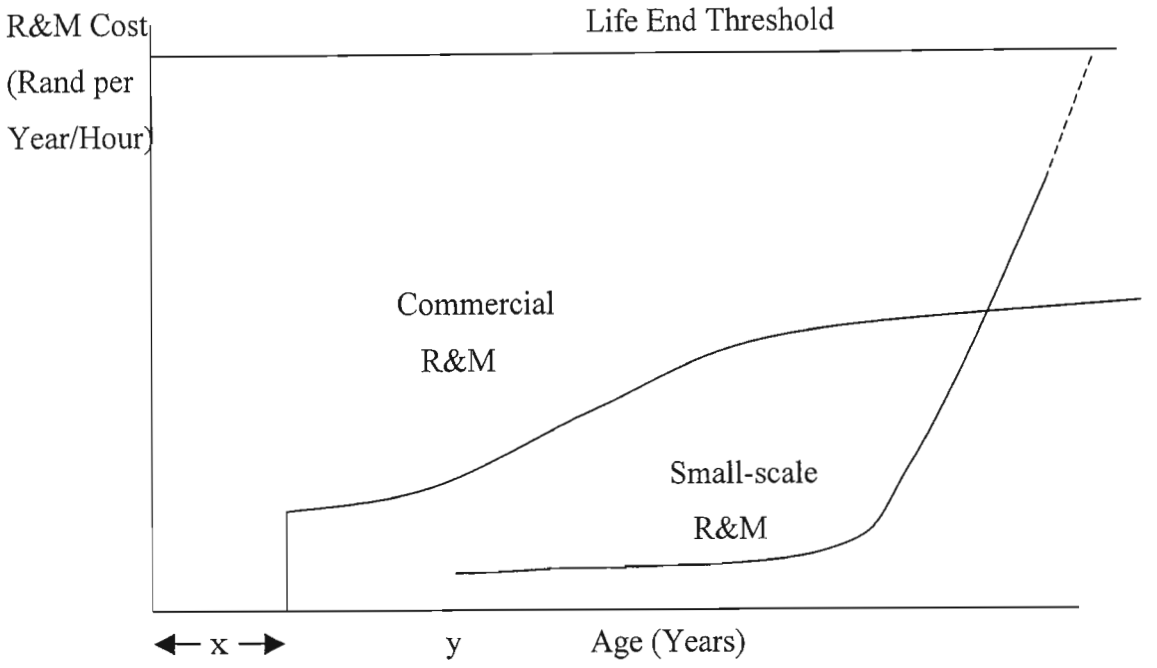

Figure 6.4: Possible R&M scenarios for tractors under commercial and small-scale conditions

x – warranty period of new tractor (commercial)

y – purchase time of second-hand tractor (small-scale)

Different haulage operations depend partly on distances to mill, and thus SSG areas situated far from the mill would have contactors hauling indirectly, while closely situated SSG areas would have contractors delivering sugarcane directly. As shown by Table 3.4, differences also exist in loading methods not only between mill areas but also within mill areas with the preferred method being the stacking of cane (56 percent). Although some contractors state that mechanically loading sugarcane is currently the best method available (Mkhize, 2002; Njapa, 2002), reasons for the bulk of small-scale contractors stacking sugarcane are assumed to be (1) the high costs associated with mechanical

loaders and their under-utilisation (Hudson, 1996), (2) the need for more than one trailer when hand-loading if contractors want tractors to be constantly utilized, (3) the availability of second-hand self-loading trailers, and (4) prior to the new minimum wage labour legislation, the low cost of labour relative to machinery investments made in self-loading trailer systems (asset specificity and irreversible investments).

From donkey-pulled carts to mechanical cutting and loading methods, small-scale contractors may have more than one option regarding sugarcane planting, maintenance and haulage systems. For example, small-scale sugarcane farmers in Thailand were faced with a difficult situation where contractors refused to do their mechanical operations due to the unprofitability of small-scale operations. Besides making tractors available for hire, cane technologists and extension workers encouraged the use of buffalos and walking tractors (Hudson, 1996). Although the latter methods required extra operations, e.g. more passes regarding ploughing operations, they may have been the best or only alternatives under the circumstances.

For small-scale sugarcane contractors, current operation options are limited; nevertheless, future investments in better systems may be necessary. A better system may not be a more expensive one, and given the constraints on contractors (low tonnages, high transaction costs) a cheaper system may be preferred, although a cheaper service may lead to a lower standard of contractor service quality, e.g. slower haulage rates. Section 4.4 states a need for improved customer contact and a change in current systems may depend on the demand for services (e.g. haulage rates versus cost of the service). The

system should depend on a customer's needs, rather than a contractor's view of which systems are best.

6.4 Types and Sources of Contractor Finance

It is important for contractors to not only compare different sources of finance, but types of finance as well. The choice is based on which is the cheapest within the confines of availability. Table 6.1 presents the types of finance used by contractors in the small-scale sugarcane industry for machinery purchases (vehicles and equipment). Nearly 60 percent used cash to finance machinery purchases while 24 percent accessed loans. From Table 6.2 it is shown that, besides savings, Ithala was the most used small-scale contractor loan source.

Table 6.1: Types of Machinery Finance for Sample Respondents, 2002/2003 (n=124)

Cash	Loan	Hire Purchase	Inherited	No Response
58.9%	24.2%	10.5%	4.0%	2.4%

Table 6.3 indicates that many contractors still plan to finance operations with cash. About five percent were undecided between whether future machinery purchases would be with cash or loans/hire purchase. Although Ithala remains the most popular planned source of borrowed finance, Table 6.4 suggests a significant drop of 5.7 percentage points for those respondents planning to use Ithala loans in future machinery acquisitions.

Table 6.2: Sources of Machinery Finance for Sample Respondents, 2002/2003 (n=124)

Savings	Ithala	Inheritance	Bank/Building Society	Land Bank
56.5%	24.2%	4.8%	3.2%	1.6%
Milling Company	**Pension**	**Garage**	**Confidential**	**No Response**
1.6%	0.8%	0.8%	2.4%	4.0%

Table 6.3: Planned Types of Future Machinery Finance for Sample Respondents, 2002/2003 (n=124)

Cash	Loan	Hire Purchase	Cash/ Loan	Cash/ HP	Stop Contracting	No Response
50.0%	26.6%	11.3%	4.0%	0.8%	4.0%	3.2%

Table 6.4: Planned Sources of Future Machinery Finance for Sample Respondents, 2002/2003 (n=124)

Not Applicable (e.g. Savings)	Ithala	Landbank	Bank/Building Society	Milling Company
52.4%	18.5%	7.3%	4.8%	4.8%
Umthombo	**Other**	**Unsure**	**No Response**	
2.4%	5.7%	0.8%	3.2%	

CONCLUSIONS AND POLICY RECOMMENDATIONS

Within current institutions, a service quality model highlights certain attributes of contractors that may provide routes through which to improve contractor service provision. The influence of contractor attributes on perceived contractor service quality was examined using information collected from a random sample of 114 contractors drawn from 10 mill group areas in KwaZulu-Natal alongside information sourced from clients/SSGs concerning contractor service quality. Results from a regression model indicate that the gender of a contractor, training received, use of information provided from SASEX and the Ingede, and a higher tonnage throughput could improve the quality of service as perceived by SSGs. Although there is a need for institutional reform, training and relevant information provision may be vital tools in improving contractor productivity within the confines of current institutional constraints.

Although contracting is not gender specific, there is evidence to support views that the rural business environment in which contractors operate has some gender discrimination. Female contractor performance may be constrained by higher transaction costs, resulting in a limited control of, and access to, resources. These resources are seen as being unequally distributed in favour of males. Policy makers need to be aware of this situation and if necessary promote institutional reform that will help to reduce transaction costs faced by women (e.g. endorse women as contractors to financial institutions, informing them of successful female contractors despite the extra costs they face, and provide separate support and advice to women dealing specifically with constraints faced by them

through, for example, female gender rights workshops). Increased female participation in the contracting sector may also be promoted by giving female contractors more voice and influence in the sugar industry through their involvement in higher levels of management (e.g. regular participation in SSG sub-committees and local associations).

Training is an important contributor to perceived contractor service quality. The importance of training should be highlighted and organisations such as the South African Sugar Association and milling companies need to identify the contractors' specific training needs. This could be done through consultation with contractors as well as SSGs in identifying training needs. Furthermore, the benefits of training need to be clearly communicated to contractors if adoption of, for example, new management techniques and technologies, or improved management of current operations is to take place. For example, training needs may be linked to forward planning or promoting the contractor's business foresight (machinery replacement cycles, cost lowering goals). A contractor needs to know where he is going (e.g. diversify, expand), what funds he will need in future, and where the funds will come from. Advice on what finances are available, how best to access these finances and how to service loan repayments, needs to be made available. Another important aspect would be the "following up" on training already given. Prevailing institutions may, however, reduce the value of investments in training; for example, the promotion of business expansion would be constrained by current tonnage allocation methods.

The results also suggest that the source of and access to information for contractors is important. SASEX appear to provide relevant information that affects the contractor's service quality as perceived by SSGs. Information on machinery costs, new industry developments, customer needs, and competitors, provided by Joint Venture or mill extension services, could make contractors more competitive by enabling them to set their own prices and improve business methods relating to transport, staff management and cost cutting. High quality and relevant information should, therefore, promote a contractor's ability to provide higher quality services to SSGs.

Contractor business size, in terms of tonnage hauled, is an important factor in promoting service quality. This is due to the nature of the contracting business and the dependence on machinery utilization linked to economies of size. Contractors transporting higher tonnages can spread fixed costs and reduce overall costs per ton. Increased profits create stronger incentives to perform and may enable them to acquire more modern and reliable machinery, leading to less downtime. The sub-committees who influence cane allocation to contractors need to be aware of the importance of economies of size and the likely influence it has on the service quality of contractors as perceived by growers. However, access to contract work remains limited for better performing sugarcane contractors in KZN due to the administrative allocation of work by sub-committees (or in the Maidstone area, by the RCDF). These institutions remove performance incentives by setting prices and allocating work subjectively. Small-scale growers do not have bargaining power and so penalties for contractors regarding poor service do not exist (a competitive market would solve this problem by eliminating poor performers). Instead of

reducing transaction costs, current institutions, such as the administrative organisation, increase costs by adding unnecessary channels through which contractors need to proceed. Seemingly an obvious problem and widely spoken of in the small-scale sugarcane industry, tonnage allocation remains the constraining factor on contractor business growth. This problem gives rise to the need for institutional reform that will promote competition.

Contractors and SSGs need to interact more in addition to the signing of cessions. This would allow SSGs to communicate their "product value" expectations (e.g. timely haulage expectations) to contractors. For example, a contractor's untimely haulage operations negatively affect a grower's income via lower Recoverable Value (RV) payments. Growers need to be able to communicate their grievances to contractors and sanction tham through exit if performance improvements are to be promoted. SSGs should therefore be allowed to choose their own contractors within a competitive sector where poor service providers would have the potential for exclusion from selection.

Changes in payment terms for contractor services are necessary in that contractors need to be more motivated to ensure that sugarcane reaches mills before RV levels drop. Thus, payments to contractors based not only on tonnage delivered, but also on RV, may reduce haulage delays. For example, the payment system may be based partly on RV and partly on tonnage depending on industry requirements. However, if this payment system were to be adopted, delivery of low quality cane by contractors would decline unless premium prices were paid covering the extra haulage costs. Contractors may be justified

in charging higher prices for harvesting poor cane. This may inevitably drive SSGs that produce low quality cane from the industry, further highlighting the need for a land (rental) market allowing high quality cane producing SSGs to rent in more land. Also, due to contractors having limited access to finance and a high liquidity preference (continuing operations with respect to fuel and repairs), earlier payment for their service needs to be seriously considered by milling companies. This is possible, as information on which contractor delivered the cane and the value of cane delivered is said to be available well within the one to two month payment time. Less delay in haulage payments would be highly beneficial to contractors in providing liquidity to fund day-to-day operations. Introducing this type of payment scheme may require preliminary adoption of a reduced payment delay (i.e. three to four weeks), with additional decreases (i.e. two weeks) being considered for the future, so as to allow mills to accustom themselves to quick payments (computer systems may need adjustment, and staff trained to deal with shorter payment schedules). Although a payment system may need to be designed for contractors, market forces would eventually decide upon charge-rates for contractors competing for work.

Regarding a competitive contractor sector, note must be taken of the bargaining power of contractors compared to SSGs. Policy makers must not overlook this relationship as short-term abuse of bargaining power over SSGs may result if contractors are to be allowed to set their own prices. In the long run, however, prices would be driven down by competition amongst contractors, especially after the expansion of contractors and their taking advantage of economies of size. The development of a competitive sector

may be realisable, in that the situation already exists in Mpumalanga (Komati and Malelane) where commercial contractors, some being SSGs themselves, are contracting to SSGs under competitive conditions.

Before discussing potential steps in moving towards a competitive sector, it is necessary to mention those contractors who may lose with regards to own vested interests and power relations, i.e. those that would oppose institutional change. Firstly, many contractors may need to exit the industry with their work being taken up by more productive contractors (quality service providers regarding timeliness and charge-rates). There is no indication of this number, however, with most contractors needing to more than double haulage levels to at least 10 000 tons (to make use of economies of size and break-even), a potential drop of 50 percent of currently operating contractors may occur. Others with vested interests would be those in authoritative positions on local associations and sub-committees. However, these institutions may still be useful in providing information, for contract monitoring and/or contract enforcement. Further costs would be faced by, for example, milling companies where computer administration may have to change in the form of new computer programmes and staff training in order to speed-up payments to contractors. This may, therefore, also invoke some resistance to change.

Potential steps in moving towards a more competitive contractor sector include:

- Allow contractors to source their own work. Contractors do not have to work through channels to get jobs beyond personal dealings with the SSGs. Also, a

milling company payment scheme is not necessarily needed, although this option should still be made available to parties contracting in a competitive market.

- Current extension services (joint venture and milling company) need to communicate the benefits of competition to both SSGs and contractors (lower charge-rates through cost cuts by contractors, improved service quality for SSGs, ability to expand contracting business and make use of economies of size for contractors, and freedom to choose clients).
- The authority of associations and sub-committees should be limited to the recording and provision of information, mediation and arbitration of disputes, and contract enforcement (this despite the vested interests of individuals within these authoritative positions). It may also be useful to deploy sub-committees as brokers to absorb costs associated with search and negotiation costs. As brokers they could also record and forward information about contractors to millers if the contractual parties wish to reduce their transaction costs by retaining the milling companies as paymasters. Crookes (2002) gives similar recommendations, highlighting the need for both government and extension services to assist in reducing transaction costs linked to an arable land rental market by providing relevant information (e.g. on legal precedents regarding contract integrity, lists of willing market participants, advice on contractual procedures, etc.).
- Make allocated tonnages transferable between contractors at prices set by contractors themselves. This would move current allocations to more efficient contractors willing to pay the highest price per transfer.

- Any support (information, extension advice) that contractors need could be provided by extension services already in place. However, if the request for information exceeds what can be provided, contractors may want to consult with (paid) private experts for advice (this will promote more efficient allocation of resources, such as information inputs, to better performing contractors).
- A short-term solution to contractors determining charge-rates may be to provide a list of potential charge-rates or price information (by extension services) of all contractors in an area to SSGs (this may be the sub-committee area or wider depending on distance costs to contractors). This could drive charge-rates down, as SSGs will likely try to source the lower cost providers.
- It needs to be clearly communicated to SSGs that contractors are service providers and that the SSGs are their customers. There must be a demand for high quality service in order to drive service levels up to acceptable standards (i.e. a more competitive industry structure will improve service quality by contractors jockeying for competitive advantage). This does not occur at present because SSGs are allocated to contractors and therefore are not voluntary clients.

In effect, contractors who are not cost effective and/or deliver poor quality services may exit the market leaving lower-cost contractors in the industry. However, competition might be limited only to contractors within the same areas, as delivering such service over a wide geographical area may prove costly for contractors.

From a development perspective, it would take time for the remaining small-scale contractors to reach commercial levels of competitive advantage, i.e. commercial charge-rate levels and commercially acceptable standards of service. It may, therefore, be necessary to protect areas where commercial contractors have access, in the short-term, to prevent the small-scale contractor sector from collapsing (i.e. leave authority of area allocation, not individual allocation as in the past, to sub-committees in the short-term so that groups of contractors compete amongst themselves in their own areas).

Porter (1985) outlined a necessary approach for contractor's operating in a competitive sector. It would be necessary for contractors to guarantee sources of key inputs (a continuous supply of fuel for day-to-day operations, and readily available repair services). Contractors would need to be able to compete with fellow small-scale contractors and commercial contractors, and to deter potential new entrants by building up a competitive advantage (e.g. ensure services are of a high standard (timely operations) and that prices are competitive). Contractors need to be aware of an expected increase in the bargaining power of SSGs as the SSGs ability to change contractors would be increased in a more competitive market.

From a machinery costing perspective, the lack of information on what costs contractors face is problematic considering that contractor costs are largely weighted by machinery costs. If the "fruits" of training contractors in recording and calculating own machinery costs expect to remain unrealised in the near future, immediate action may be to develop and provide benchmark-costing information based on real data. This would involve case

studies of small-scale contractor machinery operations, including the recording of day-to-day operational costs (fuel, oil, R&M), haulage distances and the number of days operating. Contractors also need to be advised on preventative maintenance and the importance thereof in extending the life of valuable and expensive assets such as tractors. Alternative systems used by contractors would not only depend on availability and price, but also on the service demanded by SSGs. Furthermore, contractors may need guidance in where and how to access finance for new machinery purchases. With Ithala being the preferred source of loan finance, it may be useful to inform contractors of Ithala requirements in loan approval, such as a good credit history.

The government may have a role in improving small-scale contractor performance through a change in government policy and institutions. Firstly, government could consider creating formal land markets under informal constraints (tribal authority) in partnership with those directly involved in the sugar industry (SASA, milling companies, SACGA). Following Thomson's (1996) recommended steps to address highly imperfect rental markets may be an approach that government and others involved in the industry could use.

Secondly, government needs to direct more funding towards improving rural infrastructure such as roads, which would reduce haulage costs and improve communication. Groups of SSGs (e.g. sub-committees) could invest in road maintenance equipment (subsidisation by government may be required) and maintain infield roads for those in their area. District road maintenance would remain the responsibility of

government. Furthermore, extension staff may want to advise potential SSGs not to plant sugarcane in inaccessible areas, as contractors under a competitive situation may not be willing to haul their sugarcane.

Thirdly, government needs to ensure that tribal courts do not run a dual system of decision but that all contracts are enforced consistently regardless of social status, i.e. there needs to be monitoring over tribal rulings and accessible places of appeal for those with grievances regarding these rulings. Fourthly, labour legislation should be seriously reconsidered regarding the minimum wage bill, as many small-scale contractors simply cannot pay the legal minimum wage (R650 or R800 per month depending on the area) to their unskilled labour, due to their already relatively high costs of operating (high transaction costs, diseconomies of size). Lastly, protection of those competing for work needs to be made available. "Mafia" type behaviour and abuse of authority in communal areas need to be severely dealt with by law enforcement officers.

SUMMARY

This study has two main objectives. The first is to establish the current institutional constraints that may negatively influence a small-scale sugarcane contractor's performance and overall operation. Contractor performance would include aspects such as timely haulage operations and cost effectiveness, bringing about lower charge-rates for SSGs. The second objective is to identify small-scale sugarcane contractor attributes that have a significant effect on their service quality within current institutions, as perceived by small-scale sugarcane growers (SSGs).

The organisational structure of SSGs and their contractors is different to that found in the commercial farming sector. Instead of SSGs being in direct contact with their local grower councils, they operate via their respective sub-committees, local associations and mill cane committees. Also, in many areas the sub-committees are responsible for allocation of SSG tonnages to the contractors. This makes the SSG sector unique and those involved in this sector, including small-scale contractors, face unique problems (e.g. there are tonnage allocation constraints on contractors).

The main operations for which growers make use of contractors are land preparation, sugarcane transport, planting, fertilizing and harvesting. For the SSG it makes financial sense to make contractual arrangements with contractors who should be able to provide a more cost effective machinery, and even labour, service. However, to date, productivity problems with the small-scale sugarcane contractors relate to the poor timeliness of their

operations and high charge rates reflected in the higher costs (e.g. higher transaction costs due to institutional constraints) that the average small-scale contractor faces.

Information from case studies, conducted in eight SSG areas, and a sample survey was used to examine current institutional constraints. The sample survey included 124 randomly selected contractors from 11 mill group areas in KwaZulu-Natal between September 2002 and July 2003. The mill group areas included Umzimkulu, Sezela, Eston, Maidstone, Noodsberg, Gledhow (including Glendale), Amatikulu, Entumeni, Felixton, Pongola, and Umfolozi. The case studies were conducted between September 2002 and February 2004 in four Illovo mill areas (Eston, Sezela, Gledhow and Glendale) and four Tongaat-Hulett mill areas (Amatikulu, Maidstone, Entumeni and Felixton). Case studies concerning institutional issues, such as organisational structures and functions, involved interviews with contractors, sub-committee members and development officers. There is also a brief assessment of customary institutions having an influence in the SSG sector, where a lack of land tenure rights and the existence of both gender and social discrimination is highlighted.

Both survey and case study results show that contractors face many institutional constraints such as work allocation limitations and high transaction costs. Transaction costs include negotiation costs, the risk of a loss in work independent of performance, and risk of contract default. Other constraints include cash flow problems, poor physical infrastructure and a lack of labour. Other factors that are inhibiting contractor

performance are the differences in relative bargaining power between SSGs and contractors as well as the lack of customer (SSG) contact by contractors.

Information from the sample survey, less ten observations from Umfolozi, was used for determining attributes affecting contractor service quality. Further interviews were conducted in the same time period with SSGs for information on contractor service quality (transport and general service timeliness, meeting of daily ratable delivery requirements, low downtimes, good staff management, and minimal disagreements on service terms).

An empirical regression model was formulated to include variables that may influence a contractor's service quality (rating) as perceived by SSGs. Service rating (SERV) is a score made up of six different service qualities and functions that contractors (not sample contractors) and growers interviewed perceived were important. These were transport and general service timeliness of contractors, the meeting of daily ratable delivery requirements by contractors, low downtimes of contractor machinery, good staff management by contractors, and whether minimal disagreements between SSGs and contractors regarding service terms take place.

The model's results indicate that the gender of a contractor, training received by a contractor, use of information provided by SASEX and the Ingede, and a higher tonnage throughput could improve the quality of service as perceived by SSGs. Training and

relevant information provision may be vital tools in improving contractor productivity within the confines of current institutional constraints.

A depreciation trend for contractor tractors is estimated up to 23 years of age from data drawn from both the sample survey and AGFACTS (Agfacts, 2003). A possible Repairs and Maintenance (R&M) scenario is presented where a lack of maintenance has been observed in the small-scale contractor sector. It is concluded that there is a need for further research on the issue of contractor machinery costs. In a competitive sector contractors would need to have adequate information on own costs in order to compare these with contract rates in the market.

Current and future sources of contractor finance are examined. Although the majority of contractors use cash to finance machinery purchases, Ithala Bank is the most common source of loan finance. Further guidance by extension staff and other industry advisors (e.g. development officers) in the accessing of adequate finance may be necessary, particularly in the areas of "where" and "how" to access finance. This would include loan approval requirements, such as having a good credit history.

It is concluded that the promotion of a more competitive small-scale sugarcane contractor sector will alleviate many of the problems faced by small-scale contractors, such as the inability to expand operations due to work allocation limitations. Competition would also provide incentives for the provision of higher quality and cheaper services to SSGs. There are potential steps that could be taken in the move to a more competitive sector;

these are (1) to allow the contractors to source their own work, (2) to communicate the benefits of competition to stakeholders, (3) limit the authority of associations and sub-committees, (4) to make current allocated tonnages transferable, (5) to provide support in the form of information and extension advice, (6) in the short-term provide a list of charge-rates and price information of all contractors in the area, and lastly to communicate the importance of customer satisfaction within a competitive situation to SSGs.

Government also has a role to firstly strategise the creation of land markets in partnership with those involved directly in the industry (e.g. South African Sugar Association (SASA), milling companies). Thomson's (1996) recommendations for efficient land rental markets may prove to be a useful guideline. Government needs to provide improved rural infrastructure, mainly district roads, which would reduce haulage costs and improve communication, as well as ensure unbiased tribal court rulings regardless of social status. Government also needs to monitor court rulings and provide places of appeal.

Labour legislation should be seriously reconsidered, particularly with regard to the minimum wage bill, as many small-scale contractors simply cannot afford to pay the legal wage to their unskilled labour, given their relatively high operation costs (high transaction costs, diseconomies of size). Lastly, government needs to provide protection for those competing for work, and the abuse of authority in communal areas needs to be severely dealt with by law enforcement officers.

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APPENDICES

SMALL SCALE GROWER CONTRACTOR QUESTIONNAIRE

Name of interviewer: _____ Date: _____

Name of contractor: _____ District: _____ Standard of education: _____

Gender of contractor: _____ Mill: _____

Age of contractor: _____ Association: _____

No of years operating as contractor: _____

No formal education = 1
Standard 6 (Grade 8) or less = 2
Standard 7-9 (Grade 9-11) = 3
Standard 10 (Grade 12) = 4
Tertiary Education = 5

Financing of vehicles and equipment

Financing methods (A- D):		Financing body (A-I):		Interest rate (%	Period (yrs)
Method Most Used:		Institution 1:			
2nd Most Used:		Institution 2:			
3rd Most Used:		Institution 3:			
4th Most Used:		Institution 4:			

Cash = A	Bank = A	Milling company = F
Loan = B	Building Society = B	Inherited = G
HP = C	Land Bank = C	Savings = H
Other = D (specify below)	Umthombo = D	Other = I (specify below)
	Ithala = E	

Equipment spares	Yes = Y, No = N
Carry popular spares (fan belt, filters)?	
Is there a dealer / agent in the area?	
Is there a workshop facility in the area?	
Is compressed air available locally?	
	Number
Distance to closest equip. agent (km)	
Distance to closest village/town (km)	

Record keeping	Yes = Y, No = N
Hours worked	
Distance travelled	
Fuel and oil usage	
Maintenance and repairs	
Tons transported	
Area ploughed	
Labour costs	

Equipment maintenance and repairs		Yes = Y, No = N
Major overhaul/service	Self	
	Local garage/workshop	
	Dealer	
Minor/daily service	Self	
	Local garage/workshop	
	Dealer	
Tyre and tubes	Self	
	Local garage/workshop	
	Dealer	
Does contractor have his own workshop?		
Workshop equipped with all tools for major services & overhauls?		

Diesel fuel	Yes = Y, No = N
Does he have a bulk tank (4000l)?	
Does equip. travel to nearest supply?	
	Number
Quantity of fuel kept on hand (litres)	
Distance to nearest fuel supply (km)	
Fuel price (Rand/litre)	
Diesel usage per annum	

Formal training	Yes = Y, No = N
Financial / book keeping?	
Training provided by:	
Mechanical servicing?	
Training provided by:	
Mechanical repairs?	
Training provided by:	
Planning?	
Training provided by:	
Implement setting?	
Training provided by:	
Would he like to learn how to keep good records?	

	Yes = Y, No = N		
Does the contractor have other skills?		If yes - specify	
Does the contractor have another source of income?		If yes - specify	
Would contractor share or pool machinery or equipment?		If no - why not?	
Once machinery becomes obsolete how will it be replaced? (1-4)		Use savings to replace it = 1, Obtain new loan = 2, Obtain new hp = 3, Stop contracting = 4	
Which financing institute would you obtain the loan from? (1-7)		Bank =1, Building Society = 2, Land Bank = 3, Umthombo = 4, Ithala = 5, Milling Co = 6, Other = 7	

APPENDIX 1A: Contractor questionnaire

VEHICLE AND EQUIPMENT DETAILS

Machinery and equipment currently in use

	Make	kW	Model/Year	'mark with X below' Two wheel drive	'mark with X below' Four wheel drive	Purchase year	Purchase price (Rand)	Purchase method (1-4)	Used for cane transport %	Used for landprep %	Used for other tasks %
Tractor 1											
Tractor 2											
Tractor 3											
Tractor 4											

Cash = 1, Loan = 2, HP = 3, Other = 4

	Make	Model/Year	'mark with X below' Single axle	'mark with X below' Double axle	Payload (tons)	Purchase year	Purchase price	Purchase method (1-4)	cane transport %		other tasks %
Truck 1											
Truck 2											
Truck 3											

Cash = 1, Loan = 2, HP = 3, Other = 4

	Make	Model/Year	Purchase year	Purchase price	Purchase method (1-4)
Loader 1					
Loader 2					
Loader 3					

Cash = 1, Loan = 2, HP = 3, Other = 4

Trailers	Type (eg.basket,spiller,self loading,self,offloading)	'mark with X below' Single axle	'mark with X below' Double axle	No of bundles	Payload (tons)	Purchase Price (Rand)	Purchase method (1-4)
Cane trailer 1							
Cane trailer 2							
Cane trailer 3							
Cane trailer 4							
GP trailer 1							
GP trailer 2							

Cash = 1, Loan = 2, HP = 3, Other = 4

Implements	No of shears, tines or discs	Width of cut (m)	Rows per pass
Ripper			
Plough			
Harrow			
Ridger			
Min tiller			
Boom sprayer			
Fertilizer applicator			
Tine cultivator			

Vehicle & equipment	Yes = Y, No = N Licenced	Yes = Y, No = N Insured
Tractors		
Trailers		
Trucks		
Mech. Loaders		
Cranes		
Implements		

Machinery operators	Number of:	Wage per month (Rand)	Wage per day (Rand)
Tractor drivers			
Truck drivers			
Loader drivers			
Conductors			
Supervisors			
Clerks			

Includes owner if he drives

VEHICLE AND EQUIPMENT UTILISATION

Cane haulage

Harvesting system	Yes =Y No = N	%
Manual cut & stack?		
Manual cut and windrow?		
Manual cut & manual load?		
Manual cut & mech load?		

Cane transport	Yes =Y No = N	%
Field to zone?		
Field to mill?		

How is contractor hired:	Yes =Y No = N	By what means?
Directly by Individual grower		
Through sub-committee		
Through the Association		
Another way (*state*)		

By word of mouth = 1
By word of mouth and witness = 2
By signed session/contract = 3

Operation details	In season	Off-crop
Days worked per week		
Total fuel per year (litres)		

Increased tonnage:	Yes =Y No = N
Can contractor increase the tonnage he transports?	
Would contractor like to increase tonnage transported ?	
To transport more tonnage does he need more machinery?	

How are grower/contractor disputes resolved?	

Settled privately (i.e. between the grower and contractor) = 1
By local law enforcement (the SAP) = 2
By sub-commitees = 3 By the local association = 4
Other method = 5 (*please state*) ______
Disputes are not resolved = 6

Cane haulage sessions

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

Zone No / Name:	
No of growers	
Total tonnage	
Average haulage dist. ('one-way'km)	
Home to field daily travel distance ('one-way' in km)	

LABOUR AND MACHINERY COSTS AND CHARGE OUT RATES

Over the past 2 or 3 seasons did you make a Profit?	
Yes=Y, No=N, Unsure=U	
If unsure, Do you think you made a Profit?	
Yes=Y, No=N	

Estimated contracting profit or loss made last season (Rand)	
Profit	
OR	
Loss	

(If available)

Labour Costs	Total wages per day (Rand)	Average output per day (tons)
Cutters only		
Loaders only		
Cutters/stackers		
Supervisor		
Clerk		

Mechanical loading	Rate/ton (Rand)

	Bell loader	Crane
Trans-loading	Rate/ton (Rand)	Rate/ton (Rand)

Chains	No of chains	Rate/ton (Rand)

Labour association	Yes =Y, No = N
Are unions working in the area?	

Clothing & equip supplied	Yes =Y, No = N
Cane knifes	
Files	
Stones	
Smocks	
Leggings	
Gloves	

Labour Charge Out Rates	Rate/ton (Rand)
Cutters only	
Loaders only	
Cutters/stackers	
Supervisor	
Clerk	

Contractor's haulage rates	
One-way dist. (km)	Rate/ton (Rand)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
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21	
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26	
27	
28	
29	
30	

VEHICLE AND EQUIPMENT UTILISATION

LAND PREPARATION AND CROP MAINTENANCE

Land preparation system, area and travelling distance between contractors homestead and fields:

Land preparation systems										Own System (*fill in*)	
System A	System B	System C	System D	System E	System F	System G	System H	System I	System J	System K	System L
Rip	Rip				Rip	Rip					
Plough	Plough	Plough	Plough	Plough							
Harrow	Harrow	Harrow	Harrow	Harrow	Harrow		Harrow				
Plough		Plough									
Harrow	Harrow	Harrow	Harrow		Harrow	Harrow	Harrow				
Ridge	Ridge	Ridge	Ridge	Ridge	Ridge	Ridge	Ridge		Ridge		
								Min- tiller			

	Contract 1	Contract 2	Contract 3	Contract 4	Contract 5	Contract 6	Contract 7	Contract 8	Contract 9	Contract 10	Contract 11	Contract 12
Land preparation system												
Area (ha)												
Home-field travel dist.(km)												
Charge Rate - Rand/ha												

	Contract 13	Contract 14	Contract 15	Contract 16	Contract 17	Contract 18	Contract 19	Contract 20	Contract 21	Contract 22	Contract 23	Contract 24
Land preparation system												
Area (ha)												
Home-field travel dist.(km)												
Charge Rate - Rand/ha												

Crop maintenance system, area and travelling distance between contractors homestead and fields:

Crop maintenance systems		
System A	Cultivate x one pass	
System B	Cultivate x two passes	
System C	Boom sprayer x one pass	
System D	Boom sprayer x two pass	
System E	Fertilising x one pass	
System F	Fertilising x two pass	
System G		fill in own if different
System H		fill in own if different

	Contract 1	Contract 2	Contract 3	Contract 4	Contract 5	Contract 6	Contract 7	Contract 8	Contract 9	Contract 10	Contract 11	Contract 12
Crop maintenance System												
Area (ha)												
Home-field travel dist.(km)												
Charge Rate - Rand/ha												

VEHICLE AND EQUIPMENT UTILISATION

GENERAL TASKS

TASK / OPERATION

Transporting:	Trips per day	No of days per year	Total dist. per day (km) *'one-way'*	Total dist. per day (km) *'one-way'*
Cane cutters				
General labour				
Seed cane				
Water				
Building material				
Firewood				
Diesel				
Other transporting tasks (*please state*):				

Contractor Sources of Information			
Please rank the top three in order of importance: 1 = Most, 2 = Medium, 3 = Least			
SA Sugar Association		Radio	
SA Experiment station		Television	
SASEX Extension Services		Sugar Journal	
SA Cane Growers Assoc.		SASEX "The Link"	
Mill Extension Services		Farmer's Weekly	
Machinery agents		Farmer's Days	
Local associations		Agricultural Shows	
DOAEA Extension		News papers	
Joint Venture Extension		Other farmers	
Ingede		Other contractors	

GENERAL INFORMATION

PROBLEMS ENCOUNTED AND SOLUTIONS FOUND BY CONTRACTOR

Examples:

Harvesting: Cane allocation Labour availability etc. Stack sizes Other	
Infield loading: Mechanical loading Breakdowns Other	
Infield haulage: Terrain Road infrastructure	
Transloading: Distance to zone Type of loader/crane	
Financing: Loans Repayment	
Servicing of equipment: Repair facilities Diesel supply	
Other: Group contracting: Implement pool:	

APPENDIX 1B: Small-scale grower questionnaire

Sub-Committee/Grower Questionnaire

Name of Contractor_____ **Contractor No.**_____

Name of Interviewer_____ **Date** _____

Name of Interviewee_____ **District** _____

Mill _____ **Association** _____

The following set of statements relates to the respondent's knowledge concerning the small-scale contractor in question and the services they provide to small-scale growers. Please circle the number which corresponds to the following statements.

The Contractor:	1 = Strongly Disagree 2 = Disagree 3 = Agree 4 = Strongly Agree
• moves the cane quickly to the loading zone/mill after it is cut (excludes rainy periods).	1 2 3 4
• ensures, to the best of his ability, cane is cut, carted and delivered to the mill within 3 days (excludes rainy periods).	1 2 3 4
• meets his Daily Ratable Delivery (DRD) requirements on a daily basis.	1 2 3 4
• has machinery that does not often break down (excludes minor problems such as punctures).	1 2 3 4
• is a good manager of his staff so that they work and perform well.	1 2 3 4
• seldom has disagreements with his clients regarding the service he provides to them.	1 2 3 4

Please Note: The information provided will be kept strictly confidential.

APPENDIX 2: Categories used in allocating haulage areas to strata

Mill Area	Topography	Haulage Type
Amatikulu	Undulating & Undulating to Flat	Indirect/Direct
Amatikulu (Delville)	Undulating & Undulating to Flat	Indirect
Entumeni	Steep & Steep to Flat	Direct
Eston	Undulating & Undulating to Flat	Indirect
Felixton Irrigation	Flat	Indirect
Felixton North	Flat	Indirect
Felixton South	Undulating & Undulating to Flat	Indirect
Gledhow (Glendale)	Steep & Steep to Flat	Indirect
Gledhow (Melville)	Undulating & Undulating to Flat	Indirect
Maidstone	Undulating & Undulating to Flat	Indirect
Noordsberg	Undulating & Undulating to Flat	Indirect/Direct
Pongola (Makatini)	Flat	Indirect/Direct
Sezela (Mission)	Steep & Steep to Flat	Indirect
Sezela (Mthwalume)	Steep & Steep to Flat	Indirect
Sezela (Umzumbe)	Steep & Steep to Flat	Indirect
Sezela (Zamani)	Steep & Steep to Flat	Indirect
Umfolozi	Undulating & Undulating to Flat	Indirect
Umzimkulu	Undulating & Undulating to Flat	Indirect/Direct

APPENDIX 3: The main questions asked during case study interviews

1) How is the small-scale contracting sector organised, e.g. SSGs, local associations, sub-committees, contractors?
2) What are the functions of sub-committees and local associations within your area if these bodies exist?
3) How does one enter into the industry as a contractor, i.e. what are the channels needed to go through in order to source contractor work?
4) What are the main problems faced by contractors?
5) Have you heard of or found any solutions to these problems?

APPENDIX 4: Characteristics of sample small-scale sugarcane contractors in ten areas of KZN, 2002/03 (n=114)

General Characteristics	Mean	Education Distribution	
Age in Years	52.1	No Education (%)	16.8
Experience in Years	10.1	Grade 8 or less (%)	38.1
Proportion of Females (%)	12.5	Grade 9-11 (%)	19.5
Proportion with Other Sources of Income (%)	77.2	Grade 12 (%)	19.5
Proportion with Other Skills (%)	50.0	Tertiary (%)	6.2
Tons transported Annually	6 533.9		
Tons transported Annually*	4 859.9		

*Excluding those contractors transporting more than 10 000 tons.

Note: Contractors transporting more than 10 000 tons only influenced the tonnage mean and are therefore included in calculating all other characteristic means.

APPENDIX 5: A brief overview of Principal Component Analysis (PCA)

The main purpose of Principal Component Analysis (PCA) is to reduce the dimensions in a data set where many variables may be highly correlated while attempting to preserve as much variation in the variables as possible. This technique is also used to economise on the number of variables in a model. The resulting 'new' variables or Principal Components (PCs) are transformed, uncorrelated variables where few explain most of the variation in all the original variables (Jolliffe, 1986: 1). PCA is a multivariate transformation technique where PCs are obtained through linear transformations of the original variables as follows:

$$PCi = a_{i1}X_1 + a_{i2}X_2 + \ldots + a_{iM}X_M \qquad (6.1)$$

where PCi = the score on the ith principal component;

$i = 1 \ldots M$ principal components;

$X_1 \ldots X_M$ = are the original variables;

$a_{i1} \ldots a_{iM}$ = are the component loadings *where...*

$a_{i1}^2 + a_{i2}^2 + \ldots + a_{iM}^2$ = the eigenvalue for PCi.

PCs formed equal the number of original variables, however, due to some components explaining most of the variation in the original variables not all PCs need to be retained. The number of PCs retained is based on the percentage variation explained by the PC as

well as whether interpretation of the PC is meaningful. PCs are calculated in descending order where the first PC accounts for most of the variation (Nieuwoudt, 1977: 79).

APPENDIX 6: Principal components Exmachmgt and Inmachmgt

	Principal Component	
Particulars	**Exmachmgt**	**Inmachmgt**
Popsp	-0.432	**0.754**
Dealer	**0.815**	0.172
Wkshp	**0.830**	0.251
Comair	**0.620**	0.311
Distfuel	-0.535	0.403
Eigenvalue	2.210	0.921
Cumulative Percent Variance Accounted For	44.205	18.425

Note: Popsp = one if a contractor keeps popular spares on hand, zero otherwise.

Dealer = one if a dealer exists in the area, zero otherwise.

Wkshp = one if there is a workshop in the area, zero otherwise.

Comair = one if compressed air is available in the area, zero otherwise.

Distfuel= the distance to the nearest fuel supply (km).

APPENDIX 7: Reliability of the contractor service quality model

The F statistic (3.847) shows that the null hypothesis of the model being statistically significant is accepted (Gujarati, 1995: 247-248). The R^2 value (0.428) indicates that 43 percent of the variation in SERV is accounted for by the explanatory variables. Although this model may not be adequate for predictive purposes, it may be adequate for explanatory and causality interpretations. There is no serious multicollinearity problem as the highest correlation figure is 0.48 between INFOCONT and INFORADI. High zero-order correlations are a sufficient but not necessary condition for multicollinearity to exist, however, with the R^2 being below 0.8 and with six explanatory variables having significant coefficients in the model there is evidence that the degree of multicollinearity is minimal. Further checks involve the Condition Index (CI) and Variance Inflation Factor (VIF). The maximum CI is 39.628, which lies above the mid range of moderate collinearity indicating the potential problem of multicollinearity, however, the highest VIF was 2.056 for the explanatory variable INFOCONT. This is far below the critical value of 10, which is further evidence of the low degree of multicollinearity (Gujarati, 1995: 335-339).

With cross-sectional data the order of the observations does not matter, hence serial correlation cannot be a problem. However, spatial correlation (autocorrelation in cross-sectional data) may be a problem. The Durban-Watson d statistic (1.877) for the estimated model is in the "zone of indecision", so the hypothesis of the existence of positive spatial correlation cannot be accepted or rejected (Gujarati, 1995: 420-425).

The presence of heteroscedasticity may also be a problem where OLS coefficient estimates are inefficient and inconsistent, and where standard deviations for these estimates are incorrect. White's general heteroscedasticity test was used to examine the presence of heteroscedasticity. The auxiliary regression R^2 of the square of the model's residual regressed on the included variables, the squares of the variables and the product of all the included variables was 0.239. The regression sample size (86) multiplied by the auxiliary R^2 (0.239) is 20.554, which follows the chi-squared distribution with 21 degrees of freedom. The critical values at the 5, 10, and 25 percent levels are 32.671, 29.615, and 24.935, respectively. The chi-squared value attained does not exceed any of these levels; it can therefore be concluded that heteroscedasticity is not a problem (Gujarati, 1995: 379-380).

The distribution of residuals for the model is presented in Figure 7.1. The standardised residual plot is only slightly negatively skewed. Non-normality of the error term is therefore unlikely to distort the t tests. Also, the normal probability plot of the standardised residuals in Figure 7.2 shows the normality of the data by the low deviation of the normal probability plot from the 45° line.

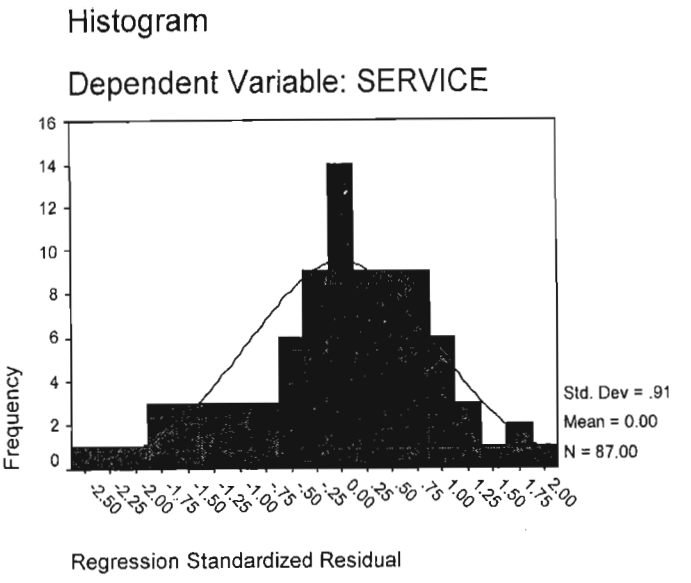

Figure 7.1: Histogram of Standardised Residuals

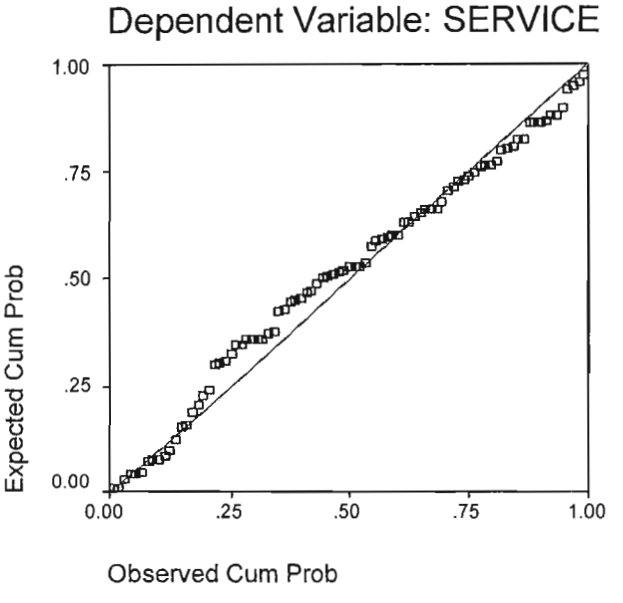

Figure 7.2: Normal probability-plot of standardized residuals