ATTRIBUTES OF SMALL-SCALE SUGARCANE CONTRACTORS THAT INFLUENCE THEIR SERVICE QUALITY IN KWAZULU-NATAL

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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 they supply with sugarcane. This study examines the attributes of small-scale sugarcane contractors that affect their quality of service as perceived by small-scale sugarcane growers (SSGs). Information was obtained through interviews conducted with 114 contractors sampled in ten mill group areas in KwaZulu-Natal between September 2002 and July 2003. 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 rateable 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)[3] 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).

1. INTRODUCTION

In South Africa small-scale sugarcane growers (SSGs) form an integral part of the sugar industry and contribute an estimated 15 percent of the total sugarcane crop, with the remaining 85 percent coming from commercial farmers (72

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percent) and miller-cum planters (13 percent) (Mashatola, 2003: 10). Small-scale sugarcane contractors are generally 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 (Sokhela, 1999). An improvement in the productivity of contractors in providing the services farmers need is expected to benefit contractors (lower costs and greater market share) 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.

The study identifies attributes of contractors that have a significant effect on the quality of their service as perceived by SSGs (e.g. transport and general service timeliness, meeting of daily rateable delivery requirements, low downtimes, good staff management, and minimal disagreements on service terms). This can assist sugar industry extension services in promoting key attributes through advice and training. It is in a SSG's best interest to have his/her sugarcane delivered to the mill on time and with minimal conflict with contractors.

Data for the study were collected between September 2002 and July 2003 from 114 contractors sampled in 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. Further information regarding the quality of service provided by contractors was gathered through interviews with some of their clients (SSGs).

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 (established in each mill supply area to represent the interests of local growers), small-scale growers operate via a different channel, namely through their respective sub-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 (which 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. It

shows the difference in the links between commercial growers (direct link) and SSGs (link via bodies (a) – (c)) with the Local Grower Council. The interaction of industry players with small-scale sugarcane contractors is also shown; for example, local associations often set tariff rates for services provided by contractors. Figure 1 also shows that sub-committees control the allocation of contractors to SSGs.

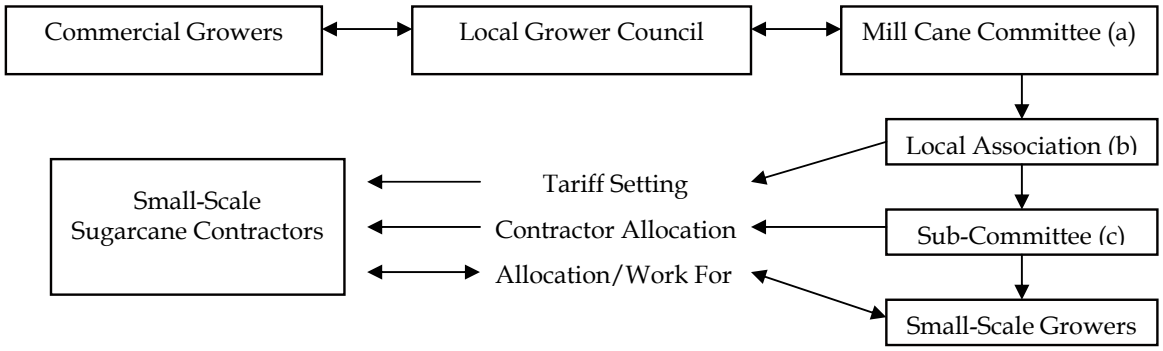

Figure 1: Organisation of small-scale sugarcane growers and contractors

Source: Adapted from Le Gal and Requis, 1999:4.

3. BACKGROUND TO SMALL-SCALE SUGARCANE FARM CONTRACTORS

In past studies that have primarily focussed on sugarcane growers, mention is often made of the role that contractors play in farming activities (Sokhela, 1999; Bates, 1979). An early example of such a study was that conducted 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 and 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) maintains that 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 (e.g. charge-rates lowered by spreading fixed costs over greater volumes of output, and monitoring and controlling variable costs), the quality of services provided, and their management capabilities. 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".

4. DATA SOURCES AND CHARACTERISTICS OF SAMPLE CONTRACTORS

Data used in this study include the responses of a survey conducted by Joint Venture[4] and mill extension staff who interviewed 114 small-scale contractors between September 2002 and July 2003. The study area includes ten of the main small-scale sugarcane grower areas, namely Umzimkulu, Sezela, Eston, Maidstone, Noodsberg, Gledhow (including Glendale), Amatikulu, Entumeni, Felixton and Pongola.

The study population was stratified in two ways, namely by topography and whether a contractor conducted direct or indirect haulage tasks. Lists of the population of contractors in each stratum were provided by the extension services of sugar milling companies in each mill area. A random sample was drawn from each stratum 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

[4] *Staff from both the South African Sugar Association Experiment Station (now called the South African Sugarcane Research Institute) and the KwaZulu-Natal Department of Agriculture and Environmental Affairs who are currently working in partnership.*
[5] *Failure to calculate contractor costs due to a lack of information made inclusion of topographical information in the study unnecessary.*

was 100 percent, but only 77 percent (10 contractors) could be located for interviews). This was done to allow for an adequate spread of tonnage in the data. Table 1 summarises the characteristics of respondents. The contractors hauling more than 10,000 tons annually only influenced the mean tonnage and so are included in the statistics computed for the other characteristics.

Table 1: Characteristics of sample small-scale sugarcane contractors in ten areas of KwaZulu-Natal, 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*	4 860		

Note: *Excluding contractors transporting more than 10 000 tons annually.

The mean age and years of contracting experience for contractors are 52 and ten, respectively. Close to 13 percent of sample contractors are female while 77 and 50 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, and welding). An average of 4,860 tons of sugarcane is transported by sample contractors per year (excluding purposively selected contractors transporting more than 10,000 tons annually). About 17 percent of the sample contractors have no educational qualifications. Thirty–eight percent achieved a grade 8 or less, while 39 percent of respondents have educational levels ranging from grade 9 to 12. Only six percent have a tertiary education.

5. 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 rateable 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.

5.1 Owner's experience, education, and gender[6]

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

[6] *Table 1 shows survey statistics that reflect experience, education and gender levels in the small-scale sugarcane contractor sector.*

to the rural elite. Bruce (1989) indicates that widowed or single women have a substantially lower social status than men in less-developed countries. It is therefore expected that women, probably facing higher transaction costs (limited access to resources such as 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 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, then organizations may cease to exist. This study indicates that sample contractors only keep two or three types of records (mainly records on tons transported and labour costs - either as receipts only or as poorly organized documentation), which are inadequate. 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.

5.3 External information sources

The link between information, decisions, and firm performance has been well established (Ford and 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 and 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 the sample of small-scale contractors had information on labour costs, and 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 2).

Table 2: Frequency of important information sources as ranked by sample small-scale sugarcane 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

Notes: *The South African Sugar Association Experiment Station.
**Seventeen missing cases.

Seventy-eight out of 97 responding contractors (80 percent) ranked 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 35 percent of respondents indicated the Ingede and SASEX as their third most important source of information.

It has been found that there is increased success with information provision, if information is targeted towards a specific need (Tucker and Napier, 2002). A similar situation may be evident in the small-scale contractor sector, which varies with respect to operation types (e.g. 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 of 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.

5.4 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. Training needs specifically linked to numeracy, bookkeeping and

marketing have in the past been highlighted by small-scale growers (Eweg, 2002). 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 3.

Table 3: Training received by sample small-scale sugarcane contractors, 2002/2003 (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*

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

5.5 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, 2001). 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 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

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

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.

5.6 Increased tonnage transported

An increase in the tonnage that contractors transport is extremely important from a size economies perspective. Economies of size are experienced when an increase in the output or tonnage transported reduces fixed costs per ton.

6. SPECIFICATION OF A CONTRACTOR SERVICE QUALITY MODEL

An empirical regression model 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.

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. 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 (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 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[9], EXMACMG[9], INMACMG[10], LNSIZE).

Table 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, thus 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 as 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 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, 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). 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 omitted 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 1), 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 on the contractor's business and therefore his or her service quality. INMACMG is a principal component (see Appendix 1) 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. 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.

7. EMPIRICAL ANALYSIS AND RESULTS

This section presents the results and interpretations of the regression model. Table 5 presents the OLS (Ordinary Least Squares) regression results for the estimated model. Six coefficients were significant at least at the ten percent level of probability, including those for 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 will improve their service quality as perceived by SSGs.

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.

Table 5: Contractor Service Quality Model

Variable	Regression Coefficient	Standardised Coefficient	t-Statistic	Significance Level	VIF[10]	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 Valid Observations		86[11]				
F-Statistic		3.847		***		
R^2		0.428				
Adjusted R^2		0.317				

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels of probability, respectively.

[10] *VIF = Variance Inflation Factor.*

[11] *Of the 114 cases considered 28 had missing data.*

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.

8. CONCLUSIONS AND POLICY RECOMMENDATIONS

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 together with 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 by 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). Also, 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.

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 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 KwaZulu-Natal due to the administrative allocation of work by sub-committees. 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.

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Appendix 1: Principal components EXMACMG and INMACMG

Particulars	Principal Component	
	EXMACMG	**INMACMG**
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
Percent Variance Accounted For	44.205	18.425

Notes: Popsp = 1 if a contractor keeps popular spares on hand, zero otherwise.
Dealer = 1 if a dealer exists in the area, zero otherwise.
Wkshp = 1 if there is a workshop in the area, zero otherwise.
Comair = 1 if compressed air is available in the area, zero otherwise.
Distfuel = the distance to the nearest fuel supply (km).