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## CAN SMALL-SCALE FARMERS BE LINKED TO AGRIBUSINESS? THE TIMBER EXPERIENCE

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### Abstract

The objective of this paper is to contribute to the design of agribusiness smallholder contracting linkages in South Africa. A fresh approach to design is adopted that combines a case study in the timber industry, the lessons of history and the economics of organisational architecture. The results confirm that the transaction characteristics of the grower-processor supply chain influence the level of managed co-ordination, that small-scale farmers generate incremental transaction cost and that medium and small-scale farmers can compete with larger growers in the supply chain. The results, however, are inconclusive with respect to the role of contracting as an institution to overcome the barriers of entry to the timber industry. A series of proposals are then developed in order to reduce transaction cost and achieve higher levels of contract enforcement in smallholder contracting arrangements with agribusiness. This paper concludes that large numbers of small-scale farmers can be effectively incorporated in the supply chain but only if specific measures are taken to reduce transaction cost.

### 1. INTRODUCTION

Agricultural production, world-wide, is changing, from an industry dominated by family farms, to one that is characterised by larger, industrialised firms that are more tightly aligned across the supply chain (Boehlje, 2000). The increasingly industrialised nature of agriculture, is thought to be largely the result of biological and information technologies (Schrader, 1986), economic growth, mechanisation, the increasing scale of organisation and the modernisation of production, processing and distribution systems (Sofranko *et al*, 2000). The industrialisation of agriculture has influenced higher levels of managed co-ordination that, currently, are a dominating feature of the structure of agricultural supply

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chains (Rhodes, 1993; Royer, 1995; Pasour, 1998). In support of this structural change, recent studies of the managerial economics of supply chains have revealed crucial new insights of the economic rationale for higher levels of managed co-ordination as a choice of governance structure (Petersen & Wysocki, 1997, 1998).

The agricultural sector is becoming increasingly polarised as a result of the need for size and continuity in agricultural supply chains. This feature is likely to be replicated and there is, thus, the danger that a majority of farmers in developing countries could be excluded from profitable niche markets. These farmers are likely to be locked into low return commodities that are prone to the price volatility of world markets. Boehlje & Doering (2000:53) argue that smaller operations, not associated with an industrialised system, will have increasing difficulty gaining the economies of size and the access to technology that is required in order to be competitive. Moreover, the liberalisation efforts, as well as, the harmonisation of standards and the encouragement of direct foreign investment, might make it more difficult for small-scale producers to participate in new marketing opportunities presented under the reforms (Stanton, 2000). Although the process of industrialisation has created opportunities for smallholders in developing countries to produce a wider range of commodities under contract (Kandiwa, 1999), there is still the danger that the process of industrialisation will exclude small farmers from high value markets (Reardon & Barrett, 2000).

The low level of investment of the South African agribusiness sector in small-scale farmer supply systems reflects similar levels of marginalisation. This level of investment is thought to be the result of the perceived higher levels of transaction cost incurred by agribusiness when they engage small-scale farmers as suppliers (Runsten & Key, 1996; Machete *et al*, 1997; Coulter *et al*, 1999; Van Rooyen, 1999). It is against this background that it is necessary to find appropriate institutional structures, which could prevent the marginalisation of small-scale producers and ensure their participation in commercial supply chains.

The central research problem addressed in this study is, whether or not, small-scale farmers in developing countries can be successfully linked to agribusiness (Kirsten & Sartorius, 2002). The specific research questions to be addressed are as follows:

- whether or not, the transaction characteristics of the grower-processor supply chain influence the governance structure that is required to co-ordinate these activities.

- whether or not, contracted small-scale growers generate incremental transaction cost to the agribusiness partner compared to contracted medium-large growers.
- whether or not, small-scale growers can compete with larger growers on the basis of the cost efficiency of production.

The outline of the study is as follows. Section Two evaluates South African small-scale farm initiatives and the lessons that have been learnt from the international experience of contracting. Section Three develops a theoretical framework to explain the link between the transaction characteristics of the firm and its governance form. Section Four discusses the methodology and data. Section Five introduces a case study in the timber industry that incorporates large numbers of micro growers. Section Six tests the first research question. Section Seven tests the second research question. Section Eight tests the third research question. Section Nine develops a framework for the design of small-scale agribusiness contracting models, and, finally, Section Ten develops a summary and conclusion

## 2. THE HISTORICAL BACKDROP

The objective of this section is to develop a number of key lessons that can be incorporated in the design of small-scale farmer supply chains. In the process of stimulating agrarian transformation in South Africa, a number of innovations have been devised that include the following schemes: farm worker equity, build-operate-transfer, lease and buy, share production, the agricultural village concept and contract farming (Van Rooyen, 1999; Van Rooyen *et al*, 1999). Examples of contract farming in South Africa include vertical co-ordination in the tea, fruit, sugar, flower, cotton, vegetable, timber, tobacco, mariculture and beverage sectors (Levin, 1988; Porter & Howard, 1997a, 1997b; Van Rooyen, 1999; Karaan, 1999; Tregurtha & Vink, 1999). Partnership approaches involving the emergent farmer and the agribusiness-commercial sector have, generally, appeared to be less costly than state led farmer settlement models. Finally, despite the numerous developments to expand the emergent farm sector, the level of investment of agribusiness in the small-scale farm sector is low (Ministry for Agriculture and Land Affairs, 1998; Van Rooyen, 1999; Van Rooyen *et al*, 1999).

A number of key issues have been associated with small-scale farmer contracting in South Africa. These issues include the effects of colonialism-apartheid on black-white relations, the issue of land tenure, the role of female farmers, the role of tribal and local authorities, contract conflict and the role of trust (Levin, 1988; Mbongwa *et al*, 1996; Klug, 1996; Kirsten &

Van Zyl, 1996; Porter & Howard, 1997a, 1997b; Van Rooyen, 1999; Karaan, 1999; Tregurtha & Vink, 1999). Small-scale farmers in South Africa appear to have viewed contracting as a means to secure inputs like credit and fertiliser, as well as, participate in high value crop production (Levin, 1988; Porter & Howard, 1997a, 1997b). The well documented international lessons, in many instances, support the South African experience and readers are referred to the works of amongst others Glover (1984, 1987, 1994), Glover & Kusterer (1990), Little & Watts (1994), Jaffee (1994), Williams (1985), Karen (1985), Minot (1986) and Runsten & Key (1996) for detailed accounts and case studies. The main lessons that emerge from this experience are that:

- the farmer partners are properly screened.
- the country specific historical and institutional legacies are taken into account in project design.
- commodities requiring more labour intensive production techniques are selected. Crops that require low levels of mechanisation, high labour inputs, that are delicate, that are highly perishable, that require a high degree of co-ordination, that need technology inputs and tight quality specificity, are better suited to contract farming involving small farmers. Crops, moreover, displaying a high value per hectare, that require high cost post harvest facilities and that display economies of scale higher in the marketing chain are ideally suited for some form of vertical integration.
- mutual asset specificity between the contracting partners is incorporated thus raising the exit costs for both partners and therefore ensuring a much more stable and sustainable relationship;
- the location and concentration of growers in relationship to the location of the agribusiness firm and other logistical factors are optimised.
- a competitive local market is not present, thus, ensuring contracted farmers do not have the option to sell to alternate outlets. The presence of alternate fresh markets has seriously disrupted agribusiness processors who are often unable to legally enforce contractual obligations.
- the legal system is well-developed, strong and respected ensuring contract enforcement at minimal costs.
- contractual relations are well managed and mutual trust between partners exists. The perceived high levels of contract manipulation by agribusiness firms, farmer distrust of the contractual relationship and a perception of a loss of autonomy have characterised contract

farming in developing countries. Removing all elements of mistrust and establishing trustworthy relationships are important for success.

- farmer interests are well represented in contract negotiations. In this respect, the formation of farmer co-operatives in a contract farming arrangement is seen as the most cost effective way to represent the interests of the contracted farmer as well as for the business to deliver inputs and services to the individual farms.
- agribusiness play a key role in co-ordinating farmer access to a range of inputs, services and facilities. These could include the promotion of literacy, improvement of business skills, fostering farmer links with agribusiness and banks, establishing a facility to resolve conflicts and infrastructure development.

These lessons, combined with developments in economic theory, as discussed in Section Three, will be used as a basis to evaluate the case study in Section Five, as well as, propose the design of small-scale farmer contracting in Section Ten.

### 3. THE THEORETICAL FRAMEWORK

The objective of this section is to use a transaction cost theory approach to demonstrate that the transaction characteristics of the firm influence organisation structure. Transaction cost economics has positioned itself in the centre of economic organisation theory and has been developed on the basis of the technical, human and behavioural nature of the firm where the concepts of bounded rationality and opportunism are key concepts that distance this theory with neo-classical economic theory (Groenewegen, 1996). Transaction cost theory assumes that economic actors will behave in an opportunistic manner if the circumstances of the transaction permit them to do so (Rowlinson, 1997) and that opportunistic behaviour, like dishonesty and exploitation, increases transaction costs for one of the parties involved. Conversely, the human behavioural characteristic of trust can reduce transaction costs (Akerlof, 1988; Dietrich, 1996; Gow *et al*, 2000; Fafchamps & Minten, 1999; Dean, 2000a) because trust eliminates opportunism. Trust, in this context, is a function of the cost of default, knowledge and emotional bonds (Adams & Goldsmith, 1999).

Transaction cost economics, like agency theory, has been developed on the basis of contract theory that sees the firm as a "*nexus*" of contracts (Reve, 1995) and transaction cost theory can be likened to the theory of optimal contracts (Seifert & Priddat, 1995). Transaction cost theory, moreover, assumes that firm structure evolves to minimise transaction cost (Coase,

1988). Transaction cost, in turn, is a function of the characteristics of the firm's transactions to acquire goods and services. These characteristics include the frequency of the transactions, the degree to which the firm's assets are tied to the transactions and the uncertainty of supply of the transacted goods and services. A key feature of transaction cost theory demonstrates that the governance form that the firm employs to co-ordinate the acquisition of goods and services is function of the firm's transaction characteristics of frequency, asset specificity and uncertainty (Barney & Ouchi, 1988; Demsetz, 1988; Foss, 1995; Groenewegen, 1996; Williamson, 1981, 1996, 2000). The relationship between these variables can be represented as follows:

$$OS = f(U, F, AP)$$

Where OS = Organization Structure, U = transaction uncertainty, F = transaction frequency and AP = asset specificity. This theoretical relationship will be used as a basis to analyse the transaction characteristics and organisation structure of the case study in Section Five.

#### 4. THE METHODOLOGY

This study has employed a case study in the timber industry to test the research questions. This approach was adopted to demonstrate that the lessons learned in Section Two, as well as, the theoretical relationships developed in Section Three, could be tested and demonstrated in the timber industry. A case study approach was, furthermore, employed because of the qualitative nature of the data contained in the historical records of both the company and the contracted growers. A case study approach was also adopted because of the need to explore a wide range of variables that affect the structure and performance of a grower-processor supply chain. The case study in the timber Industry was specifically selected for a number of reasons. Firstly, the timber industry was selected because of the widespread nature of small-scale contracting. The industry, to date, has promoted the development of, some, 18 876 small-scale growers, occupying in excess of 43 000 hectares, in Zululand, the Natal Midlands, Southern Natal and the Eastern Cape. The timber industry has, moreover, developed strategic plans to significantly expand small-scale growers. Secondly, the case study was also selected because small-scale growers compete with both company plantations and medium-large farmers. Finally, the case study was chosen because of the complex logistics required to co-ordinate large volumes of this semi-perishable raw commodity in a continuous processing arrangement.

The data for Sappi-Saicor are located at the company's headquarters in Umkomaas, KwaZulu-Natal. The data for Sappi Forest Division were acquired from Forestry Economic Services, in Pietermaritzburg, KwaZulu-Natal and Johannesburg, as well as, the head office of Sappi Forest division in Pietermaritzburg, KwaZulu-Natal. Further comparative data, including the weighted average regional and national figures were provided by Forestry Economic Services and the Forest Owners Association located in Johannesburg. Finally, the data for Project Grow farmers have been developed by the Sappi Forest division in Pietermaritzburg, in conjunction with the Lima Rural Development Foundation, also located in Pietermaritzburg. The Sappi case study data were collected on a number of field trips that were conducted between June and December 2001. The data can be, largely, be classified as qualitative although the cost data, over time, can be considered to include quantitative properties.

## 5. SAPPI-SAICCOR TIMBER SUPPLY-PROCESSING OPERATION

The South African forestry industry is an important player in the South African economy. This industry consists of two primary segments, namely, the growing of timber that falls into the agricultural sector and the processing of timber that falls into the manufacturing sector. In 2000/1 the timber industry contributed a total of 2%, 8% and 9% of the total national, agricultural and manufacturing gross domestic product respectively, as well as, generated a trade surplus of R3.3 billion, or 8% of South African exports. In the same period the forestry sector employed 135 000 people that provided for the support of over two million dependants and the estimated linkages effect generated by the industry would suggest a total employment potential of 500 000 people.

### 5.1 The company

Sappi-Saicor, acquired by Sappi Limited in 1988, is situated at Umkomaas on the south coast of KwaZulu-Natal and is a Sappi Limited company in the Sappi Forests Products division. Sappi-Saiccort is one of the world's leading producers of rayon grade dissolving wood pulp. The company, that currently employs a 1 000 people, was founded as a joint venture in 1953 and commenced production in 1955. Sappi-Saiccort production has increased from 40 000 tons in 1956 to the current level of 560 000 tons in 2001 with a current capacity of 1 600 tons of pulp per day that requires the processing of some 6 000 tons of timber. Sappi-Saiccort performance in the period 2000/1 indicates the company generated sales of R2.85 billion, contributed some R1.16 billion to operating profits out of net operating assets of R1.32 billion (current cost > R5 billion) and achieved a return on operating assets of 88%.



Sappi-Saiccor exports over 99% of products to customers in Western Europe, the Americas and the Far East.

## 5.2 The growers

Three principal categories of grower supply timber to the Sappi-Saiccor mill. These growers include the plantations of the Sappi Forest division, medium to large contract growers and a managed smallholder<sup>3</sup> scheme. Sappi Forest Division oversees the production and delivery of all timber to the Sappi-Saiccor mill. Sappi Forest, as a grower, owns and manages 500 000 hectares of plantations in Southern Africa that primarily grow eucalyptus and softwoods. The forestry division consists of the regional growing operations in South Africa that include Natal, Zululand, the Highveld and the Lowveld. The second category of grower consists of medium to large-scale contracted farmers. This category of farmer can generally be classified in terms of a medium to large size family farm with an area under timber in excess of fifty hectares. These farmers are generally involved in a number of other agricultural sectors including timber, sugarcane, tea and fruit. These growers are largely autonomous with respect to the growing of timber but the felling and delivery operations are controlled and co-ordinated by Sappi Forest Division. The third category of grower includes managed small-scale farmers incorporated in Sappi's Project Grow program. This category of grower, occupying an average of 0.6 hectares each, is, mostly located within a one hundred kilometre radius of the company mill. Project Grow is a tree-farming scheme that has the objective of converting rural subsistence farmers into emerging commercial operations. This project was launched in 1983 by Sappi Forests, the Gencor Development Fund and the KwaZulu Department of Agriculture and Forestry with a view to developing viable small-scale timber operations in rural KwaZulu-Natal. Since 1989, Sappi Forest division has contracted out the management of this project to a rural development organisation called Lima which is a non-government organisation registered under Section 21.

The Sappi Project Grow arrangement provides small-scale farmers with financial assistance, seedlings, technical advice and a guaranteed market. Sappi Forest provides an interest free loan of up to a maximum of R2 700, calculated on a per hectare basis, for farmers to establish trees where all contracts have the approval of the local tribal authority. Thereafter, advances are paid out to the farmer for completed certified work over the growing period of the trees to ensure that operations are funded over the growing cycle. The Lima extension officers visit the growers frequently and

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<sup>3</sup> *Sappi Limited (Dr John Job) proposed a future timber small-holder article.*

Sappi Forest Division, if requested, may also assist with technical advice and negotiations with contractors. A majority of the small-scale farm workforce is made up by female household members where many of the men are migrant workers. At the time of harvesting Sappi Forest buys the timber from the farmers at a market related price less the advances paid out during the growing period.

### 5.3 Organisation structure of timber supply

The continuous production of dissolving pulp by Sappi-Saiccor requires a detailed level of co-ordination to synchronise the high cost processing facilities with a large range of growers that are geographically dispersed. The co-ordination of timber supply, illustrated in Table 1, indicates the company's choice of governance forms on a continuum of structures suggested by Petersen & Wysocki (1997, 1998). The company co-ordinates 50% of timber supply by way of the fully integrated company plantations and 50% by way of a detailed specification contracting arrangement that allows Sappi to control the growing-felling of contracted timber operations. The organisation structure to co-ordinate timber supply, thus, incorporates a combination of full integration and specification contracting.

Table 1: Organisation structure: Grower-processor

Actual structure	Spot market	Specification contracting (50%)	Strategic alliance	Formal co-operation	Full vertical integration (50%)
Level of managed co-ordination	0%	Low	Intermediate	Intermediate/High	High
Governance form		1. Contract Growers			2. Company Estates

Source: Petersen & Wysocki (1997, 1998).

### 5.4 Land tenure

The growers in the Sappi-Saiccor timber supply operations have various categories of land tenure arrangements. The company holds freehold title to its timber plantations, as do the medium-large growers in the supply chain. The land tenure governing small-scale farm production is largely regulated by communal tenure legislation implemented and controlled by tribal authorities. The Tribal authorities have access to the land as defined by the Proclamation R188 of 1969 where land access is usually by virtue of membership to a community and not through sale, lease or rent. Only men are entitled to inherit land rights and individuals do not own their residential and arable allotments but rather are allowed the right of

occupation and cultivation as stipulated by the tribal authorities (Klug, 1996).

## **5.5 Supplier contract**

All suppliers must enter into a timber purchasing agreement with Sappi Forests (Pty) Limited. The purchasing agreement specifies the exact location of the grower as well as the commencement and duration of the relationship. Variations of the agreement can include a financing arrangement that separately specifies the related conditions. Project Grow farmers are co-ordinated by way of a different version of the timber supply contract that accommodates communal land tenure and tribal authority requirements. The basic timber supply agreement indicates the price that will be paid for a specified total tonnage to be delivered to the mill during the period of the contract. Finally, the supplier must adhere to quality specifications and obtain the necessary permits, license or statutory authority from the Department of Water Affairs and Forestry, the National or Provincial Environmental Authority and the Department of Agriculture.

## **5.6 The transaction characteristics of the supply chain**

The interface between growers and the company mill, with respect to the continuous supply of large volumes of timber, generates a unique set of transaction characteristics. The actual Sappi-Saiccor timber supply transaction characteristics, illustrated in Table 2, were developed for the period 2000/1.

### ***5.6.1 Transaction frequency***

High levels of delivery frequency involve the continuous supply of 6 000 tons of timber per day by way of 125 road-rail trucks. In 2000/1 a total of 46 669 deliveries were incurred to deliver 1.48 million tons of eucalyptus and 174 317 tons of wattle. The delivery frequency-schedule is largely controlled by the Sappi-Saiccor timber logistics department. On the basis of this volume of supply the transaction characteristic of frequency has been classified as intermediate-high

### ***5.6.2 Asset specificity***

The net operating assets employed for the year 2000/1 was valued at R1.3 billion on a historical cost basis that translates to a current replacement cost of approximately R5 billion. These assets are highly specific and have a low opportunity cost outside the timber industry. The assets, moreover, are

relatively immovable and are also site specific as they have been located in close proximity to certain suppliers, harbour as well as rail and road facilities. The factory assets also demonstrate high levels of asset specificity as a result of the need for the synchronisation of a continuous processing operation. The high levels of co-ordination are further elevated by the perishable nature of the semi-processed raw commodity, namely, wood chips. Conversely, the asset specificity of the contracted growers is much lower. The medium-large growers are, mostly, also involved in the production of other commodities and their assets-equipment are of a general farming nature. The micro growers own very few assets and contract out for activities that require the use of capital inputs.

### *5.6.3 Uncertainty of supply*

The uncertainty of supply has, historically, been relatively low due to a number of factors. Firstly, the uncertainty of supply has been reduced by the monopolistic nature of the timber industry where Sappi Limited is a major player. Secondly, the company estates have, historically, produced more than 50% of the timber processed by Sappi-Saiccor and uncertainty of supply was further reduced by the site specificity of many growers who are located within a 150 kilometre radius of the Saiccor Mill. Thirdly, uncertainty is reduced by the long-term nature of timber production. Sappi Forest division is, in this regard, able to manipulate the supply of timber according to annual mill requirements and standing timber can, therefore, be felled if required or maintained until a future time when it is required. The economic viability of the standing timber is not affected due to the annual growth rate of this commodity. Finally, in recent times, the reduced demand for dissolving pulp (25%) has further decreased the uncertainty of supply because the company still controls the original contracted volume of supply that, temporarily, exceeds processing requirements.

Table 2: Timber supply transaction characteristics

Transaction characteristic	Sappi-Saiccor
<b>1. General</b>	
Types of Growers	Estate, Large, Medium, Small, Micro
Hectares	> 500 000 hectares
<b>2. Frequency</b>	High
Tonnage Chipped	1.66 million tons
Number of Deliveries	46 669
Administration	5.3 tons/transaction
<b>3. Asset Specificity</b>	High
Co-ordination Level	12 months/year/24 hrs /day 7 days/week road-rail, wood chips perishable, mill requirement 6 000 tons/day
Value of Estates	> R3.8 billion (net operating assets)
Value of Plant	> R5 billion (replacement cost)
<b>4. Uncertainty</b>	Low-Moderate
Company Estates	Legislation, environmental issues, cost of inputs, physical variables, land constraints
Medium-large Growers	Timber Prices, physical variables, limited additional land, water cost, environmental
Small-scale Growers	Different time horizons, land tenure, cost of inputs, legislation, lack of access, moral hazard, theft
Processing	High Degree of leverage
Downstream	Volatile markets, changing nature of industry > high uncertainty

A number of factors, however, contribute towards higher levels of timber supply uncertainty. Firstly, uncertainty is partially a function of asset specificity and the Sappi-Saiccor operation demonstrates high levels of this transaction characteristic. Secondly, the National Water Act of 1998, in conjunction with other legislation, environmental concerns and the inefficiency of local-national structures, has increased the difficulty of obtaining water use licenses. Other factors increasing uncertainty include labour market legislation, a deterioration in infrastructure and services, a reduction in government research, the impact of AIDS and the future cost of transport, capital equipment and insurance. Finally, additional factors that contribute to increased supply chain uncertainty include the different time horizons of the growers versus the mill, the problems surrounding the land tenure issue, the gender factor and the deteriorating security situation in many of the rural areas. On the basis, however, of the current historical records this study concludes that the level of supply uncertainty can be classified as low to intermediate. Should Sappi Limited divest out of the timber growing industry, as has been suggested, the projected level of supply uncertainty is likely to increase.

## 6. RESEARCH QUESTION ONE

The objective of this section is to test, whether or not, the actual contract-transaction characteristics of the Sappi-Saiccor timber supply-processing operations influence the choice of governance form required to co-ordinate the respective activities.

### 6.1. Matching transaction characteristics and structure

The process of matching a set of transaction characteristics with the optimal governance is a central tenet of transaction cost theory. Organisations that have transaction characteristics that reflect high levels of asset specificity, combined with the need to carefully co-ordinate a complex input-output function, require higher levels of managed co-ordination than the open market mechanisms (Williamson, 1981, 1996, 2000; Petersen & Wysocki, 1997, 1998). The matching of transaction characteristics and organisation structure can also be approached from a contracting theory perspective. Contract theory suggests that, given a certain level of uncertainty, transactions characteristics that are both infrequent-occasional and display low levels of asset specificity are best co-ordinated by a classical set of contracting conditions. Conversely, conditions that include a high level of frequency-asset specificity, combined with some measure of uncertainty, are best matched by relational contracting. The contract conditions, in particular, that influence its structure include the ability to walk away from the contract, the availability of substitutes, the degree of identification of the parties, the duration of the contract, the level of ex ante control and ex post importance, the level of shared information and the ability to enforce the contract (Williamson, 1975, 1981, 1986; Petersen & Wysocki, 1997, 1998).

In Table 3 the actual transaction (2) and contract characteristics (3) of the Sappi-Saiccor timber supply operation are matched with the optimal governance form. The actual governance form (1) of the timber supply operation is included for comparative purposes and demonstrates that co-ordination is achieved by a combination of specification contracting for 50% of supply and full vertical integration for 50%. The actual transaction characteristics (2) indicate a high level of frequency-asset specificity and a low-intermediate level of uncertainty. The optimal governance structure to accommodate these characteristics, on the basis of transaction cost theory, would suggest that the characteristic of uncertainty would be best matched with specification contracting whilst frequency-asset specificity requires higher levels of managed co-ordination. Similarly, plotting the actual contract characteristics (3) would appear to suggest that the conditions match a relational rather than a classical contract structure.

Table 3: Matching transaction characteristics with the level of managed control

Vertical co-ordination continuum	Spot market	Specification contracting	Strategic alliance	Formal co-operation	Full vertical integration
1. Sappi-Saiccor structure		50%			50%
2. Transaction characteristics	Low	Low-Intermediate	Intermediate	Intermed-High	High
Frequency					Saiccor = 46669
Asset specificity					Saiccor = R5 bill
Uncertainty		Saiccor			
3. Contract characteristics	Classical	Classical-Neo-classical	Neo-classical	Neo-class-Relational	Relational
Level of control	Low/external	Higher/external	Saiccor 50%	Hierarchy	Saiccor 50%
Ability to walk away	High	Saiccor 50%	Less	Low	Saiccor 50%
Substitutes	Yes	Lower level	Less	No	Saiccor 100 %
Parties have own identity	Yes	Saiccor 50%	Yes	No	Saiccor 50%
Duration	Short	Longer	Saiccor 50%	Long	Saiccor 50%
Ex ante control	High	Lower	No	No	No
Ex post importance	Low	High	Saiccor 100%	High	High
Information shared	Low	Higher	Saiccor 100%	High	Extensive
Enforcement	Legal	Legal-complex	Saiccor 50%	Hierarchy	Saiccor 50%

Source: Williamson (1975, 1981, 1986) and Petersen & Wysocki, (1997, 1998).

## 6.2 Conclusion: Research Question One

The actual transaction-contract characteristics appear to suggest an optimum governance form that ranges between specification contracting and full vertical integration. On the basis of the transaction characteristics of frequency-asset specificity, as well as, the relational nature of the contract characteristics, this structure would appear to be weighted towards higher levels of managed co-ordination than specification contracting. The actual Saiccor governance structure, in support of the suggested optimal structure, is made up by full vertical integration (50%) and specification contracting (50%) but appears to lean more towards specification contracting than the optimal form suggested by transaction cost theory. This study agrees with a body of literature that concludes that the spot market is unlikely to be as

synchronised as contracting with respect to ensuring the continuous supply of a uniform quality raw commodity (Glover, 1984; Kilmer, 1986; Glover, 1994; Mahoney, 1992; Hennessy, 1996; Azzam, 1996). On the basis of the results, this study suggests that the transaction characteristics of the grower-processor supply chain have influenced the minimum, rather than maximum, level of managed co-ordination. These results support the theoretical framework that has been developed in Section Three and confirm the overwhelming empirical evidence of this relationship as demonstrated by the literature (Masten, 1996; Williamson, 2000).

## 7. RESEARCH QUESTION TWO

The objective of this section is to test, whether or not, contracted small-scale farmers in an agribusiness supply relationship generate a proportionally larger volume of transactions than larger suppliers. Grower transactions in the timber supply chain include start-up costs, technical advice, the use of inputs, cane supply-delivery transactions and the administration of the suppliers in the company's financial accounting system.

### 7.1 Start-up transactions

A number of transactions are required to register a timber purchase agreement with the prospective contract grower. The process, moreover, only commences when the prospective farmer is in possession of a water license. Some ten transactions are incurred by Sappi Forest in order to register a standard contract. The evaluation of the application is initially done by the project manager before being further assessed by the regional project manager, the resource manager, the contracts manager, the logistics manager and the environmental manager. Finally, the contracts manager will forward the agreement pack to the fibre supply manager who will direct it to the managing director, Sappi Board, for approval. The Project Grow micro farmers generate an incremental twenty transactions because they are assisted right through the process whereas larger farmers self establish their facilities, legality and water license. The incremental transaction cost of smallholder contract registration is incurred because this category of grower is assisted with respect to obtaining a water license, securing the permission of tribal-local authorities and the recording of their plots on a geographical positioning system.

### 7.2 Planting and growing transactions



Smallholder growing transactions, illustrated in Table 4, are incurred as a result of training requirements, technical inputs, transport-delivery of seedlings, and financing requirements.

Table 4: Project Grow: Transaction volume

Year	Cumulative farmers	Cumulative hectares	Project Grow: Transaction per farmers per year	Project Grow: Transactions per hectare per year	Medium-Large transactions per hectare per year
1991	718	417.8	4	6.9	< 1
1992	1072	560.9	3.6	6.8	< 1
1993	1315	693.8	3.0	5.7	< 1
1994	1549	828	2.8	5.2	< 1
1995	2098	1040	3.1	6.4	< 1
1996	2876	1449.7	3.3	6.5	< 1
1997	3532	1934.2	2.9	5.3	< 1
1998	4394	2537.2	2.6	4.4	< 1
1999	5158	3075.5	2.3	3.9	< 1
2000	6243	3648.7	2.3	3.9	< 1
2001	7100	4223.6	2.2	3.7	< 1

Medium and larger farmers are largely autonomous with respect to the growing of timber. Sappi Forest division is available for consultation and the fibre supply department, in particular, normally physically evaluates every contracted timber on an annual basis. Conversely, the contracted small-scale growers generated an average of 3.7 transactions per hectare for the year 2000/1. Each smallholder is visited at least twice per year and this increases to six transactions in the planting phase. Fertiliser and chemicals are also dispensed from five different locations in the Project Grow area. The number of planting-growing transactions per farmer-hectare has decreased because the average age of the plantations has increased. By contrast, the number of transactions per hectare per year for medium-large growers is less than one illustrating the increased cost of dealing with micro growers.

### 7.3 Felling-delivery transactions

Project Grow farmers generate incremental transaction cost in the harvesting operation because of the high level of Lima supervision involved. Lima is paid a fixed fee per ton, as part of their annual contract, to manage the harvesting and transport of Project Grow timber. The incremental level of transaction cost occurs because of the need to help farmers contract with harvesting-transport agents and to ensure that the necessary documentation is facilitated. Lima manages the entire felling-transporting process and ensures that the selected growers supply, and are

paid for, the correct volume of timber and that the necessary access roads are available. By contrast, medium and large-scale farmers, largely, do not need assistance from Sappi Forest for this activity and engage and pay for their own contracted services.

#### 7.4 Administration transaction cost

A sample of growers harvesting-remittance administration transactions have been recorded in the Sappi Forest accounting system (TCS) for the year ended September 2000. A record of accounting transactions generated versus timber delivered is listed in Table 5. The transaction cost of administering grower records is reflected in terms of the number of accounting entries that are generated for the tonnage delivered.

Table 5: Grower accounting transactions

Grower name	Classification of grower	Tonnage delivered	Accounting transactions	Tons per transaction
Kevard	Small-medium	5633.65	249+249=498	11.31
P Hayter	Small-medium	7487.1	228+228=456	16.41
Project Grow	Micro	12805.31	3301	<3.87
Sappi Braemar	Medium-large	26841.35	740+3700=4440	6.04
Sappi Sutton	Large	91258.9	3103+15515=18618	4.90
Total		144026	27313	5.3

Project Grow farmers appear to generate an incremental administration cost of between 26% and 56% in the Sappi Forest TCS system compared to the Sappi Forest estates of Braemar and Sutton. The incremental cost of Project Grow farmers, however, is between 282% and 424% respectively for the contracted medium size growers, namely, Kevard Estates and P Hayter.

#### 7.5 Conclusion: Research Question Two

The results of this section suggest small-scale growers generate higher levels of transactions cost than larger suppliers. The primary reason for the incremental level of transaction cost is caused by differential levels of start-up costs, growing-felling-delivery costs and the administration of growers' affairs. Medium to large contracted growers, largely, self develop their capacity to operate as Timber growers whereas the development of the Project Grow program has cost Sappi Forest division in excess of R10 million in the period 1989-2001. This project, moreover, has required nearly a decade of committed inputs and periodic payments have been made to the micro growers to ensure the planting and maintenance of woodlots. Smaller growers also generate incremental farm visits whereas larger growers,

largely, maintain their own timber and are only visited on an *ad hoc* basis by Sappi Forest division. Larger growers are also responsible for the felling and transport of their timber to Sappi-Saiccor whereas Lima arranges these operations for Project Grow farmers. Finally, the administration transaction cost of small-scale farmers appears to be later than larger growers because of the smaller volume of deliveries allied to the greater use of company inputs and the administration of the micro financing arrangements.

## 8. RESEARCH QUESTION THREE

The objective of this section of the case study is to test, whether or not, contracted small-scale growers in the Sappi-Saiccor timber supply operations effectively compete, in terms of cost efficiency, against medium and large growers.

### 8.2 The grower sample

A range of eucalyptus growers have been selected in order to evaluate the comparative performance of company estates compared to private growers, small-scale farmers and provincial and national statistics. The company estates include the Sappi Forest regions of Umkomaas and Richmond. Data. The cost data used is the result of a benchmarking exercise conducted between 1997 and 2001. The cost data has been restated in terms of 1999 prices and averaged. The commercial growers include the results of a workshop held in May 2001 where the results of 61 000 hectares of farmland were consolidated. The Project Grow small-scale farmer cost data is the result of an analysis of the performance of 98 farmers between 1991 and 2001. Lastly, general data for KwaZulu-Natal and South Africa, also restated in terms of 1999 prices, have been included for comparative purposes. The growers all supply the Saiccor Mill and are located within a 100 kilometre radius of this processing unit.

### 8.3 Grower performance

The data comparing the grower performance is displayed in Table 6. Ignoring revenue received, and focusing entirely on cost, the grower results indicate that contracted medium-large growers are the most competitive category of farmer. The performance of the Project Grow farmers, although less efficient than larger growers, appears to be competitive with the Sappi plantations of Umkomaas and Richmond. All the Sappi-Saiccor growers, moreover, appear to grow timber at less cost than the provincial and national statistics for eucalyptus production.

Table 6: Comparative grower performance\*

Grower cost and Revenue data	Umko-maas <sup>1</sup>	Richmond <sup>2</sup>	Med-Large <sup>3</sup>	Project Grow <sup>4</sup>	Natal <sup>5</sup>	South Africa <sup>6</sup>
Mean annual increment	12.90	13.10	19.15	11.00	13.80	14.08
Planned age at clear-felling	10.00	10.00	8.9	9.1	9.3	9.7
Actual tons	99683	219531	569115	4583	1554823	4322634
	R/ton	R/ton	R/ton	R/ton	R/ton	R/ton
Establishment	8.19	11.01	9.31		12.03	14.43
Tending	11.07	7.58	8.92		12.59	12.33
Forest protection	23.08	20.57	11.15		18.33	18.11
Harvesting	39.04	38.83	42.27		40.91	38.46
Transport	50.33	55.99	43.99		58.14	61.66
Operating cost	131.71	133.98	115.64	131.00	142.00	141.99
Overheads	39.13	35.33	30.70	36.00	45.51	44.85
Total production cost	170.84	169.31	146.34	167.00	187.51	186.84

*Notes:*

\* excludes interest levied on R10 million.

<sup>1</sup> & <sup>2</sup> Average cost for 1997-2000 at 1999 prices.

<sup>3</sup> Results of May 2001 Workshop covering 61 000 hectares. Prices restated to 1999.

<sup>4</sup> Results for 98 Project Grow farmers within a 50 km radius of Saiccor between 1989-2001.

<sup>5</sup> & <sup>6</sup> Results for 1999 calendar year.

Contracted medium-large growers' operating costs are some 12.2% to 13.6% below Sappi Plantation costs and 18.2% to 18.5% below the regional and national average largely because of lower forest protection costs, competitive tending costs and lower overhead costs. Contracted medium-large farmers reflect overhead costs that are 13.1% to 21.5% lower than Sappi Plantations and 31.5% to 32.5% lower than the regional and national averages. The principal reason for the competitive overhead cost structure of medium-large growers is because many services-facilities are contracted out rather than internalised like the Sappi plantations. Project Grow overhead costs; by contrast, appear to be as high as the Sappi plantations, despite the fact that a majority of forestry services-facilities are contracted for. On the basis of the results, however, Project Grow production performance is between 1.1-2.3% more efficient than the Sappi plantations and 10.6% more efficient than the regional-national averages suggesting that this category of grower is at least competitive with the other growers.

## 9. CONTRACT FARMING IN SOUTHERN AFRICA: *QUO VADIS?*

A series of general proposals are developed in this section that can be incorporated in the design of small-scale contracting projects. The proposals have been formulated on the basis of the lessons of Section Two, the results of the case studies and, in certain instances, transaction cost theory. The key issue is to establish the types of institutions that that can help ensure small-scale farmers in Southern Africa benefit from the globalisation and industrialisation of agriculture. Kirsten & Sartorius (2002) suggest the problems of smallholder contract farming in developing countries can be summarised, largely, in terms of two issues, namely, the enforcement of contracts and the high level of transaction cost of dealing with small-scale farmers. The following proposals are listed with respect to the design of smallholder contracting arrangements.

- Transaction cost theory suggests that the choice of a co-ordination structure should be guided by the contractual-transaction characteristics and logistics of the activities concerned. The case study illustrates how the transaction characteristic-contract characteristics of a timber growing operation can be used to question the suitability of the governance form. An understanding, moreover, of the relationship between commodity characteristics-logistics and transaction-contract characteristics can further assist the designer to select the optimum co-ordination structure (Delgado, 1999). The company, at the outset, can evaluate the transaction frequency of visits, inputs and farmer deliveries with the distance from the processor, the nature of the roads and the available communication system. The timber case study, in particular, illustrates the increased level of transaction cost generated by large numbers of micro farmers that are spatially dispersed and it is suggested that minimum plot sizes should be incorporated in small-scale farm programs.
- The careful screening-identification of future partners is a key success factor. Farmers who have a record of previous interaction with agribusiness appear to be more successful contracting partners (Levin, 1988; Porter & Phillips-Howard, 1997a, 1997b). The case study developed a data bank of farmer details for each prospective new farmer but appears to have selected a majority of the applicants regardless of their characteristics-entrepreneurial ability.
- An understanding of how the historical legacies have influenced property rights economics, policy and the institutional environment are important success factors that can contribute towards a better

understanding of opportunities to customise the future transaction cost of contracting with large numbers of small-scale farmers (Gittinger, 1982; Williamson, 2000). Agribusiness in South Africa has the power to lobby for changes in regulation to reduce the transaction cost of contracting in the form of subsidy-tax relief or amended property rights regulation. Legislation, in particular, that could be amended includes land tenure, the water act, the role of tribal authorities, the labour act, the rights of the female farmer, the national heritage acts and the conservation laws. The company can also attempt to influence improved property right economics by employing tribal authorities to enforce the contractual conditions.

- Gow *et al* (2000) have demonstrated that contract innovations, or interlocking factors, can contribute towards reduced transaction cost. The case study also supports the contention that contract enforcement often relies on the mutual interests of the parties rather than through the judicial system (Williams, 1985; Little & Watts, 1994; Rehber, 1998). Factors that can influence interlocking conditions include the administration of growers' affairs, the company acting as banker, the supply of inputs and high levels of involvement in local communities. The timber industry case study demonstrates the interlocking nature of a contract that provides financial assistance and/or part payment for certain phases in the growing process. Colchao (1999) suggests the agribusiness partner can successfully induce contract enforcement by acting as a banker to the contracted farmer. The company, moreover, is able to compete in the banking sector as a result of better information combined with the ability to enforce contracts in alternate ways. The company, in this regard, could attempt to own-control the assets and technology of the grower, as well as, play a role in the financing of these assets (Colchao, 1999). Finally, the use of a renewable contract is also suggested as a cost effective way to achieve enforcement. The company, in this instance, has the option of not renewing the contract in the case of defaulting suppliers (Key & Runsten, 1999).
- Trust based relationships can be a dominant interlocking factor that can contribute to contract enforcement. (Fafchamps & Minten, 1999; Tregurtha & Vink, 1999). The development of trust is especially important given South Africa's history of colonialism and apartheid (Porter & Phillips-Howard, 1997a, 1997b). The integrator can inculcate trust as a measure to reduce transaction cost by understanding the dynamics of trust, as well as, installing measures to build trust. Trust can be quantitatively measured using a field survey technique. Trust,

moreover, can be positively influenced by ensuring that company interface officers are local, that grower information is conveyed in the local language of the community (Porter & Phillips-Howard, 1997a, 1997b) and as a result of ensuring grower representation in all stages of the decision making process (Delgado, 1999).

- The creation of mutual asset specificity reduces uncertainty and raises the exit costs of both sets of contracting partners. The case study indicates that the company partner is confronted with significantly higher levels of asset specificity than the contracted farmers. Mutual asset specificity can be pursued by way of farmers associations undertaking the purchase of industry specific capital inputs. The company can also act as a facilitator of finance to increase the interlocking nature of the arrangement. Finally, the company can examine other ways of influencing mutual asset specificity by way of configuring the technology of the grower-processor operations in such a way that only the company possesses the technology to perform specific activities in the supply operation (Rehber, 1998).
- The careful assessment and treatment of start-up cost is a key project evaluation procedure. In many instances, the company must commit long-term resources to establish small-scale farmer projects. Sappi Limited, for instance, has invested ten years and R10 million to establish small-scale tree farming in KwaZulu-Natal. Start-up cost will, generally, be higher if non-traditional crops are being introduced because of the need to train farmers and introduce complex technology. The start-up cost, moreover, can include the linking of small-scale farmers to institutions like banks, insurance companies and suppliers. The assessment of start-up cost, moreover, should form the basis of lobbying for government subsidy-relief or, alternatively, to charge back this amount to a farmers association or the individual farmers. If the contracted farmers are unable to amortise start-up cost, the viability of the operation should be questioned from the outset.
- The design of contracting structures can consider developing a commodity characteristics profile to establish, whether or not, the supply of the commodity is suited to a contracting arrangement. Crops, in particular, that are labour intensive in the growing operation and display economies of scale in processing, are more suited to smallholder contracting (Delgado, 1999). The case study in the timber industry did not demonstrate particular growing economies for smallholder family labour yet these growers, mostly, matched larger growers with respect to the cost efficiency of

production. Finally, the commodity characteristics can be used as a basis to select technology, which has also been cited as a key factor influencing project failure (Gittinger, 1982). The company, in this respect, sometimes has a choice of technology alternatives and it has been suggested that, if a labour intensive option does not detract from performance, this option should be chosen in developing countries (Watts, 1994).

- Recurrent small farmer transaction cost can be avoided by contracting with a larger entity like a farmers association who undertakes the administration of its members' interests. In many instances contract enforcement is difficult to ensure through the legal process and the logic of contracting with large numbers of smallholders is a questionable issue (Runsten & Key, 1996; Rehber, 1998; Sofranko *et al*, 2000). The company can also influence the efficiency of the farmers association by acquiring representation in the management structure, by ensuring this body maintains records, has no political agenda, is limited in size and that it contains sufficient professional management.
- The use of activity based costing systems can reduce transaction cost. Firstly, this system can identify the different cost elements and secondly, if necessary, be used as a basis to charge back incremental cost to the contracted farmer. The case study clearly illustrated that transaction cost could be broken down into the cost elements of start-up cost, planting-growing transactions, harvest-delivery transactions and administration cost. The timber case study clearly indicates the cost to the company of purchasing timber from small-scale suppliers is higher than medium-large growers and the company plantations. Finally, activity based costing can be used as a basis to highlight the incremental cost of recurring smallholder transactions with a view to lobbying the South African government for assistance-relief.
- The company can favourably influence contract enforcement and reduce transaction cost by establishing whether or not a competitive fresh market for the contracted commodity exists and then taking the necessary steps to create interlocking factors. The occasional opportunistic sale of timber in rural KwaZulu-Natal highlights this problem that was well documented in the Mexican tomato-growing sector (Runsten & Key, 1996). The company can reduce unauthorised sales by locating outside the area of the competitive market, by securing an agreement with competitors and by paying market related prices. A long-term perspective on prices could contribute to locking contracted growers into a commodity and ensuring continuity of



supply in depressed conditions (Levin, 1988; Watts, 1994; Abbott, 1994).

- The role of the female farmer is especially important in many developing country contracting arrangements (Carney, 1988) and Gittinger (1982) suggests that a failure to understand the social environment is a prime cause of project failure. The case study suggests high levels of labour inputs are supplied by female household members. Agribusiness in South Africa can contribute towards the future role of the female farmer by securing legislation that ensures full representation-rights for the female farmer in communal tenure areas. It is also suggested that agribusiness payment for the commodity should be directed to the household member responsible for supply. The role of tribal authorities in communal areas will also need to be configured to promoting gender access in rural areas.

## 11. SUMMARY AND CONCLUSION

This study commenced by examining how small-scale farmers in developing countries face the threat of marginalisation as a result of the changing nature of the agricultural sector. The lessons of history, in many instances, also suggested reasons why smallholders have often been ignored in modern agricultural supply chains. Transaction cost theory then demonstrated a conceptual relationship that can be used to explain the choice of organisation structure with a view to incorporating this approach in the design of smallholder contracting arrangements. A case study was then chosen to test the research questions.

The results of the case study suggest that smallholders cannot be excluded from agricultural supply chains on the basis of the cost efficiency of production. The case study also demonstrated that the use of transaction cost theory could provide agribusiness management with additional insights and costing techniques to reduce transaction cost. Firstly, contract-transaction cost theory can be used to determine the optimum structure to co-ordinate raw commodity, as well as, question the suitability of the existing structures. Secondly, transaction cost theory allows management to approach cost management from a different perspective. Activity based costing, for instance, can be used to highlight differential cost that can be used as a basis to lobby for some form of policy or, alternatively, to charge back the incremental cost to the contracted party. The case study also demonstrated the high level of small-scale farmer transaction cost generated by managing large numbers of farmers who are, largely, unable to make

their own decisions. Small-scale grower supply models, one of the only potential sources of expanding timber supply, need to be developed in a more efficient manner than the Project Grow model. Project Grow farmers, for instance, could consider operating under the umbrella of a farmer's association. Finally, the paternalistic nature of the relationship between Sappi Forest, and Project Grow is unlikely to contribute towards the commercialisation of this category of grower. Ideally each grower should be entrepreneurial and a climate of free loans, combined with high levels of company inputs, is unlikely to develop this category of farmer.

This study appears to confirm the suggestion that a "fresh approach" can be adopted in the design of small farmer-agribusiness supply models. The suggestion that the organisation structure of modern supply chains is becoming increasingly important appears to be supported from both a theoretical and case study perspective. Clearly, supply chains with specific transaction characteristics demand different levels of managed co-ordination. The lessons of contracting history are also equally important and can be utilised to identify key issues and critical success factors to reduce transaction cost and the problems of contract enforcement. In conclusion, the economics of contracting suggest there is no particular economic rationale for the agribusiness partner to choose small-scale suppliers over larger growers despite the fact that smaller growers are competitive with larger growers. This assumption is especially likely if all the contracted parties are paid the same price and deliver the same level of quality. This being the case, it is likely that the state will have to promote the increased use of this institution. Alternatively, South African agribusiness would be required to take specific steps to make smallholder contracting an attractive source of raw commodity supply.

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