
Chapter 1 Introduction

Chapter 1 Introduction

1.1 The emergence of vertical coordination in the agro-food complex

The world economy at the beginning of the 21st century is increasingly global and integrated. Agribusiness firms are expanding their horizons and procurement networks to source raw materials and products all over the world. This heralds a new age for the agricultural sector and especially for local agribusiness firms which have to compete with powerful multinational firms in domestic and international markets.

As governments all over the world are diminishing their role in the marketing of agricultural products and consumers are posing new demands to the food system, supply chain management has emerged as a key performance area for agribusiness managers. Agribusiness managers have to find ways to realise new opportunities presented by consumer needs and fulfil functions previously performed by governments. Agribusiness is challenged to provide products that not only meet consumer needs, but to exceed their expectations in order to maintain and expand their market share. This is taking the agricultural sector beyond the traditional production, technology and product orientation to a service and quality orientation that encompasses customer and societal satisfactions such as environmentally and socially responsible production practices.

The globalisation of the world economy, consumer demands, social and ethical business and production practices and role of supply chains in this process, especially in the agricultural sector poses the very important question: What role and impact will supply chains have on agriculture and agribusiness?

International trade in processed agricultural, food and fresh products has grown rapidly over the last few decades (Unnevehr, 2000). Increasing product trade is driven partly by trade liberalisation such as the GATT on global scale and on regional level by agreements such as Mercosur and NAFTA. Market-oriented economic reforms is another driver which reduces cross-border distribution costs and trade barriers. Farmers in the developing world are linked to developed countries by profit-

seeking private sector firms. The growth in international trade is taking place against a background of an increasingly industrialised agricultural industry. The 1990's heralded a relatively rapid and intense agroindustrialisation in many low- and middle-income countries (Reardon and Barret, 2000, and Cook, Reardon, Barret and Cacho, 2001). Agriculture is still an important source of employment, economic growth and foreign exchange in many developing countries and also in South Africa. The causes and implications of the industrialisation process on these factors are important to the agricultural and agribusiness sector of South Africa.

Tom Urban coined the phrase 'the Industrialization of Agriculture' at the turn of the previous decade. The term 'agricultural industrialisation' is described as the trend towards economics of scale through the movement to larger production units and the increasing occurrence of vertical coordination and integration between the various stages of the food and fibre system i.e. the supply chain (Antonovitz, Buhr, and Liu, 1996). Boehlje (1996) defines industrialisation as the application of modern manufacturing, production, distribution and coordination methods to the food supply chain. Drabenstott (1995) identified the primary changes as a shift from food commodities to differentiated food products, and a shift from spot markets to more direct market channels, such as production contracts. The Council of Food, Agriculture and Resource Economics (in Sonka, 1995) defines the industrialisation of agriculture as the increasing concentration of farms and vertical coordination (contracting and integration) among the various stages of the food and fibre system. The emerging system is expected to be highly competitive in global markets, more efficient, more responsive to consumer demands, less dependent on government assistance, and more able to rapidly adopt new technologies.

The Reardon and Barret (2000) definition of industrialisation is generally accepted and will be adopted for this discussion: "(1) The growth of agroprocessing, distribution, and farm input provisions off-farm; (2) institutional and organisational change in the relation between agrofood firms and farms such as a marked increase in vertical coordination; (3) concomitant changes in the farm sector, such as the changes in product composition, technology, and sector and market structures." The industrialisation of agriculture is attributed to three general 'drivers of change' namely

the changes in consumer demand; changes in agricultural policy; and changes in the agricultural supply structure.

Consumer demand is probably the most important driver for change in agricultural and food supply chains. Food quality and assurance is increasingly important to the modern health conscious consumer. Recent food scares have also contributed heavily to the newfound consumer attention to the quality of food. (Boehlje, 2000; Drabenstott, 1995; Davis and Langham, 1995; and Verbeke and Viaene, 2000) This presents a significant opportunity to food and agricultural chains to establish a competitive position in the market. Consumers with expanded discretionary income are more discerning in their tastes and demand more convenience, variety, and added value as part of the product mix. Consumer value can be created by giving attention to quality and quality assurance, production processes, assortment width and depth, consumer service, product information, environmentally and socially responsible production practices and traceability. The result is a highly fragmented market on the consumer side where agribusiness is serving a large number of distinct niche markets. (Fearne and Hughes, 1999). The emergence of societal values like fair trade and environmental sustainability are also putting pressure on the food system as consumers increasingly demand these attributes. These trends are largely driven by Non Governmental Organisations (NGO's) in their role as societies' watchdogs. (IFAMA, 2002)

On the retail side a significant degree of concentration is taking place as multiples compete intensively for market share. The only market growth that the retailers can achieve is a result of increased consumer expenditure rather than new customers. This is due to the expansion of the food retail sector in the late 1980's and early 1990's into the markets of independent retailers (butchers, bakers and greengrocers). In response to the limited scope in physical market expansion and changing consumer demand retailer strategies have moved away from location and size dominance to product differentiation and own labels. (Fearne and Hughes, 1999)

Product differentiation is made possible by the advances in production, processing and information and communication technology (Downey, 1996). Biotechnology is used to induce two categories of characteristics namely lowering farm-level

production costs (e.g. pest resistance) and / or enhancing product quality (e.g. nutritional content, storage characteristics, product appearance). Information and Communication Technology provide numerous new opportunities for management and control systems. Electronic communication is nearly instantaneous and removes spatial barriers, enabling managers to monitor production, transportation, inventories, and consumer preferences very fast and accurately. The ability to measure more precisely and track product and processes more easily increases the accountability of each actor in the supply chain for their contribution to the final product (Downey, 1996).

Product differentiation was initially primarily based on processing technologies, quality of raw materials and chain efficiency through lowered costs. As consumer demands are getting more sophisticated (and intangible) supply chains have to utilise communication technology to assure and certify food safety and sustainability (natural and social) of production practises. Traceability, transparency and assurance are now key performance areas in supply chain management. These requirements from the consumers are forcing whole supply chains to invest in capital-intensive production, production management and information systems. Supply chains have to improve the coordination between the actors in order to produce a wider range of high quality differentiated products.

The deregulation of agriculture and agrofood trade is a worldwide phenomenon introduced by the Uruguay Round of Trade negotiations. Increasing liberalisation in world agricultural markets, as well as the range of domestic market reforms in developing countries, is a further impact on agricultural supply chains across the world. The liberalisation efforts, as well as the harmonisation of standards and the encouragement of foreign direct investment, present significant challenges to producers to participate in new marketing opportunities presented under the reforms (Stanton, 2000). Domestic market reforms boosted agricultural exports in general and provided opportunities for investment by global and regional companies in agribusiness in developing countries. The rapid increase of multinational firms in the agri-food sectors also led to increased concentration in the down-stream enterprises in the agri-food chain and contributed to significant changes in the organisation of the agri-food system.

Deregulation of the South African agricultural sector commenced in the 1980's. This process fundamentally changed the structure and the responsibilities of the actors in the sector. Farmers and agribusiness had to shoulder responsibilities and risks in agricultural markets (e.g. product distribution; quality and price control) that were previously fulfilled by government agencies. Various authors have recorded this process extensively (Van Zyl, Kirsten and Binswanger, 1996; Vink and Kirsten, 2000; and Bayley, 2000; amongst others). This process has not proven to be an easy one. The complexity of issues related to new marketing systems, institutions and relationships require innovative approaches and research programs.

Since 1994 the agricultural marketing boards and state trading organisations were abolished as part of the liberalisation process. These marketing boards used to direct the marketing functions in the marketing of agricultural produce to a greater or lesser degree. Farmers and the agribusiness sector therefore never had a direct responsibility in marketing their produce. When the marketing boards were abolished, producers had to devise and establish new institutional structures and arrangements to govern the marketing of food and fibre products to replace the functions and institutions of the marketing boards (Bayley, 2000; Vink and Kirsten, 2000). The next important influence resulted from the liberalisation of agricultural trade. South African farmers were exposed to international prices and competition in domestic markets and new opportunities on international markets. International food and agribusiness trends consequently became a reality to South African markets. The deregulation and liberalisation of the South African agricultural sector exposed farmers and agribusiness alike to international trends. These actors now have to be competitive in order to survive in domestic and international markets.

The last category of change drivers i.e. the change in the agricultural supply structure, is caused by higher price risk in the agricultural environment. This is partly due to deregulation and new consumer demands for differentiated and safe food products. The uncertainty concerning the nature of food quality and problems in detecting quality contributes to the risks in the agricultural sector. Farmers and agribusiness are seeking mechanisms to share and reduce the risks associated with price and product

uncertainty in the supply chain. (Hennessey, 1996; Boehlje, 1999; Boehlje, Akridge and Downey, 1995; Vink and Kirsten, 2000)

The drivers of change in marketing systems, which encourage the adoption of such a chain approach are summarised by Loader (1996) as:

1. Technological progress tends to accelerate structural change. Therefore the dynamics of (and relationships between) such systems are more important than conventional theories of equilibrium.
2. The world-wide return to the market as the focus of agricultural and food policies invites the study of interacting systems, their policies, the role of their organisations and the changes they are experiencing.
3. The globalisation of trade and the increasing internationalisation of economic and social exchange indicate that an approach, which summarises a whole chain of events, regardless of the border, is more appropriate than a narrow national study.
4. The concentration of capital in the agrofood industry and in distribution has revived interest in issues, such as price formation, market structure, institutional influences, the strategies and behaviour of market groups, and in particular the extent of integration in the market.
5. The marginal, yet incontestable role of agriculture in the economies of many developed countries means that, for these countries, an analysis of agriculture as a small if vital part of a larger system is more valid than simply looking at the problems faced by producers.
6. The cases in many countries where the non-integration of the production and marketing systems means that acceptable produce is not marketed and is either unused or inefficiently used.
7. The creative tension between agricultural production and final consumption. The agricultural producer tends to have a certain conception of product quality and quantity, in particular, which is not always shared by consumer groups.

Traditionally, the market-pricing mechanism (auction or spot market) was seen as the most important mechanism guiding the exchange of commodities in the agricultural network. Price and quality (standards and grade usually enforced by government) were the most important indicators directing the process of procuring a constant

supply of homogenous materials. Consumers respond quantitatively to retail prices, while processors interpret these signals and send modified signals to growers via grades and standards (Hennessy, 1996). Zuurbier and Trienekens (2000) describe the 'market-pricing mechanism' as discrete transactional exchanges. Each event is independent of all other dealings, as price alone determines whether the exchange will take place or not. The discretionary exchange is relatively adversarial as both the buyer and the seller attempt to achieve the best economical position through opportunistic or exploitative behaviour.

In spot market transactions, actors rely almost exclusively on a coordinating mechanism that is entirely or nearly entirely external to the exchange relationship. Neither of the parties can influence the price or generic standards and both must adhere to them if effective exchange is to occur. The parties can only withdraw from the transaction (and thus create a shortage of supply or demand) until the terms of the transaction (mostly price and product characteristics) are again satisfactory (Mansfield, 1992; and Peterson and Wysocki, 1997). Spot market transactions are therefore primarily concerned with price, quantity and quality as defined by the (usually limited) grading system. Given the emerging needs of consumers, price signals have thus become too 'fuzzy' to guide the growers in producing and delivering products that will meet these emerging needs (Hennessy, 1996). In contrast to discretionary transactions, relational exchanges are based on longer-term interactions involving repeated transactions¹. These relationships are defined as alliances, or value-adding partnerships, because each actor makes a substantial investment in developing the relationship. Relational exchanges may have many different organisational forms, developing over time from rather loose informal agreements to formal joint ventures. Relational exchanges assume a distribution of proprietary rights over more than one firm (Zuurbier and Trienekens, 2000). Hennessy (1996) uses the example of production contracts as 'crystal clear' mechanisms used to specify the genetics, feeding programmes, and management programmes in the production process. These specifications ensure the provision of a homogeneous product to meet tighter consumer expectations. Supply chains are therefore

¹ Zuurbier and Trienekens (2000) add that over time social interactions develop as discrete transactions. These social interactions smoothen price negotiations and communication in the transaction process.

collections of firms in a business network that cooperate and coordinate to add superior value to satisfy consumer needs.

Bowersox (1992) states the advantages of successful alliances or coordination in the supply chain as the following:

- Reduced cost through specialization
- Improved synergistic performance
- Increased information to support joint planning
- Enhanced customer service
- Reduced risk and uncertainty
- Shared creativity
- Competitive advantage

The Dutch School treats the supply chain, which consists of a series of relational exchanges, as a manageable entity within a broader defined network economy (Omta, 2002). This implies conscious interference in the way supply chains function as opposed to the concept of isolated and independent firms taking decisions based on price alone (Heijbroek, Nederhoed, and van Potten, 1994).

The concept of supply chain management can be defined as the collaboration among actors in a supply system, from the primary producer to the end-consumer, to better satisfy consumer wants and needs at lower costs. It is a process of bringing order to the system that produces, processes and distributes food and agricultural products to consumers. Supply chain management focuses on improving the efficiency and effectiveness of the system that cost effectively delivers a wide range of safe and desirable agricultural products. Supply chain collaboration is an integrative approach to planning and controlling the flow of materials, information and finances from the producers to the consumers by breaking down the barriers that exist between each of the links in the supply chain. Supply Chain Management is an integration of these activities through proven relationships between participants, to achieve a sustainable competitive advantage. (Downey, 1996; Van der Vorst, Beulens, de Wit and van Beek, 1998; and Handfield and Nichols, 1999) Supply chain management clearly

represents more than supply chain logistics. It also represents a complex but focussed set of activities to develop and sustain chain relationships.

1.2 Problem statement

The South African agricultural sector has to compete in a new environment as discussed earlier. This new environment was primarily the result of changes in policies, changes in the demand for agricultural products and changes in the supply of agricultural products. The competitiveness of the agricultural sector will determine the sustainability, profitability, survival and expansion of the sector in the emerging business environment.

The most basic notion of competitiveness is the ability of a firm to produce a commodity at a variable cost lower than the price of the commodity (Fafchamps, de Janvry and Sadoulet, 1995). This notion can be expanded to include the ability of firms to deliver these products to international markets at prices as good as, or better than other suppliers. In this process they should also be able to attract capital, land and labour resources from other economic activities (Freebairn, 1986; Van Rooyen, Esterhuizen and Doyer, 2000; and ABC, 2002).

The challenge to the South African agricultural sector is to achieve and maintain competitiveness in order to survive in the new competitive environment. The sector must achieve this while addressing societal issues such as social equity, environmental responsibility and ethical business practises. Porter (1998) notes that to sustain competitive advantage, firms must achieve more sophisticated competitive advantage over time through providing higher-quality products and services or producing more efficiently. To achieve competitive success, firms must possess a competitive advantage in the form of either lower costs or differentiated products that command premium prices. The firm should therefore have the ability to create and deliver value through cost leadership or differentiation. The key to value creation is based on the intimate knowledge of and rapid response to the complex nature of consumer demand (Ortmann, 2000).

The challenge of delivering value to the consumer at a competitive price is central to the notion of competitiveness. Agribusinesses are therefore challenged to create

superior value and achieve lower prices. In addressing this challenge, vertical coordination between agribusinesses is emerging as an important strategy to achieve domestic and international competitiveness (Hudson, 1990). The evolution of coordinating mechanisms could provide opportunities for individual firms and industries to enhance their competitiveness. This can be achieved by improving the ways to add value and address costs in the supply chain through more effective cooperation and vertical coordination (O’Keefe, 1999). This process of cooperation and coordination is also known as supply chain management. Supply chain management is a key performance area for agribusinesses that want to compete effectively. The competitiveness of a supply chain is based on the delivery of superior customer value at the lowest possible cost, or in other words, product differentiation and cost reduction (including transaction costs) through improved collaboration and coordination between actors in the supply network.

A supply chain is a complex entity consisting of several dimensions namely the product flow or activity dimension, information flow dimension, financial flow dimensions, incentive dimension and the governance dimension. The final dimension, that of governance, is the focus of this thesis. A governance structure (or institution) is the structure that sets the “rules of the game” which prohibit, permit or require certain actions (Gerrard, 2000). Governance structures are arrangements between economic agents in an attempt to decrease uncertainty and the costs of exchange and ownership (Ortmann, 2001). A continuum of governance structures are available to firms and are defined by Peterson, Wysocki and Harsh (2001) as spot/cash market, specifications contract, relation-based alliance, equity-based alliance and vertical coordination. Choosing a suitable governance structure is an important aspect of supply chain management, as this is the structure that facilitates the effective and efficient operation of the other supply chain dimensions. An efficient governance structure will therefore ensure an optimal flow of product, finances and information along the supply chain (from consumer to producer and *vice versa*) at lowest possible coordination, logistical and business cost to the participants. An efficient governance structure will enhance the competitiveness of the participants in the supply chain.

South African agribusinesses are still in the process of adapting to the deregulated business environment. In the process new alliances and relationships between firms

are being forged to manage the total supply chain. Governance of the supply chain is therefore critical for efficiency and consequently competitiveness. The problem for each individual supply chain is to find the most optimal governance structure. However, the knowledge and understanding amongst business leaders and academics on governance structures is still lacking in South Africa. This thesis is therefore addressing this shortcoming by asking the following questions: “Are South African agribusinesses changing they way in which transactions between actors in agricultural supply chains are governed in response to the deregulated, internationalised business environment?”; “Which governance structures are South African Agribusinesses adopting?”; and to a limited extent: “Why are they changing and adapting their governance structures?”

Motivation for the study

In order to understand the way the food system develops, agricultural economists need to understand the nature and development of vertical coordination between firms. It provides insight into appropriate directions for policy makers who wish to improve the functioning of agricultural markets through initiatives in areas such as regulation of the food system, and price and marketing reforms. Organisation structure and government policy have important implications for the strategic and competitive position of individual firms. Therefore, an understanding of governance structures and vertical coordination concepts is of commercial value to firms operating in the food system (Heilbron and Roberts, 1995).

Very little work has been done on governance structures and agribusiness in South Africa. Vink (2000:450) indicates that “...we seem to take the presence of the intermediate capital goods and processing industries for granted...” in his paper on agricultural policy research. Earlier work on agribusiness issues in South Africa includes papers by Berning and Potgieter (1996), Ortmann, (1998) and Esterhuizen and van Rooyen (1999). This thesis also contributes to two other research issues identified by Vink (2000) for the next decade namely structural and institutional issues. More specifically this thesis attempts to address the emergence of supply chain management in the agricultural and agribusiness sector. Very little work has been done on supply chain management issues in South Africa. This includes studies by Troskie and Goedecke (1998) and Troskie and Smit (1999) who analysed the

wheat industry from a supply chain perspective. Several cluster studies were commissioned by the Department of Trade and Industry in, amongst others, the wool, wheat and dairy sectors. In addition Van Rooyen, Esterhuizen and Doyer (2001) studied the interrelation of competitiveness of agricultural supply chains in the South African agrofood complex. Ortmann (2001) addresses the role of supply chains in promoting competitiveness in the agricultural industry and identifies research in agribusiness and value-adding supply chains as relevant research issues for agricultural economists. The research on linkages between firms mostly stems from the development discipline. Machete, Reardon and Donald (1997) address the linkages between small-scale farmers and the agrofood industry, and survey evidence in Southern Africa. Delgado (1999) address the possible institutional innovations for linking small-scale farmers to agribusiness from a theoretical perspective. Ortmann (2000) also addresses the linkages and the role of government institutions in these linkages between small-scale farmers and agribusiness from a theoretical perspective. Karaan (1999) analyses contracts between small-scale and large scale Diamond coast oyster growers from a transaction cost perspective and suggests appropriate contractual agreements to facilitate these transactions. Meissenheimer, Karaan, Vink and Tregurth (2001) discuss the impact of transaction costs in the wine supply chain and make suggestions to enhance the competitiveness of the wine industry by addressing these costs. Tregurth and Vink (1999) and Hardman, Darroch and Ortmann (2002) address the issue of trust in effective coordination between participants in supply chains. The only work done on the role governance of governance in South Africa was done by Karaan (1999) and, from a Southern African perspective, Delgado (1999). The goal of this thesis is therefore to expand on the South African body of knowledge on supply chain governance structures.

1.3 Framework of analysis

This study uses the constructivist paradigm as the dominant philosophy for scientific inquiry. This paradigm is discussed in Chapter 2 and was recently introduced into the agricultural economic enquiring system by Doyer and van Rooyen (2001). The aim of constructivist inquiry is understanding and reconstruction as opposed to positivist approach of explanation, prediction and control. Most agricultural economists use the positivist approach as the dominant research philosophy. The nature of knowledge in the positivist approach centres on the verification of hypotheses to establish facts or

laws. The constructivist approach attempts the individual reconstruction of knowledge by conceptualising the opinions of participants into a general consensus. The conventional positivist benchmarks of internal and external rigour in terms of the validity, reliability and objectivity are replaced by trustworthiness and authenticity of the subject matter and conclusions.

This study is primarily an exploratory study to observe and describe the phenomenon of changing governance structures in the South African agribusiness sector. In the qualitative research schools the reference framework of the researcher and the applied theory binds *a priori* hypotheses that has to be tested against data gathered specifically for this purpose. Because of this the most important problem presented by the quantitative research design is the exclusionary research design because of the difficulties encountered in quantifying some variables. The problem lies not only with the quantification of the variables, but also in the consideration of variables for their usefulness and applicability to the research question. A variable can be excluded because it is not included in the theoretical framework utilised for the study. The danger therefore exists that facts are only considered facts within some theoretical framework. (Denzin and Lincoln, 1994) A study on the evolution of governance structures is essentially an observation of human behaviour on an individual (or transaction) level, which is difficult to quantify. Coase (1998) also notes that quantification is still an ideal in New Institutional Economics, which is one of the most important theories to elucidate the choice of governance structures. A single theory is therefore not used as a point of reference for this study, instead a number of theories and observations are used as aids in interpreting and understanding observations. The research framework presented below is therefore a conglomerate of applicable theories which were identified and utilised to describe, explain and understand the phenomena observed in the research process. The *modus operandi* was not to use theories to evaluate observations (prove/disprove hypotheses), but to relate observations to possible theories that can explain the phenomenon under investigation.

The biggest danger in using the constructivist approach in combination with the case study methodology is misapprehension due to a lack of rigour in the research process. This challenge was addressed by four research strategies namely: an eclectic literature

analysis to identify all the relevant scientific approaches to the problem at hand, application of the framework to the cases, comparing the results obtained to the opinions of participants in the field and a comprehensive survey of the opinions of agribusiness managers on agribusiness strategy, coordination and change drivers. All of the case studies were compiled in the constructivist role of the researchers as a “passionate participant and facilitator of multi-voice reconstruction” rather than the positivist “objective and disinterested scientist” role in informing decision makers, policy makers and change agents.

The basic point of departure (or hypothesis in the traditional positivist sense) of this thesis is that the trends in the international food and agribusiness sector will be observed in South Africa. These trends will put the agro-food complex under competitive pressure. South African agribusiness firms will find new ways to stay competitive in internationalising markets. The governance structure of transactions between participants in supply chains will be one of the important sources of competitive advantage for agribusinesses to exploit. A good governance structure will improve supply chain (and thus participant) competitiveness by reducing transaction costs and improving the effective and efficient flow of goods, services and information in the process of creating exceptional customer value. Therefore, the analysis and the design of supply chain governance must be based on a good understanding of the evolution of the coordination mechanisms in agricultural supply chains and the factors that influence coordination.

The framework of analysis for this thesis is illustrated in Figure 1.1. The first component of the framework is the drivers of change in the agro-food complex (I) namely consumer demand, changing societal values and norms, technology, deregulation and supply structure as discussed earlier. These factors create the environment in which agribusiness firms have to compete. A strong linkage exists between competitiveness (VI) and the drivers of change. Agribusiness firms have to harness and use these drivers to their advantage. These factors are also the drivers of competition as other firms use them to their own advantage. The internationalisation of agribusiness would serve as a good example. Internationalisation provides exciting new opportunities and markets which agribusiness can realise, while it also presents enormous challenges to these same firms to improve their competitiveness lest they

are out-competed in their own markets by international firms. The drivers of change are extensively discussed in chapter 5.

The drivers of the agro-food system influence the characteristics of the product, supply chain and supply chain strategy (II). This is where the drivers shape the way in which supply chain participants collaboratively plan, design and control all the logistical business processes and activities in the supply chain to deliver superior customer value. These dimensions of the supply chain are discussed in chapter 3. Governance structures, which play a fundamental role in this process, are discussed in the following section to show how the other dimensions of the supply chain influence the choice of governance or coordination structure. Agricultural produce has several unique characteristics which discern agricultural supply chains from those in other industries. These characteristics, as defined by Zuurbier *et al* (1996) are the:

- perishability of products;
- variability in quality and quantity caused by genetic variation, season changes, climatological differences, etc.;
- variation in production rate between processors and producers;
- variation in scale efficiencies in the different stages of the production process which makes vertical integration very difficult;
- complementarity of agricultural raw materials which fixes the output ratio of different products;
- the stabilisation of the consumption of agricultural products;
- the increasing awareness of consumers regarding product, production methods, health, safety and environmental impact;
- the intrinsic value of produce, especially that of fresh produce, which is highest at the moment it is harvested; and
- the demand for capital that creates a measure of dependency.

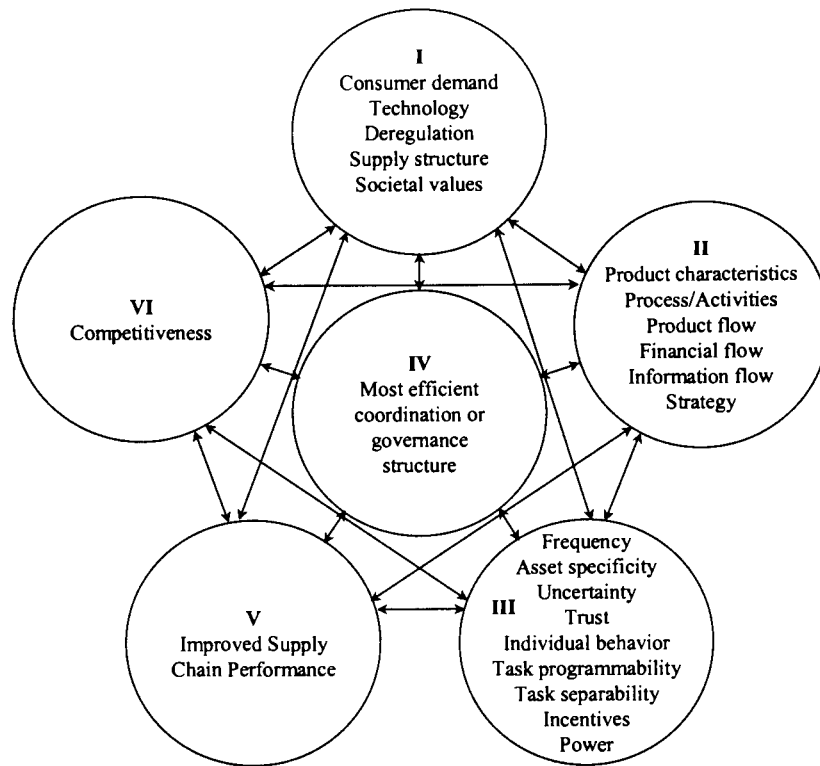


Figure 1.1: Framework of analysis

These characteristics in combination with the supply chain requirements imposed by the drivers of change shape the nature and characteristics of the transactions (III) and interactions between the participants in a supply chain. The most important characteristics of the transactions are the frequency, asset specificity, uncertainty, trust, individual behaviour, task programmability and separability, incentives and the power of these transactions. The combination of these factors defines the characteristics and costs of the transactions required in the supply chain. Given the transaction characteristics and costs, the most efficient coordination or governance structure (IV) for the specific product and industry can be observed and analysed. The interrelation of all of these factors is discussed in chapter 4.

The most efficient supply chain governance or vertical coordination structure will improve the performance of the supply chain (V) which, in turn, will enhance the competitiveness (VI) of the participants in the supply chain.

It is important to note that the framework is used to inform rather than to guide the case studies. The framework was not applied to each case study in a deterministic way as is done in the positivist research paradigm. Each case study is an attempt to “individual reconstruction coalescing around consensus” rather than the verification of hypotheses at the hand of the theoretical framework. In this way parts of the theoretical framework was applied to analyse and explain the different cases.

1.4 Objectives

The general goal of this thesis is to contribute to the general body of agribusiness and agricultural economic research in South Africa as discussed earlier. Supply chain management is emerging as a focus area in the research agenda of South African agricultural economists and is expected gain popularity as supply chains become more prevalent in the agricultural sector. This thesis is generally aimed at expanding research in agribusiness and more specifically on the emerging governance structures in agribusiness supply chains.

The specific goal of this thesis is to explore the emerging types of coordinating mechanisms or governance structures that were set up to improve the coordination and the negotiation process in South African agricultural supply chains and the factors which led to the choice of the specific governance strategy. The context and approach of this thesis is that of supply chain management. Supply chains are manageable entities that regulate the way actors transact with each other. Effective supply chain management has the potential to improve the competitiveness of the South African agricultural sector. Supply chain management and vertical coordination has not received due attention by South African agricultural economists and agribusiness authorities. This relatively new phenomenon needs to be explored and defined to create a solid basis for further research. The goal is addressed at the hand of three objectives.

The first objective is to elucidate the nature and extent of the emergence of supply chain management as a key performance area in the management of South African agribusiness. The reasons for the evolution in the South African agricultural sector and the strategic direction the sector will take must be established. The 'drivers of change' need to be identified to understand underlying pressures for change and the causal relationships in the process of change. The industry response to the pressures emanating from the changes in agricultural policy, consumer demand and agricultural supply need to be investigated to validate the causal relationships in the change process.

The second objective is to observe and describe the manifestation of these trends in the South African agricultural complex at the hand of selected case studies. The intention is to validate and incorporate the observations made in the first two objectives to understand and explain the emergence of supply chains.

The third objective of the thesis is to understand and explain the emerging governance structures in the selected case studies. The choice of governance structure in each of the case studies needs to be evaluated at the hand of relevant theories to explain the critical factors influencing the choice of the structure. Within the framework of the constructivist approach, theory needs to be related to the governance structures observed in practice. The ability of these theories to inform the choice of the most efficient governance structure need to be evaluated.

1.5 Delimitations

This thesis does not strive to evaluate the competitiveness of the various sectors, but rather to consider the importance of governance structures in achieving and sustaining competitiveness. In this way the approach followed is supply chain management with specific emphasis on management. The questions of "why" and "how" are more relevant to the thesis than how much and what value.

The case study approach that is followed needs to be followed up in time to validate the findings in a positivistic sense. The research approach is more exploratory and descriptive than prescriptive and analytical, which leaves ample opportunities for further study in the field.

A series of methodological issues also arises when case study methodology is used. These are the generalisation of the findings, causal or narrative analysis, the nature and role of theory, and authenticity and authority.

Case study research is criticised for its ability to provide a basis for scientific generalisation. A common argument is that a single example cannot be generalised and applied to the whole population. It is important to keep in mind that case studies are answerable to theoretical propositions and not to populations or universes. Case studies should be applied to expand and generalise theories and not to enumerate frequencies. (Lincoln and Guba, 2000; Yin, 1994 and Sterns *et al*, 1998)

Case study researchers can sometimes identify causal relationships after compiling one or two case studies, which is not feasible in survey research. This is possible because the cases are studied in depth, and over time rather than at a single point. However, case study researchers should distinguish between causal and narrative analysis and the validity of the research results gleaned from the process. The narrative account is important to form a sufficient background for the causal analysis, as is used by historians. (Stake, 2000)

Most case study researchers agree on the importance of theory in case study research. However, there is some disagreements about the nature of the theoretical perspective required. For some theory must make sense of a case as a bounded system. Here, the emphasis is on cases as unique configurations that can only be understood as wholes. For others theory should be used to explain the observations in a case in terms of a wider social context. Most authors agree that case analysis always assumes some wider context and the emphasis should be on choosing the correct theoretical construct(s) for this purpose rather than the extent to which theory binds the case format. (Stake, 2000).

The generalisation of results, causal analysis and the theoretical construct supports or undermines the validity, authenticity and authority of the case results. The validation of results at the hand of face and construct validity are therefore important. (Trienekens, 1999 and Stake, 2000)

In conclusion it should be kept in mind that case studies have general relevance, but cannot be used as a basis for scientific generalisation in the conventional kind.

1.6 Outline

The study is primarily concerned with the governance structures that are evolving in the South African agro-food complex. Keeping in mind that supply chain management is a relatively new field in agricultural economics. Chapter 2 expounds the most applicable research paradigm and tools needed to approach the challenge of researching agricultural supply chain governance structures.

Chapter 3 explores the dimensions of the supply chain. It also defines supply chain management and sets the environment for transaction characteristics and costs which determines the optimal governance or vertical coordination structure. Chapter 4 focuses specifically on the governance dimension by introducing the concept of relationships and the evolutions of relationships in agricultural supply chains on which vertical coordination or governance is based. This is followed by three perspectives on governance, namely the transaction cost theory, agency theory and strategic management theory. Vertical coordination or governance is defined in terms of a continuum of choices available to coordinate partners in the supply chain.

Chapter 5 discusses the most important drivers behind the emergence of supply chains in the international agro-food complex. This chapter is constructed in the positivist paradigm. The intention is to validate and generalise the observations made in the case studies. Considerable attention is devoted to the impact of South African agricultural policy on local supply chains. The evolution of the marketing act is extensively discussed since product marketing lies at the core of supply chain management. An extensive survey of the opinions of South African agribusiness managers on coordination preferences and business growth strategies, strategic focus areas, the future shape of the agrofood sector, and the major drivers of change are discussed as a conclusion to this chapter.

The next section of the thesis consists of three case studies to explore the evolving supply chain governance structures in the South African agro-food complex. The case

Chapter 1: Introduction

studies were specifically chosen to represent three examples along the vertical coordination continuum namely market governance (Sandveld potato case), contracting or hybrid governance (contracting in vegetables case) and hierarchy or vertical integration governance (tobacco processing and marketing case). The first (chapter 6) deals with the reasons why the Sandveld Potato Producers are still selling their produce through the auction market and the challenges facing them in establishing a supply chain in their industry in order to improve the competitiveness and profitability of their enterprises. The problems related to the auction market are explored and several possibilities for implementing supply chain strategies are discussed. The second case study (chapter 7) deals with the reasons why vegetable farmers and retailers prefer to bypass the National Fresh Produce Markets to deal directly with each other. Moral hazard and transaction costs are used to explain why contracts or hybrid forms of governance are more suited to vegetable transactions than other forms of coordination. The final case study (chapter 8) deals with a taper integration, a form of hierarchy, implemented by the Potgietersrusse Tabakkoöperasie to facilitate vertical integration in the tobacco chain. The taper integration is explained at the hand of strategic management theory as proposed by Harrigan (1983). The explanatory variables in this case are the bargaining power of the cooperative, competition in the industry and management objectives. Conclusions and recommendations are discussed in the final chapter.

Chapter 2: A New Research Approach for Agribusiness Research

Chapter 2: A New Research Approach for Agribusiness Research

2.1 Introduction

This chapter addresses the research paradigm for supply chain management research. The complexity of the issues involved in supply chain management research necessitates a constructivist paradigm to address research problems. Most agricultural economic research is conducted out of the positivist paradigm. The positivist approach asserts the existence of one absolute, physical-material reality from which there are no variations. This assertion is violated in the agro-food complex – mostly due to the vagaries of consumer tastes and demands, but also due to the complexity and biological nature of agricultural products, production and marketing. The positivist approach focuses on explaining, prediction and control. The constructivist approach focuses on understanding and reconstruction.

Ritson in Padberg, Ritson and Albisu (1997) identifies three traditional problems in agro-food marketing. The first centres on the phenomenon of concentration in the agro-food sector which allows firms to exploit their market power at the detriment of farmers and consumers. Excessive marketing margins due to inefficiencies in the market structure are the second problem, with price formation the third. Analysis of these problems is divided into three broad categories analogous to the problems in the market namely (1) structure/conduct/performance analysis, (2) the analysis of marketing margins, and (3) the analysis of supply and demand relations and the explanation for price movements over time and space. Finally market policies are divided into three broad categories namely (1) price controls (e.g. intervention buying, margin controls, and import taxes), (2) formation of producer or marketing groups and boards (i.e. countervailing power), and (3) various initiatives aimed at improving marketing efficiency (e.g. quality, standards and information). These issues are schematically represented in Figure 2.1.

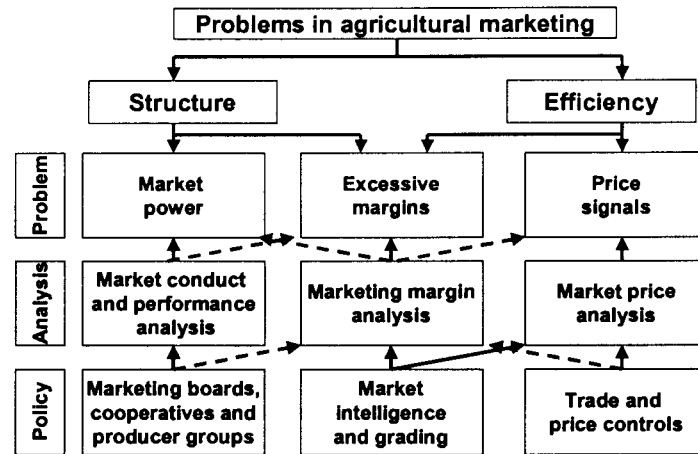


Figure 2.1: Schematic organisation of issues in agricultural marketing

Source: Padberg *et al* (1997)

The core problems in agro-food marketing will always remain. As agriculture is industrialised and supply chain management is implemented agricultural issues will become even more involved, demanding concomitant improvement of research and analysis paradigms and tools. In the past economists and managers have used traditional economic and cost analysis models to examine agro-food market problems. Supply and demand analysis, transaction costs, and other traditional tools were used in the new classical framework to examine the effectiveness of each stage of the flow of products from inputs through farm production and manufacturing to the final consumer. These tools are important and valid for many purposes. However, vital assumptions implicit to much of this paradigm can increasingly be questioned. The following challenges emerge (Downey, 1996, Boehlje, 1999, Zuurbier and Trienekens, 2000):

- With fewer open markets, how is price determined?
- What constitutes a fair price and what does a price reflect that is negotiated behind closed doors?
- How much information flow is needed in a system to ensure that the needs of the consumer are satisfied?
- Who should bear risk and how should risk be divided between the members of the supply chain?

- What is a fair distribution of profits?
- What constitutes fair competition amongst firms when the number of competitors in a system is shrinking and the rest 'collude'?

2.2 Towards a New Inquiry Paradigm

Before we consider the systems available to evaluate the performance of supply chains it would be constructive to consider, for a moment, the inquiry paradigm with which we should approach these challenges.

Beers *et al.* (1998) argues that the diversity and complexity of the challenges involved in supply chain management necessitates a multi-disciplinary approach. A supply chain practitioner should be able to harness the contributions from various scientific disciplines to define adequate sub-problems and to obtain solutions for these from the disciplines available. The different solutions must be successfully synthesised to create a unique solution to the primary problem facing the supply chain. *"It is the explicit multi-disciplinary scope and its own level of abstraction that differentiates this challenge from more specialised disciplines"* (Beers et al, 1998).

Four paradigms have been competing for the paradigm of choice in informing and guiding inquiry: positivism, postpositivism, critical theory and constructivism. A paradigm may be viewed as a set of *basic beliefs* (metaphysics) that deal with the ultimates or first principles. It represents a *world view* that defines, for its holder, the nature of the 'world', the individual's place in it, and the range of possible relations to that world and its parts. Historically there has been a heavy emphasis on quantification in science. Scientific maturity is commonly believed to emerge as the degree of quantification found within a field increases (Denzin and Lincoln 1994).

Positivism was, until recently, the dominant philosophy for scientific inquiry which supplied the dominant theory of how knowledge cumulates and declines in disciplines, but also directly informed virtually all economic practice (Ritzer, 1992). The theory of positivism asserts the existence of one absolute, physical-material reality from which there are no variations (Patton, 1980). In recent years criticism has mounted against the conventional paradigm of quantification in terms of the metaphysical assumptions of positivist and postpositivist inquiry. Ritzer (1992) states

that “Positivist arguments privilege “scientific” methods and knowledge so strongly that they tower imperiously above all public discussion, providing ready-made rationales for expert planning, elite decision making, and weak democracy.” This does not imply a criticism against the application of quantification itself, but the assumptions on which the commonly accepted superiority of quantification has been based.

The critiques against the quantitative schools - i.e. positivism and postpositivism - can be classified into internal or intraparadigm critiques, and external or extraparadigm critiques (Denzin and Lincoln, 1994):

Intraparadigm critiques: In the process of quantification certain variables and subsets of variables are excluded due to the difficulties in quantifying these variables. Consequently the context is “stripped” due to the exclusionary design of the quantitative model. Quantitative research tends to exclude the meaning and purpose of human behaviour in the research context. Qualitative data can provide a rich insight into human behaviour in this context. Positivist and postpositivist research tend to cause a disjunction of ground theories with local contexts. Generalised theory based on aggregated data has little or no relevance to the local context of economic actors i.e. business firms. This is directly related to the inapplicability of general data to individual cases. And finally the positivist and postpositivist research paradigms tend to diminish the discovery dimension in inquiry. The reference framework of the researcher and applied theory binds *a priori* hypotheses that has to be tested against data gathered especially for the purpose.

Extraparadigm critiques. Conventional approaches to research involve the verification or falsification of hypotheses within a certain theoretical framework. The facts or data used for proving or disproving the hypotheses are considered for their applicability to the research question against the background of the chosen theory. It can therefore be said that facts are only facts within some theoretical framework. Theory tends to be underdetermined. This problem is based on the difficulty of successful induction of observations to theory. Although it is relatively easy to deduce certain facts from a specific theory, it is very difficult to induce theory from a set of facts. A set of data can consequently be viewed through the “glasses” of several different theories with

satisfactory results. The challenge, although unattainable, remains to induce a single, unchallengeable theory to explain the “real” truth. Facts are also interdependent and value laden. The use of specific theories lends inordinately more value to certain facts or subsets of facts that what should be the case. The interactive nature of research will always create uncertainty as to what “really” exists. Even in the physical (or hard) sciences, phenomena such as Heisenberg's uncertainty principle and the Bohr complementarity principle indicates measurement and induction uncertainty. In the same way the collection of data influences the behaviour of the subject, while the data collection process is bound by the framework and theories of the researcher (Denzin and Lincoln, 1994).

Table 2.1: Basic Beliefs (Metaphysics) of Alternative Inquiry Paradigms

Item	Positivism	Postpositivism	Critical Theory	Constructivism
Ontology	naïve realism – “real” reality but apprehendable	critical realism – “real” reality but only imperfectly and probabilistically apprehendable	historical realism – virtual reality shaped by social, political, cultural, economic, ethnic, and gender values; crystallised over time	Relativism – local and specific constructed realities
Epistemology	dualist/objectivist; findings true	modified dualist/objectivist; critical traditional/community; findings probably true	transactional/subjectivist; value-mediated findings	transactional/subjectivist; created findings
Methodology	experimental/manipulative; verification of hypotheses; chiefly quantitative methods	modified experimental/manipulative; falsification of hypotheses; may include qualitative methods	dialogic/dialectical	hermeneutical/dialectical

Source: Denzin and Lincoln (1994)

Note: Ontology: What is the form and nature of reality and what can be known about it?

Epistemology: What is the nature of the relationship between the knower and would-be knower and what can be known?

Methodology: How can the inquirer go about finding out whatever he or she believes can be known?

Table 2.2: Paradigm Positions on Selected Practical Issues

Item	Positivism	Postpositivism	Critical Theory	Constructivism
Inquiry aim	explanation: prediction and control		critique and trans-formation; restitution and emancipation	understanding; reconstruction
Nature of Knowledge	verified hypotheses established as facts or laws	nonfalsified hypotheses that are probable facts or laws	structural/historical insights	individual reconstructions coalescing around consensus
Knowledge Accumulation	accretion – “building blocks” adding to “edifice of knowledge” – generalisations and cause-effect linkages		historical revisionism; generalisation by similarity	more informed and sophisticated reconstructions; vicarious experience
Goodness or quality criteria	conventional benchmarks of “rigour” internal and external validity, reliability and objectivity		historical situatedness; erosion of ignorance; action stimulus	trustworthiness and authenticity and misapprehensions
Values	excluded – influence denied		included-formative	
Ethics	extrinsic; tilt toward deception		intrinsic; moral tilt toward revelation	intrinsic; process tilt toward revelation; special problems
Voice	“disinterested scientist” as informer of decision makers, policy makers and change agents		“transformative intellectual” as advocate and activist	“passionate participant” as facilitator of multi-voice reconstruction
Training	technical and quantitative; substantive theories	technical; quantitative and qualitative; substantive theories	resocialisation; qualitative and quantitative; history and empowerment	

Adapted from: Denzin and Lincoln (1994)

Constructivism differs the most from other paradigms in terms of the ontological position. The relativism of the constructivist approach, which assumes multiple, apprehensible, and sometimes conflicting social realities, contrasts significantly with the naïve realism of the positivist paradigm.

Constructivism aims to understand and reconstruct the realities of the actors in the research problem. “Knowledge” used in the reconstruction is based on relative consensus of those competent to interpret the substance of the construction.

Ritzer (1992) points out that although positivism should not be seen as the only research paradigm, the alternatives should be applied with circumspection. Most of the alternative research paradigms are heavily dependent on the interpretive skills of the individual investigator which can be idiosyncratic and essentially unstructured. Morgan (1983) holds a very strong and significant opinion on the application of positivism in research. In a substantive study a determinist, realist, and positivist approach will always remain the most applicable. Unnecessary application of constructivist, or other, research paradigms can be counter-productive. Positivist research 'cuts to the bone' while the danger always exists that the researcher can remain caught up in metaphysical or philosophical exploration of the topic rather than getting down to the important issues of the problem.

The complex view on reality of the constructivist approach is deemed an important complement to positivist paradigms in order to understand the complexities of supply chain management research. The epistemology and methodology of the constructivist approach grants the researcher the opportunity to create knowledge through interaction with the subject(s). The information learned from the interaction can then be used to reconstruct previously held construction in a hermeneutic or dialectical methodology.

New paradigms of inquiry are posing weighty challenges to conventional methodology. The problems associated with conventional methodology can be ameliorated through the augmented application of qualitative data in research. This is not an argument for or against the use of quantitative data, but rather a challenge to carefully consider the fundamental inquiry paradigm relevant to the research problem and consequently the basic assumptions applied in the research problem (Ritzer, 1992, Patton, 1980; Denzin and Lincoln, 1994).

Chain Science is emerging as a distinct discipline in its own right. In the early stages of an emerging discipline specialists are 'specialised problem solvers'. In the second stage of development discipline practitioners exhibit the urge to exchange experiences to structure a 'rule-of-thumb' way in which to conduct investigations and present results. Hypotheses are generated and tested in the third stage to formalise and understand the 'rule-of-thumb' in the embryonic stage of a formal science. The fourth

stage utilises models of causal relations to test the relevance of the developed hypotheses to reality. In the final stage the concepts are operationalised through quantification (Beers *et al.* 1998). This quantification will only make sense if the preceding steps were executed within the right research paradigm.

2.3 Inquiry Tools for the Supply Chain

In the previous section the need for a combination of positivist and constructivist research paradigms was expounded. This section comprises an overview of the theoretical constructs available to the researcher to study the challenges of supply chain management. The theoretical constructs range from procedural to the relational dimensions of supply chains. This is where the biggest challenge is posed to the researcher: to integrate and apply the different (positivist/reductionist) methodologies to render constructivist results that will make sense in complex supply chain systems.

Various tools or methodologies exist to analyse specific aspects of the supply chain. Handfield and Nichols (1999) divides their book *"Introduction to Supply Chain Management"* into three subsections which are: (1) information systems and technology, (2) managing the flow of materials across the supply chain, and (3) developing and maintaining supply chain relationships.

Boehlje (1999) identifies six critical dimensions of the value chain as illustrated in Figure 2.2. These critical dimensions relate to the set of processes or activities that create the attributes or products that are demanded by the consumer, to the flow of products, finance and information between the different participants in the supply chain, induced and maintained by incentive structures within a governance structure.

Three dimensions which describe the supply chain namely the process, performance and institutional dimensions are proposed by Trienekens (1999), and Beers *et al.* (1998). Chain performance refers to the relationship between the supply chain and its environment as perceived by the actors in the chain and the actors within the environment of the supply chain. The perspective of the process focuses on the way the supply chains perform the process of delivering a product with specific attributes to the consumer. These processes encompass primary support, communication, co-ordination, and management. The institutional perspective concentrates on the way

different organisations co-operate with each other in a formalised way. Different possibilities for linking participants together is described and analysed (Beers, *et al.* 1998).

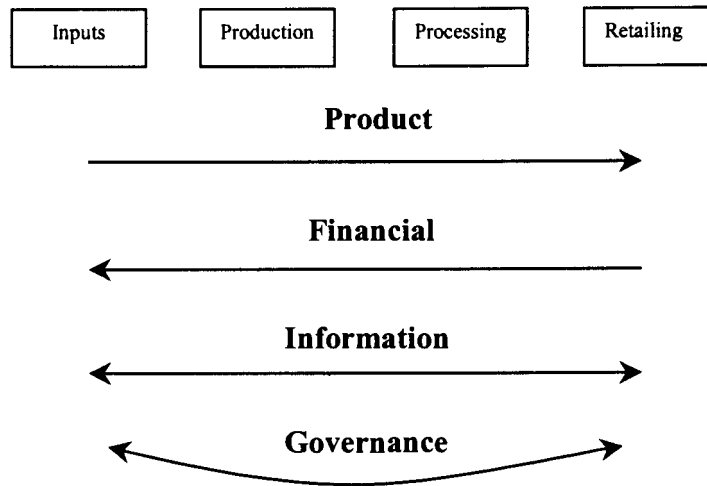


Figure 2.2: Critical dimensions of a value chain

Source: Boehlje, 1999

Boehlje (1999) divides the measurement of economic performance of emerging phenomena in the agricultural industry into two categories as indicated in Table 2.3.

Table 2.3: Measurement of Economic Performance

Physical Product/Financial Stocks and Flows	Relationship/Information Stocks and Flows
1. Quality	1. Trust
2. Yield/input-output/physical efficiency	2. Accuracy of messages (information)
3. Economic value	3. Flexibility
4. Market or transfer price	4. Commitment
5. Time to market	5. Speed of response
6. Errors/mistakes	6. Strength of signals
7. Cost	7. Equitability (fairness)/distributional issues (cost, revenue, risk)
8. Profit	8. Adaptability
9. Return on assets	9. Transition/switching cost
10. Cash flows	10. Value creation and capture
11. Capital turnover	11. Value decay
12. Property rights	

Source: Boehlje, 1999

Trienekens (1999) related various scientific approaches applicable to chains to the three primary dimensions of chain analysis. This division is represented in Table 2.4.

Table 2.4: Possible contributions of different theoretical frameworks to supply chain analysis

Institution	Performance	Process
Transaction cost economics	Transaction cost economics	Supply Chain Management
Agency theory	Agency theory	Information and Communication
Network Theory	Resource Dependency theory	Technology
Strategic Management	Activity Based Costing	Activity Based Costing
Transaction Cost of Ownership	Direct Product Profitability	Direct Product Profitability
	Transaction Cost of Ownership	Transaction Cost of Ownership

Source: Trienekens, 1999

These theories can be evaluated according to their contribution to the research framework in terms of the subject and context of the theory (why), the applicable variables (what), and the problem approach (how). The scientific approaches are classified according to these standards in Table 2.5.

2.4 Research in supply chains

In this section it is argued that the complexity of the business and institutional environments facing business firms in the new global economy extend beyond the scope of neoclassical economics and should be augmented by a holistic application of various economic theories from a constructivist paradigm. Conventional agricultural economic analysis is bound by the Leibnizian inquiry paradigm (positivist). This paradigm approaches reality with in a deterministic view where clear and linear assumptions apply.

Agribusiness activities in South Africa currently occur in a free, deregulated environment. Agricultural economic analysis is challenged to capture complex business reality and decisions in scientific models in order to explain and predict the institutional and governance structures and optimal resource allocation behaviour of firms within a labile global business environment.

Table 2.5: Examples of theory elements of various scientific approaches to vertical co-ordination

Approach	Why? (view of reality)	What? (aspects/variables)	How? (problem approach)
Transaction Cost Economics	Goal: search for the most appropriate organisational form to govern transactions. Elements in view: - nexus of contracts - bounded rationality - opportunism	Frequency Uncertainty Asset specificity (of transactions)	Make/buy decision
Agency Theory	Goal: contract optimisation. Elements in view: - self interest - bounded rationality - risk aversion	Principal Agent Information	Trade-off between risks and costs of measurement
Strategic Management	Goal: competitive advantage Elements in view: - market - strategic position	Stakeholders Competitors Market	Strategy building (e.g. cost / differentiation)
Network Theory	Goal: best network position Elements in view: - dynamic relationships - power - trust	Nodes Links Market	Building network relationships
Resource Dependency Theory	Goal: resource securement/control. Elements in view: - resource dependency - core competencies	Resources: - information - capital - labour - capabilities	Building supply networks Outsourcing
Supply Chain Management	Goal: efficient and effective replenishment Elements in view: - customer orientation - efficiency of processes	Product flow Information flow Processes Co-ordination	Throughput time reduction Gearing processes
Information Technology	Goal: enable co-ordination between parties Elements in view: reduce costs and risk of co-ordination	Data Process Event Object	Information modelling System building Information technology in products
Cost approaches	Goal: cost minimisation Elements in view: - activity based costing - direct product profitability - total costs of ownership	Process Costs Product Ownership	Define processes as cost centres Assign processes to products Define ownership relationships

Source: Trienekens, 1999

The research approach followed in this thesis is a combination of a positivist and constructivist approaches. The combination of these approaches enables a holistic approach to the research problem. Positivism's strong explanatory and prediction

capabilities are combined with the strong understanding and reconstructive capabilities of the constructivist approach. Qualitative and quantitative data can be used in this framework to analyse the trends in the agricultural sector.

The constructivist approach is essential in the growth of supply chain science as a discipline in its own right. Beers, Beulens and van Dalen (1998) outlined the growth of a scientific discipline as follows:

- In the early stages the science exists as a profession of ‘specialised problem solvers’;
- The specialists start to exchange views and experiences in the next stage as specialists identify the need for a structured way to approach challenges in the field. In this stage ‘rule of thumb’ diagnoses and solution are defined;
- The ‘diagnosis-action-rules’ so not always work, are still unsystematic and lack a scientific basis. The next stage in scientific development is to identify and test the practical rules (hypotheses) are applicable and do work. This step is generally recognised as the start of ‘science’ as hypotheses are identified and tested;
- In order to find out why actions have certain consequences, conceptual models of causal relations in reality are generated and tested in the real world.
- When the relevant concepts and valid causal relationships have been identified, the next stage is to make the concepts and relations operational by quantifying it.

Beers *et al* (1998) stated that chain science is probably still in the middle of the second stage. The comments by Trienekens and Zuurbier (2000) on the development of the science would indicate that the science is entering the third stage of scientific maturity. The combination of constructivist and positivist, where the former is used for theory generation and the latter for theory testing, would be an appropriate framework for addressing the changes in South African agricultural supply chains.

2.5 Methodology

The methodology applied in this thesis is primarily case study research. The case studies are used to identify and describe causal relationships in different coordination mechanisms along the vertical coordination continuum. The case studies are qualitative by nature and efforts are made to test the validity of the cases with empirical work as much as possible.

The case study approach gained steady ground as a recognised scientific research tool in recent years (Sterns, Schweikhardt, and Peterson, 1998). Other ways include experiments, surveys, histories, and the analysis of archival information (the favourite playground of agricultural economists) (Yin, 1994). Case studies do not transfer knowledge in the traditional sense of stimulating lower-order thinking skills. However, case studies have proved to be very successful in stimulating higher-order thinking skills e.g. stimulating discussion, promoting analytical thinking and encouraging readers to test hypotheses (Harling and Misser, 1998).

The case study method is one of the most popular methodologies employed by constructivist researchers (Denzin and Lincoln, 1994 and Hammersley and Gomm, 2000). As indicated in Table 2.7, a case study is concerned with understanding the case (or phenomenon) in itself – the focus is not on theoretical inference or empirical generalisation. The primary concern is not to control or influence the variables to determine behaviour, but to observe the study subject in its ‘natural’ state. The basic belief of a constructivist inquiry paradigm in terms of methodological approach is hermeneutical or dialectical (see Table 2.1). Experiments and surveys has theoretical inference, practical evaluation of interventions and empirical generalisation as goals (Hammersley and Gomm, 2000, see also Table 2.7). These goals are based on the experimental and manipulative methodologies of the positivist and postpositivist paradigms. Case study methodology therefore gives the researcher the opportunity to understand and reconstruct observations at the hand of, rather than determined by, theory. It is essentially a reconstruction of individual cases around general consensus without the limitations imposed by the positivist inquiry paradigm. (Denzin and Lincoln, 1994).

Sterns, Schweikhardt, and Peterson (1998) argues that the most important contribution of case study research is the ability of the research instrument to explore the inside of the 'black box' of managerial decision making in agribusiness firms. The three objectives of research are to (1) conduct applied, problem-solving research, (2) to develop new theory, and (3) to test existing theory. They are of the opinion that case study methodology can be selectively applied to meet these objectives.

The case study research method is extensively described by Yin (1994). Traditionally research strategies were arranged hierarchically i.e. case studies are appropriate for the exploratory phase of an investigation, that surveys and histories were appropriate for the descriptive phase, and that experiments were the only way to so explanatory or causal inquiries. According to Yin this view is incorrect inasmuch that case studies have been successfully applied to various phases of the research process.

Three types of case studies can be discerned namely exploratory, descriptive and explanatory case studies. The important conditions that a researcher has to consider in the choice of an appropriate research strategy are:

- (a) The type of research question posed;
- (b) The extent of control an investigator has over actual behavioural events; and
- (c) the degree of focus on contemporary as opposed to historical events.

(Sterns *et al*, 1998; and Yin, 1994).

The familiar array of research questions is:

“who”, “what”, “where”, “how” and “why”

The first and most important condition for choosing an appropriate research strategy is to identify the type of research question being asked. The “what” question can in general be either exploratory or about prevalence. The most appropriate strategy for the former is the case study, while the most appropriate for the latter would be surveys or analysis of historical data.

Table 2.6: Relevant situations for different research strategies

Strategy	Form of research question	Required control over behavioural events?	Focuses on contemporary events?
Experiment	How, why	Yes	Yes
Survey	Who, what, where, how many, how much	No	Yes
Archival analysis	Who, what, where, how many, how much	No	Yes/No
History	How, why	No	No
Case study	How, why	No	Yes

Source: Yin, 1994

However, the application of a case based research strategy is not without dangers. The biggest challenge is the lack of rigour of case study research. Case study investigators have in the past allowed equivocal evidence or biased views to influence the direction of the findings and conclusions. Yin (1994) points out that the problem of bias is possible in any kind of research strategy and has to be dealt with actively.

The second concern about case study research is that they provide little basis for scientific generalisation. A common argument is that a single example cannot be generalised and applied to the whole population. It is important to keep in mind that case studies are answerable to theoretical propositions and not to populations or universes. Case studies should be applied to expand and generalise theories and not to enumerate frequencies. (Yin, 1994 and Sterns *et al*, 1998)

The final peril that the case study researcher has to be aware of is the rendering of massive, unreadable documents that take a long time to produce. This challenge must be addressed by the researcher self as a matter of writing discipline.

The challenges related to the first two challenges to case study research can be addressed with a proper system of research validation as proposed by Trienekens (1999). Two validation tests are relevant to case study research namely face validity

and construct validity. Face validity refers to the degree in which the results of the study reflect the phenomenon studied. This includes a reflection of meaning and content of the concept used; specification of the theoretical dimensions of the concept; and finally the choice indicator for each of the chosen dimensions. Construct validity refers to the correlation between theoretical compositions and eventual empirical evidence. Construct validity gauges the accuracy of identification of variables, concepts and relationships, how they are constructed in a model and how accurately the model is executed.

Table 2.7: A schematic comparison of case study with experimental and survey approaches

Experiment	Case study	Survey
Investigation of a relatively small number of cases	Investigation of a relatively small number of cases (sometimes just one)	Investigation of a relatively large number of cases
Information gathered and analysed about a small number of features of each case	Information gathered and analysed about a large number of features of each case	Information gathered and analysed about a small number of features of each case
Study of cases created in such a way as to control the important variables	Study of naturally occurring cases; or in “action research” form, study of cases created by the actions of the researcher but where the primary concern is not controlling variables to measure their effects	Study of a sample of naturally occurring cases; selected in such a way to maximise the sample’s representativeness in relation to some larger population
Quantification of data is a priority	Quantification of data is <i>not</i> a priority. Indeed, qualitative data may be treated as superior	Quantification of data is a priority
The aim is either theoretical inference – the development and testing of theory – or the practical evaluation of an intervention	The main concern may be with understanding the case studies in itself, with no interest in theoretical inference or empirical generalisation. However, there may also be attempts at one or another, or both, of these. Alternatively, the wider relevance of the findings may be conceptualised in terms of the provision of vicarious experience, as a basis for ‘naturalistic generalisation’ or transferability	The aim is empirical generalisation, from a sample to a finite population, though this is sometimes seen as a platform for theoretical inference

Source: Hammersley and Gomm (2000)

The researcher has three tools available ensure that the validity of the research. These are a good literature analysis to identify all the relevant scientific approaches to the

problem at hand, the case study to apply the framework and finally the opinion of experts in the field. (Trienekens, 1999)

It is clear that case study research is better suited to how and why research questions. The research challenge related to the emergence of governance structures in supply chains is primarily related to the “how and why” of the phenomenon. The case study strategy would therefore be appropriate to the phenomena in the South African agribusiness sector.

However, in order to partly address the shortcomings of the case study methodology a positivist section is added in the form of a survey of managerial opinions on vertical coordination , supply chain management and the future trends in the agribusiness sector. The intention of this section is to validate and extend the generalisation of the case studies.

2.6 Conclusion

In this chapter the methodology and research approach for studying the evolving supply chain governance structures of the South African agribusiness complex is considered. There is a growing understanding that the competitiveness of the food and fibre industry is not only based on the competitiveness of individual firms, but also on the effectiveness of linkages between competitive firms (O’Keefe, 1999).

Firms have to respond efficiently to external shocks like changes in consumer demand, financial and exchange rate risks etc., to remain competitive. However, firms operate in a supply system to which they usually only contribute a relatively small portion of the value of the final product. Individual firms can improve their competitiveness through cooperation and coordination with other firms in the supply chain. Mutual dependency emerges which requires better coordination and control of transactions and, more specifically, investment in productive assets. The institutional and governance structure employed to coordinate the supply chain will determine the manageability, reactivity and ultimately, the competitiveness of the supply chain.

The constructivist approach at the hand of case studies is discussed as the research approach to study the evolution of governance structures in South African

agribusiness supply chains. The case study approach is used for the ability of this research instrument to explore the inside of the 'black box' of managerial decision making in agribusiness firms. The case study methodology is suited to the constructivist research paradigm. The case study methodology enables the researcher to understand and reconstruct observations at the hand of, rather than determined by, theory. It is essentially a reconstruction of individual cases around general consensus without the limitations imposed by the positivist inquiry paradigm.

However, there are several limitations to case study methodology namely the generalisation of findings, nature and role of theory and the validation of the research. Solutions are proposed of which a quantification of the emergence of the emergence of new governance structures is included to establish construct validity and further the generalisation of the research results.

Chapter 3: Supply Chain Management in Agriculture

Chapter 3: Supply Chain Management in Agriculture

3.1 Introduction

In this chapter supply chain management is defined and the different aspects of supply chain management explored in the agricultural industry. The goal is to get an overview of all the dimensions involved in supply chain management that have to be considered and their application in the marketing of agricultural produce. These dimensions represent the activities, processes and exchanges between participants in the supply chain which have to be facilitated by the governance structure. The supply chain delivers the required product to the consumer and therefore plays an important role in value creation. In the framework of analysis the drivers of change determine chain strategy and the required output of the chain. In turn the supply chain processes shape the required characteristics of the transactions between the participants to facilitate value creation. Definitions for supply chain management are presented after which these definitions will be analysed and discussed.

3.2 Defining Supply Chain Management

The process of getting goods to the customers has traditionally been referred to as the physical distribution process (Kotler, 2000). This process starts at the farmer when the farmer chooses the marketing channel that delivers the product to the final consumer at the right time, in the right form and in the most cost-effective manner. In its simplest form the marketing channel for an agricultural product can be represented in terms of the steps or stages involved in marketing of the product as indicated by Kohls and Uhl (1998):

1. Assembly of raw commodities
2. Transportation
3. Grading and classification
4. Processing
5. Further processing
6. Packaging
7. Storage
8. Distribution
9. Retailing

Chapter 3: Supply chain management in agriculture

Supply chain management expands on physical distribution as it also includes the procurement of the right inputs (raw materials, components, and capital equipment), convert them efficiently into finished products and dispatch it to the final destination (Kotler, 2000).

The term Supply Chain Management originates from the logistics discipline where it was defined in terms of the all the constituent parts that make up the system such as material suppliers, production facilities, distribution services, and customers, linked together via the forward flow of materials and the backward flow of information (Stevens, 1989). Ganesham and Harrison (1995) defines a supply chain as a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finishes products to customers.

Tan (2001) points out that within management science two alternative perspectives on supply chain management distinguished namely that of the purchasing and supply school and the transportation and logistics school. The purchasing and supply school defines supply chain management (or supplier base integration) as attempts by manufacturers to integrate and partnership with their suppliers to more efficiently and effectively manage the purchasing and supply functions. The objectives of these activities are to reduce the supplier base, concurrently engineer supply chain processes, reduce cycle times, reduce inventory, and to improve customer satisfaction. The transportation and logistics school defines supply chain management (or integrated logistics) as attempts by the wholesalers and retailers to integrate the logistics function and partnership with their transportation providers to more efficiently and effectively manage the transportation and distribution functions. The objectives of these activities are to provide visibility to the chain, reduce demand uncertainty, consolidate distribution centres, reduce transportation costs, and to replace inventory with information. Tan (2001) finds that when the two bodies of knowledge was integrated from the two perspectives into a common body of knowledge that encompassed all the value-adding activities on the value chain, researchers and managers realised the importance of incorporating supply chain management in overall business planning process.

Ellram (1991) expands this definition to include the dimension of cooperation and collaboration between firms: "...integrative approach to dealing with the planning and control of the materials flow from suppliers to end-users. It is an approach aimed at co-operatively managing and controlling distribution channel relationships for the benefit of all the parties involved, to maximise efficient use of resources in achieving the supply chain's customer service goals...".

Beamon (1998) indicates that the definition of supply chain management (as originally used in the logistics discipline) has expanded: "...an integrated process wherein a number of various business entities (i.e. suppliers, manufacturers, distributors, and retailers) work together in an effort to: (1) acquire raw material, (2) convert these raw material into specified final products, and (3) deliver these final products to retailers. This chain is traditionally characterised by a forward flow of materials and a backward flow of information. Traditionally, researchers and practitioners have primarily investigated the various processes of the supply chain individually. Recently, however, there has been an increasing attention placed on the performance, design, and analysis of the supply chain as a whole."

The definitions of Ellram and Beamon underline the notion of collaboration and cooperation between firms as introduced in chapter one. The nature of transactions between organisations is evolving from discrete to relational transactions to accommodate the co-operative management and control of distribution channels as a whole as opposed to atomistic firms acting in isolation. Dooley and Akridge (1998) gives a graphical representation (Figure 3.1) of the process that takes place as discrete transactions evolve to relational transactions. Note the change in roles of the sales and purchasing functions and the collaborative R&D planning that ensues as firms co-operate to manage the supply system. Spekman, Kamauff, and Myhr (1998) summarises the revolutionary transformation that the new competition demands and the changes faced by the procurement manager:

Table 3.1: An illustration of Purchasing's New Role

Evolving role	Revolutionary role
Transaction accountant	Information exchange broker
Administers inter-firm contracts	Guides the information and implementation of partnerships and inter-firm networks
Primary point of contact with suppliers	Manager of external manufacturing
Interface with first-tier suppliers	Responsibilities throughout the supply chain
Minimises risks (e.g. supply disruption, incoming defects) to the buying organisation	Manages and leverages the skill of the supply chain
Reacting to external stimuli (reactionary change)	Proactively assessing external information
Safeguarding proprietary/critical information – transaction driven	Enhancing information sharing through the value chain – early supplier involvement
Unidirectional communication	Simultaneous two-way communication
Cross-functional coordination	Functional integration
Cause and effect problem solving	Systems thinking
Purchasing mentality	World view

Source: Spekman et al 1998

The concept of the food supply chain management is defined by (Downey, 1996) as “...the process of bringing order to the system of producing, processing, and distributing food and agricultural products to consumers. From the consumer perspective supply chain management focuses on improving effectiveness and efficiency of the system to deliver a wide range of safe and desirable agricultural products in a cost effective manner. From the suppliers point of view, supply chain management involves the creation of organisational structures and linkages that will ensure a strong position in the market and enhance their profitability.”

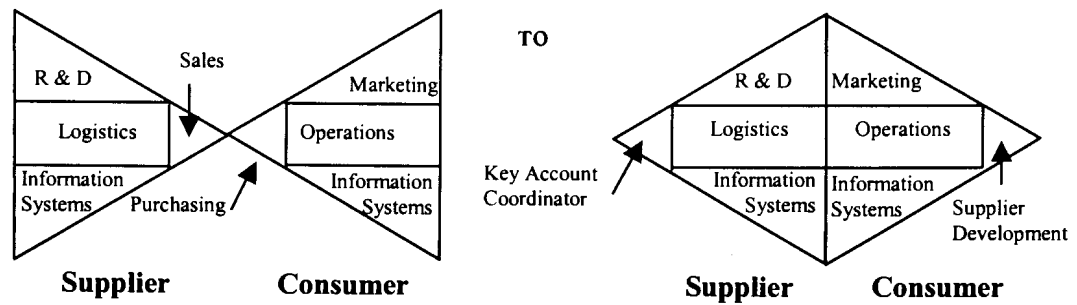


Figure 3.1: Changes in Procurement with Shift to Supply Chain Management

Source: Dooley and Akridge (1998)

“The supply chain encompasses all the activities associated with the flow of products from the raw materials stage (extraction), through to the end user, as well as the associated information flows. Material and information flow both up and down the supply chain. Supply Chain Management is the integration of these activities through proven supply chain relationships, to achieve a sustainable competitive advantage” (Handfield and Nichols, 1999).

Boehlje (1999) expects that supply chain management will improve efficiency through better flow scheduling and resource utilisation, increase the ability to manage and control quality throughout the chain, reduce risks and especially the risk associated with food safety and contamination through trace back, and increase the ability of agricultural industries to respond quickly to changes in consumer demand for food attributed. He identifies six critical dimensions to the supply chain in agricultural industries namely the process/activities, product flow, financial flow, information flow, incentives and governance of the supply chain.

Van der Vorst, Beulens, de Wit and van Beek, (1998) presents an expansive definition of supply chain management as the collaboration among actors in a supply system, from the primary producer to the end-consumer, to better satisfy consumer wants and needs at lower costs. This collaboration is an integrative approach to plan and control the flow of materials from the producers to the consumers by breaking down the barriers that exist between each of the links in the supply chain. Pareto improvement is achieved in the process with none of the parties worse off and one or more of the

parties better off. Additional flows of materials and information is created in the process.

The following points are clear from the preceding definitions of supply chain management:

- It is a co-operative process across firm boundaries;
- with the aim of managing distribution channel processes and relationships;
- to bring order to the system of:
 - acquiring raw material (producing)
 - processing raw material
 - delivering final product to consumers (distributing)
- by means of organisational structures and linkages;
- that;
 - improve the effectiveness and efficiency of the chain;
 - ensure a strong position and;
 - sustainable competitive advantage in the market while;
 - ensuring Pareto improvement for the whole chain.
- to deliver safe and reliable food to the consumer and;
- to create consumer satisfaction – to deliver superior customer value.
- the dimensions of the supply chain are product, financial, information, incentives, and governance structure

A simplified version of the supply chain and its dimensions is presented in Figure 3.2.

3.2.1 Supply chain management definition caveats

Three important aspects are worth noting when discussing supply chain management. Firstly the use of the term ‘chain’ can be seen as an oversimplification of the nature of the supply chain process. The term ‘chain’ could create the impression that a supply chain is a linear and rigid arrangement of firms serving the final consumer. Supply chain management actually refers to a system or network of firms interacting to deliver a product or service of superior value to the end consumer. (Ellram, 1991 and Zylbersztajn and Farina, 1998) Supply chains therefore look less like a pipeline than an uprooted tree, where the branches and roots are the extensive network of customers and suppliers (Lambert and Cooper, 2000). Supply chains are networks of dynamic

relationships that are constructed, deconstructed and revised as circumstances dictate. Supply system management would therefore be a more applicable term to use. The common denominator separating the supply chain from the rest of the agrofood system is the common goal held by the actors namely specific and superior value creation for a clearly defined market (Omta, 2002).

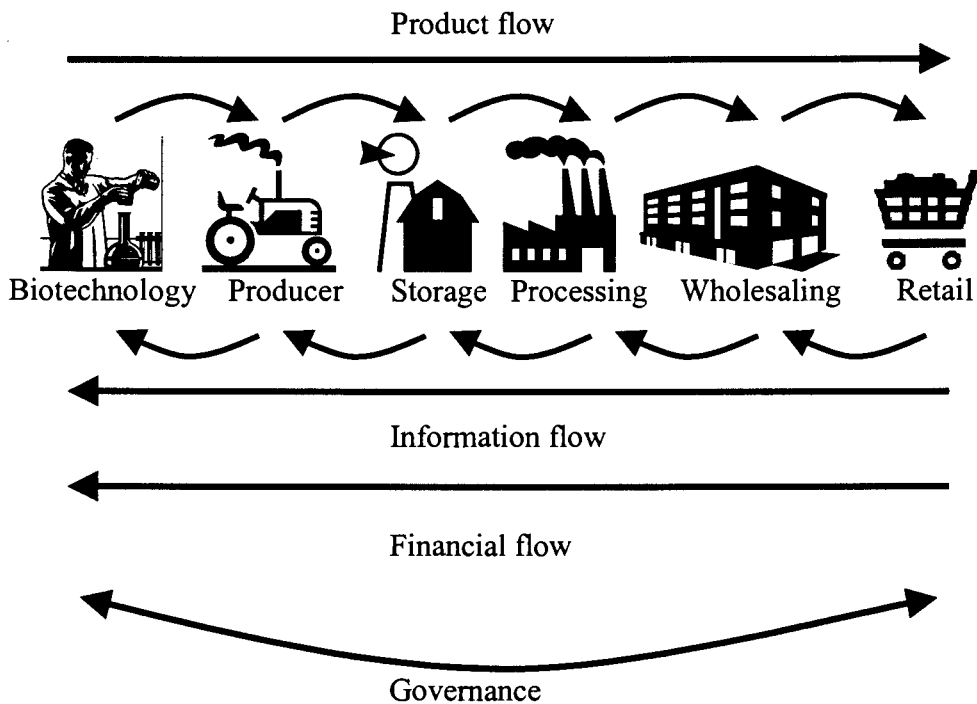


Figure 3.2: Dimensions of the Supply Chain

Adapted from Boehlje (1999), van der Vorst *et al* (1998) and Poirier (1999)

Secondly, Kotler (2000) is of the opinion that the supply chain approach views markets as only a destination point. The company would be more effective by considering its target market's first and then designing the supply chain backward from that point. This criticism is justified as applied to the traditional view on supply chain management (see Stevens, 1989), but it is clear from more recent authors that the definition and application of supply chain management has expanded to a more integrative and holistic approach. A demand chain would therefore be a more applicable term to describe the process.

Supply chain management is therefore probably not the best term to describe the extent and application of the discipline. Demand system management could be a much more accurate description, but the term ‘supply chain management’ is upheld to avoid confusion as it is currently the most widely used term.

The term value chain is also frequently used to describe a supply chain. Michael Porter popularised the usage of the term in his discussions on competitiveness and firm and industry strategy. However, in Porter (1998) he states that: “Every firm is a collection of activities that are performed to design, produce, market, deliver, and support its product. All these activities are can be presented using a value chain...” and “A firm’s value chain is embedded in a larger stream of activities that I term the value system.” (authors’ underlining). The term value chain refers essentially to the processes in the firm itself. The term value system would therefore be the correct terminology to utilise when referring to the supply chain although the term value chain has undergone a semantic evolution over time and will continue to do so.

Omta (2002) positions supply chain management research as a part of Chain and Network Science. Chain and Network Science is the theoretical domain concerned with the “behavioural and social aspects of organisation and governance of exchange relationships, the nature of choices being made, the incentives and constraints, the basis and the use of power, and the nature of interaction and communication.” (Omta, 2002:14). The supply chain management discipline as a sub-discipline of chain and network science focuses on the coordination of activities between actors to deliver a specific product.

3.2.2 Critical dimensions in the supply chain

In the previous section the critical dimensions of the supply chain was identified (Boehlje, 1999). These are:

- Processes/activities
- Product flow
- Information flow
- Financial flow
- Incentives
- Governance

The first dimension of the chain concerns the activities or processes involved in delivering the final product to the consumer. These activities create the attributes that satisfy the consumer's needs (Kotler, 2000 and Boehlje, 1999).

The second critical dimension of a value chain is the product flow across the chain. Aspects like transportation and logistics ensuring that the different elements in the supply chain are delivered to the right processes at the right time (Boehlje, 1999; Stevens, 1989; and Handfield and Nichols, 1999).

The third critical dimension of a supply chain is the financial or cash flow across the chain. The sharing of financial performance information in the chain between participants and stages in the chain is an important aspect of this dimension and often a source of conflict (Boehlje, 1999).

The fourth important dimension of the chain concerns the information flow across the chain. Information is necessary to control primary business processes in chains, generate management information to assist in decision-making and statistics for regulation bodies (Hofman, 1998). A new dimension is information for traceability to give quality and safety assurances to consumers (Verbeke and Viaene, 2000).

The fifth critical dimension of the supply chain is the incentive system that is in place to reward performance and share risk. The conflicts encountered as a result of inflexible contract and similar incentive systems that result in inequitable sharing of gains and losses are constantly challenged to produce systems that are more responsive to dynamic economics and business conditions (Boehlje, 1999).

The sixth and final dimension of the supply chain is the chain governance or vertical coordination system. Alternative governance systems may include open-access markets, various forms of contracts, strategic alliances, joint ventures, franchising arrangements, networks and cooperatives, and vertical ownership. The choice of governance/coordination system will have a significant impact on the distribution of power and control in the supply chain (Boehlje, 1999 and Peterson and Wysocki, 1997). The governance or vertical coordination system is discussed in chapter four.

Poirier (1999) presents a more practical approach that indicates the dimensions of supply chain management implementation in firms. He identifies four dimensions or levels through which a firm has to evolve to achieve advanced stages of supply chain management and to realise the rewards. These levels and the different aspects involves in each level is presented in Table 3.2.

Table 3.2: Levels of Supply Chain Optimisation

	Internal		External	
	Sourcing and Logistics I	Internal Excellence II	Network Construction III	Industry Leadership IV
Driver	Vice President Sourcing (under pressure)	CIO/supply chain leader	Business unit leaders	Management team
Benefits	Leveraged savings	Prioritised improvements across network	Better partner performance	Network advantage, profitable revenue
Focus	Inventory, logistics, freight, order fulfilment	Process redesign, system improvement	Forecasting, planning, customer services, inter-enterprise	Consumer, network
Tools	Teaming, functional excellence	Benchmarks, best practise, activity based costing	Metrics, database mining, electronic commerce	Intranet, Internet, virtual information systems
Action Area	Midlevel organisation	Expanded levels	Total organisation	Full enterprise
Guidance	Cost data, success funding	Process mapping	Advanced cost models, differentiating processes	Demand-supply linkage
Model	None	Supply Chain Intra-enterprise	Inter-enterprise	Global market
Alliances	Supplier consolidation	Best partner	Formal alliances	Joint ventures
Training	Team	Leadership	Partnering	Network processing

Source: Poirier, 1999

The levels of supply chain optimisation as proposed by Poirier (1999) approximates the definitions of supply chain management in the sense that in the lower levels the focus is on the internal logistics practices of the firm with the only external linkage that of product procurement. The next two levels (III and IV) also labelled ‘external’ occur when the business joins forces with external firms to seek the advantages of co-ordination as discussed in the definitions of supply chain management.

The first level of supply chain management implementation is primarily the responsibility of the sourcing or purchasing managers who has to ensure that the right suppliers are selected, they are meeting performance expectations, appropriate contractual mechanisms are employed, and good relationship is maintained with these suppliers (Handfield and Nichols, 1999).

The second level of supply chain management implementation concerns the enterprise as a whole. All the different functions and departments in the enterprise have to be co-ordinated to optimise cross-functional efficiency (Poirier, 1999). The value chain in the firm as defined by Porter (1998) has to be managed efficiently to reduce cycle times, reduce errors and inspection in the enterprise, lessen paperwork and inventories, and to share enhanced value across the network.

The third level of supply chain management is to establish the strategic network. The most important characteristic of this phase is that the best partners are chosen and working models established with them. This model will form the basis for expanded networks that will form the basis of the channel leadership goals of the fourth level.

3.2.3 Synopsis

The most important characteristic of supply chain management is inter-organisational cooperation. The notion of atomistic firms that interact with each other on a transactional basis is discarded for relational interaction with long-term benefits for both partners. These relational interactions are managed in the supply chain management approach to achieve the maximum long-term benefits. The governance or vertical coordination system is of particular importance as it should minimise transaction costs and maximise relational benefits.

The supply chain management process consists of different levels or dimensions that are co-ordinated to attain mutual benefit for all the players involved in the supply chain. Most writers categorise a supply chain in three broad dimensions namely those of product flow or logistics, information and supply chain relations or governance structure (Beamon, 1998; Handfield and Nichols, 1999; and Downey, 1996 amongst others). Boehlje (1999) does point out that the financial flow; incentives and

governance dimensions of the chain are closely interlinked. In view of this the three-dimension approach, namely product flow, information flow and governance structure (discussed in Chapter 4), is adopted to elucidate the nature of supply chains. The dimensions that are not explicitly included will be implicitly dealt with in later chapters as the issues are interrelated.

3.3 Product flow dimension

3.3.1 Introduction

The product flow dimension or logistics can be described as the backbone of the supply chain. The Council of Logistics Management (CLM) defines logistics as “...the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements.” (Handfield and Nichols, 1999). The logistics discipline coined the term of supply chain management, but the term has grown in meaning since then. Logistics constitute an important aspect of supply chain management. The logistic requirements of agricultural produce are unique due to the biological and mostly perishable nature of these products. Special care needs to be taken especially when transporting fresh products over vast distances to markets like the European market. There are three important decision areas related to logistics namely location, production, inventory and transportation.

3.3.2 Background

In the 1950's and 1960's, most manufacturers emphasised mass production to minimise unit production cost as the primary operations strategy, with little product or process flexibility. New product development was slow and relied exclusively on in-house technology and capacity. ‘Bottleneck’ operations were cushioned with inventory to maintain a balanced line flow, resulting in huge investment in work in progress inventory. Sharing technology and expertise with customer or suppliers was considered too risky and unacceptable and little emphasis appears to have been placed on cooperative and strategic buyer-supplier partnership. The purchasing function was generally seen as a service to production, and managers paid limited attention to issues concerned with purchasing. In the 1970's Manufacturing Resource Planning

was introduced and managers realised the impact of WIP inventories on manufacturing cost, quality, new product development, and delivery lead-time. Manufacturers responded by implementing new materials management concepts to improve performance within the four walls of the enterprise. The intense global competition in the 1980's forced enterprises to offer low cost, high quality, and reliable products with greater design flexibility. Manufacturers utilised just-in-time (JIT) and other management initiatives to improve manufacturing efficiency and cycle time. In the fast moving JIT manufacturing environment with little inventory to cushion production or scheduling problems, manufacturers began to realise the potential benefit and importance of strategic and cooperative buyer-suppliers relationship. The concept of supply chain management emerged as manufacturers experimented with strategic partnerships with their immediate suppliers. In addition to the procurement professionals experts in transportation and logistics carried the concept of materials management a step further to incorporate the physical distribution and transportation functions, resulting in the integrated logistics concept, also known as **supply chain management**. The evolution was continued in the 1990's as organisations further extended best practise management in managing corporate resources to include more sophisticated reconciliation of cost and quality considerations. Instead of duplicating non-value-adding activities, such as receiving inspection, manufacturers trusted suppliers' control by purchasing only from a handful of certified suppliers. More recently, many manufacturers and retailers have embraced the concept across the value chain (Tan, 2001).

3.3.3 Challenges for the logistical control of agricultural supply chains

Agribusiness has some characteristics that distinguish it from other industries. The most prominent ones are the perishability of the products, non-homogeneity of product quality, unpredictability of supply lead times due to seasonal influences, uncertainty in product availability, and variable product yield. (Van der Vorst, 1996, and Zuurbier *et al* 1996). These constraints are particularly pronounced for South African fresh products on global markets. Delivering fruit on these markets require consistent levels of high quality produce at competitive prices. Product quality is a prime criterion in gaining access and retaining a competitive edge on global export markets. Product quality is determined by the specific genetic characteristics and

physiological status. Inherent product quality at harvest and during storage thereafter is already affected by preharvest conditions such as soil type, relative humidity, temperature, water potential, light, frost and rainy weather at harvest, as well as cultural, disease and pest management practices. In addition, the preharvest environment, general health of the plant and production methods has a large impact on postharvest diseases and the ultimate quality of the product. Certain pathogens that cause root (or tuber), leaf, flower, fruit, pod, stalk or stem diseases before the harvest can often also cause decay of fruit and vegetables after the harvest. In the postharvest environment, vegetables can be infected by both fungal and bacterial pathogens, while fungi mostly attack fruit. The high perishable nature of vegetables and certain fruits owing to their relative high metabolic activity, high moisture content and their extreme sensitivity to physical injury and bruising during harvesting, handling and marketing makes it highly susceptible to fungal attack (Korsten, 1999). Fluctuating temperatures can cause (Ministry of Agriculture and Forestry: New Zealand, 1982):

- Increased weight loss
- Cold damage
- Condensation
- Microbial growth especially fungal if the temperature rises to -8°C or above;
- Autolytic change (internal breakdown)
- Reduced shelf life

The traditional approach to dealing with uncertainties in supply chains is to keep inventories, to create extra capacity or to create slack time. These measures lead to increased logistic costs and a reduction in the flexibility of the production organisation (Van der Vorst, 1996). Due to the limitations imposed the perishability of most agricultural produce; the pressures on modern supply chains (Zuurbier *et al*, 1996) and the high utilisation of available capacities in agribusiness, it is difficult to anticipate supply irregularities using traditional methods. If companies on agribusiness want to play a prominent role in the changing environment, the supply control of successive links in the chain needs to be coordinated (Van der Vorst, 1996)

Bender (1995) summarised the following trends in the development of logistics management in food chains:

Strategic level:

- Specialisation in commodities and equipment
- Stronger and simpler logistic interfaces
- Spread of logistic risks via several (sub) contractors

Tactical level:

- Improvement of logistic conditioning processes and equipment
- Increasing computerisation of logistic processes, including decision support systems (DSS), with incorporation of quality development of commodities n chain processes
- World wide standardised information systems

Operational level: (reduction of:)

- Defects of quantity and quality of the delivered goods
- Breakdowns of equipment
- Lead times in logistic chains
- Stocks or inventory i.e. waiting times
- Administration

Leading companies are implementing several strategies to ensure supply chain performance (Handfield and Nichols, 1999):

- Rationalising supply chains by changing locations and transportation modes;
- Reducing the buffers of inventory and tome between successive steps in the supply chain;
- Increasing the geographic and international scope of the supply chains; and
- Increasing the sophistication of the goods and services accessed through supply chains.

The importance of logistics in supply chain management is therefore to organise the movement of materials from initial raw material supplier across the chain to the ultimate end customer at the inter-organisational level (Handfield and Nichols, 1999).

3.3.4 Supply chain decisions

The cost categories for supply chains according to Handfield and Nichols (1999) are:

- 1) Manufacturing costs – purchased materials, labour, equipment charge and supplier's margin;
- 2) Movement costs – transportation cost, inventory in pipeline and safety stock cost, and duty;
- 3) Incentive costs and subsidies – taxes and subsidies;
- 4) Intangible costs – quality costs, product adaptation or performance costs, and coordination;
- 5) Overhead costs – total current landed costs; and
- 6) Sensitivity to long-term costs – productivity and wage changes, exchange rate changes, product design, and core competence.

These cost categories gives a good indication of the nature of supply chain management decisions. Supply chain management decisions can be classified into four major categories (Ganesham and Harrison, 1995):

- 1) Location
- 2) Production
- 3) Inventory
- 4) Transportation (distribution)

3.3.4.1 Location

The geographic placement of production facilities, stocking points, and sourcing points is the natural first step in creating a supply chain. The location of facilities involves a commitment of resources to a long-term plan. Once size, number, and location of these are determined, so are the possible paths by which the product flows through to the final customer. These decisions are of great significance to a firm since they represent the basic strategy for accessing customer markets, and will have a considerable impact on revenue, cost, and level of service. These decisions should be determined by an optimisation routine that considers production limitations, etc. (Ganesham and Harrison, 1995)

The nature of the product is of particular importance to agricultural related business. The following product factors are important considerations (Marx *et al*, 1998):

- The perishability of the product (especially relevant to agricultural produce)

- The mass and volume of the product, with specific reference to the change of these characteristics along the supply chain
- The size of the product, which may make it difficult to handle and transport
- The risk of pollution associated with the production, manufacturing, handling or transport of the product

3.3.4.2 Production

Production decisions include the questions of what to produce, where to produce and how much to produce. However, for a supply chain this question is very important for the sourcing of the product (Ganesham and Harrison, 1995). Companies are sourcing their products from all over the world to ensure a constant supply of products on their shelves. The sourcing of especially agricultural products has become an international industry (van Hoek, 1996).

3.3.4.3 Inventory

It is very difficult to synchronise the time of production (or acquisition) and consumption (or sales) in an enterprise. It is often not possible to exactly determine the demand for end products, and adequate inventories serve as a buffer against this uncertainty. Due to the seasonality of agricultural production it is virtually impossible to manage the marketing process without inventories. An enterprise without inventories, or with low inventory levels, is very vulnerable to out of stock costs and customers lost as a consequence. However, inventories are expensive to keep and this cost of keeping inventories has to be played off against the risks and costs of low or no inventories. (Marx *et al*, 1998 and Van der Vorst, 1996)

Inventories exist at every stage of the supply chain as either raw material, semi-finished to finished goods. They can also be in-process between locations. Their main purpose is to buffer against any uncertainty that might exist in the supply chain. Since the holding of inventories can cost anywhere between 20 to 40 percent of their value, their efficient management is critical in supply chain operations. Important aspects are the determination of the optimal levels of order quantities and reorder points, and setting safety stock levels, at each stocking location. These levels are critical, since they are primary determinants of customer service levels (Ganesham and Harrison, 1995)

3.3.4.4 Transportation

Transportation decisions are closely linked to inventory decisions since the optimal transportation mode is often a trade-off between the costs associated with the mode of transport and the indirect cost of inventory associated with that mode. Airfreight may be fast, reliable, and require less safety stocks, but is very exorbitant. Sea-freight and railways on the other hand is much cheaper, but these modes of transport will necessitate large inventories to buffer against the inherent uncertainty associated with these modes of transport (Ganesham and Harrison, 1995).

Marx *et al* (1998) identified the following principles for efficient transportation:

- Use the shortest and safest routes;
- Strive constantly to transport optimal numbers of units every time. It will be more cost-effective to wait until sufficient units are available instead of transporting only a few items at a time;
- Limit the back and forth transport of raw materials and other items to the minimum. Also try to eliminate double and in-between handling of materials, which increases the cost and lengthens the waiting and delivery times of products

3.3.5 Conclusion

Lowest cost, quality, delivery, and technological performance do not guarantee success for the supply chain. Increasingly, organisations are finding that they must also be able to compete on the basis of time. This does not mean that cost, quality, delivery, and technology consideration are no longer important. Reducing the time required to provide the end customer with products or services is one of the major forces that is leading organisations to participate in supply chain management initiatives. Adopting an integrated supply chain management approach provides the means to make a significant reductions in the cycle time required to move materials between supply chain members and the end customer (Handfield and Nichols, 1999). Given the perishable nature of agricultural produce time will always be an extremely important aspect in the logistics of agricultural supply chains.

3.4 Information dimension

3.4.1 Introduction

Information is critical in any enterprise to enable management to take informed decision. Supply chain management decisions are taken across organisational boundaries. Information is essential to enable managers to take efficient decisions in an integrated supply chain environment to manage operations and processes in the system. An effective supply chain system should therefore have some kind of inter-organisational information system (IOIS). The prevalence and application of IOISs have expanded along with the explosion of information and communication technology (ICT). The ultimate level of supply chain organisation would supply all members of the system with cost-effective and accurate information in real time (Handfield and Nichols, 1999; and Marx, 1998).

3.4.2 Definition

Uncertainty is the difference between the amount of information needed to fulfil a task and the quantity of information that is already available. This implies that the more uncertainty one faces, the more information is needed. According to this view information is seen as a steering variable responsible for the quality of the decision (Migchels, 1996). Without information, management cannot take sound decisions to further the vision, mission, and objectives of a company (Marx *et al* 1998). Perfect information would imply perfect decisions, but information is hardly ever perfect let alone sufficient. Joint initiatives and free and open exchanges of information will enable enterprises in a supply chain to improve planning capabilities; re-engineer business processes and improves the efficiency across the organisation as a whole (Migchels, 1996)

However, the demand for information is stretching beyond the needs of managers in supply chains to include the information needs of the consumer. The modern consumer demands a safe and healthy product grown in a sustainable way with high quality standards. The supply chain in turn needs mechanisms to guarantee that the product is safe, does not contain harmful substances, and is produced with environmentally friendly production practises. This implies that the production,

processing and distribution of the product must be traceable, verifiable and certifiable to the consumer (Van Roest and Engelbart, 1998; and Viaene *et al* 1997).

According to Verbeke and Viaene (2000) there are four types of information that is exchanged in a supply chain namely process information, business information, market information and traceability data. This information is utilised by the different actors in the supply chain, in Verbeke's model, the consumer markets, retailers, processing industry, and primary producers. The components of a two-way information flow in food supply chains are presented in Figure 3.3.

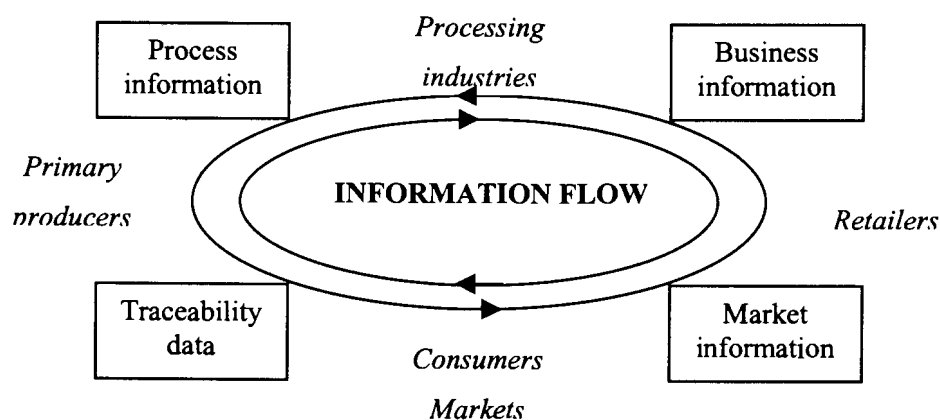


Figure 3.3: Components of a two-way information flow in food chains

Source: Verbeke, 2000

3.4.3 Information technology and information

The development and expansion of information technology application over the last few in all walks of life and enterprise has been nothing short of amazing. Information and Communication Technology (ICT) is enabling Electronic Data Interchange (EDI) between computers and enterprises in a standard format. Barcode scanning at 'Point-of-Sale' (POS), standardisation of article coding, distributed databases, and interactive production planning and –scheduling are improving the effectiveness and efficiency of supply chain decision-making and operation. All of these processes improve the delivery times and business processes in supply chains, attaining the primary

objective of speedy and efficient delivery of the product demanded by the consumer (Zuurbier *et al*, 1996).

Table 3.3: Supply Chain IOIS (Inter Organisational Information Systems) Information Categories

Information categories	Examples of Information Contained in Category
Product information	Product specifications, price/cost, product sales history
Customer information	Customer forecasts, customer sales history, management team
Supplier information	Product line, product lead times, sales terms and conditions
Product process information	Capacities, commitments, production plans
Transportation information	Carriers, lead times, cost
Inventory information	Inventory levels, inventory carrying costs, inventory locations
Supply chain alliance information	Key contacts for each organisation, partner roles and responsibilities, meeting schedules
Competitive information	Benchmarking information, competitive product offering, market share information
Sales and marketing information	Point-of-sales information, promotional plans
Supply chain process and performance information	Process descriptions, performance measures, cost, quality, delivery, time, customer satisfaction, etc.

Source: Handfield and Nichols, 1999

EDI describes both the capability and practice of communication information between two organisations electronically instead of the traditional forms of mail, courier, or

fax. Capability refers to the ability of the various members of the supply chain to use their computer systems to communicate effectively, whereas practise refers to the ability of the members of the supply chain to willingly share and effectively utilise the information exchanges. EDI is used to link supply chain members together in terms of order processing, production, inventory, accounting, and transportation (Handfield and Nichols, 1999).

The benefits of EDI are numerous including (Handfield and Nichols, 1999):

- Quick access to information
- Better customer service
- Reduced paperwork
- Better communications
- Increased productivity
- Improved tracing and expediting
- Cost efficiency
- Competitive advantage
- Improved billing

The types of information demanded and exchanged in the information exchange systems in supply chains are represented in table 3.3.

3.4.4 Conclusion

Information sharing among the members of a supply chain will remain a fundamental requirement for the success of a supply chain. Information enables managers in decision making across functions and enterprises to improve the efficiency of the supply chain. Information is also fundamental to fulfil the need of the consumer for certification and quality assurance. Information systems should enable enterprises to trace, verify and certify the food production process to ensure the health of the consumer. Supply chain management initiatives are unlikely to succeed without the appropriate information, information systems and the technology to support them.

3.5 Trust

In most discussions on supply chain management trust is seen as one of the success factors (Zuurbier *et al* 1996). Trust seems to be the glue that keeps relationships together (Nooteboom, 1999). Trust is not easy to define, identify or to measure. The elements of trust will vary according to the specific situation (Handfield and Nichols, 1999). The advantages and effects of trust in relationships are explored before the concept is defined.

Trust implies that the risk of opportunistic behaviour by one of the partners in the alliance is perceived as very low. When partners trust each other the importance of control in the relationship is made redundant. Consequently the costs associated with control are also reduced (Zuurbier *et al*, 1996). The advantages of trust as discussed by Nooteboom (1999) can be summarised as follows:

- Economises the specification and monitoring of contracts
- Material incentives for cooperation and reduces uncertainty
- Flexibility advantage in comparison to detailed formal contracting that is difficult to modify when the conditions change
- Detailed formal contracting starts a contract on a footing of mistrust
- Lowered costs of search and monitoring because trusting people are less secretive
- Higher efficiency due to better information sharing between organisations
- Partners will deliberate and negotiate on a basis of give and take rather than exit (walk out) when conflict arises

However, it has to be recognised that an individual or organisation is exposed to the risk of betrayal. Trust can therefore be defined as accepting or neglecting the possibility that things will go wrong. Trusting implies that the organisation or an individual is more exposed and vulnerable to the actions of another because the 'trusting' organisation does not engage in risk reduction, avoidance or transfer actions (Blois, 1998).

Crotts and Turner (1999) presented the following summary of the most cited definitions for trust as:

- A willingness to rely on an exchange partner in whom one has confidence;
- One party believes that its needs will be fulfilled in the future by actions taken by the other party;
- A party's expectation that another party desired coordination, will fulfil his/her obligations and will pull its weight in the relationship; or
- The belief that a party's word or promise is reliable and a party will fulfil his/her obligations in an exchange relationship.

Deutsch (1962, quoted in Nooteboom 1999) defines trusting behaviour as actions that (1) increase one's vulnerability (2) to another whose behaviour is not under one's control (3) in a situation where the penalty one suffers if the other abuses that vulnerability is greater than the benefit one gains if the other does not abuse vulnerability. Tregurtha and Vink (1999) argue that the concept of trust consists of two aspects namely the acceptance of relational risk and secondly that the other party, aware of the relational risk exposure, will not behave opportunistically if presented with the option. Trust cannot only be limited to the expectation that the other party will not act in bad faith, but should include a positive expectation of goodwill (Blois, 1998; and Crotts and Turner, 1999). Thus the definition has to be expanded to include an expectation of goodwill as well.

From an economics perspective we instinctively relate trust directly to risk as a subjective probability that something will not go wrong. This is an appealing idea but it would assert trust as calculative, obeying customary estimation of ordinary probabilities. Trust can also be based on routine, lack of awareness, naivety or emotional or ethical commitment (Weber, 1998, and Nooteboom, 1999). The basis for trust can be tacit or explicit and rational. Tacit or implicit trust cannot be subjectively evaluated and measured.

Nooteboom (1999) distinguishes between trust, confidence, relational trust and organisational trust. Trust refers to the relations we engage in by our own choice based on a subjective assessment whether the relational partner is 'trustworthy'. Confidence on the other hand refers to the continuity of the natural and moral order i.e. nature, God, government and the legal system. If things go wrong an actor does

not ascribe it to a lack of judgement on the actor's part (Weber, 1998). Organisational trust is seen as a constellation of behavioural trust. An organisation cannot 'trust' another organisation. The people in an organisation can trust the people in another organisation, but within the structure and culture acting as institutions to guide the behaviour of staff. Therefore organisational trust is a constellation of behavioural trust exhibited by the management and staff (especially the 'gatekeeper' staff functions like purchasing, marketing, and negotiating) within the bounds imposed by the structure and culture (institution) of the organisation.

Trust can be subdivided in three levels namely macro level- (institution based); meso level- (characteristics based); and micro level trust (process based) (Nootboom, 1999; and Tregurtha and Vink, 1999). The institutions based trust is generated by confidence in the 'formal structures' of society and the ability of these structures to enforce sanctions when trust is breached. Characteristics based trust is based on the characteristics (competence and reputation) of the transacting parties (Crotts and Turner, 1999; and Selnes, 1998). Process based trust results from continuous interaction between organisations. The organisations trust each other incrementally based on the experience of several previous transactions. The extent, riskiness, and intensity of the interaction determine the intensity of the resultant trust. Williams (1998 in Nootboom, 1999) presents the sources of cooperation in table 3.4:

Table 3.4: Sources of cooperation

	Macro	Micro
Egotistic	Coercion or fear of sanction from some authority (God, law)	Material advantage or 'interest'
Non-egotistic	Ethics: values, norms of proper conduct	Bonds of friendship, kinship or empathy

Source: Williams (1988) cited in Nootboom (1999)

Trust can also be seen in an operational perspective (Nootboom, 1999). The 'drivers' of trust are especially identified by the emerging discipline of relationship marketing (Selnes, 1998; and Young and Wilkinson, 1989). These 'drivers' give good indication of the practical implication of trust in the daily operation of a

business. Selnes (1998) uses the following model to illustrate the drivers for ensuring continuous relationship marketing:

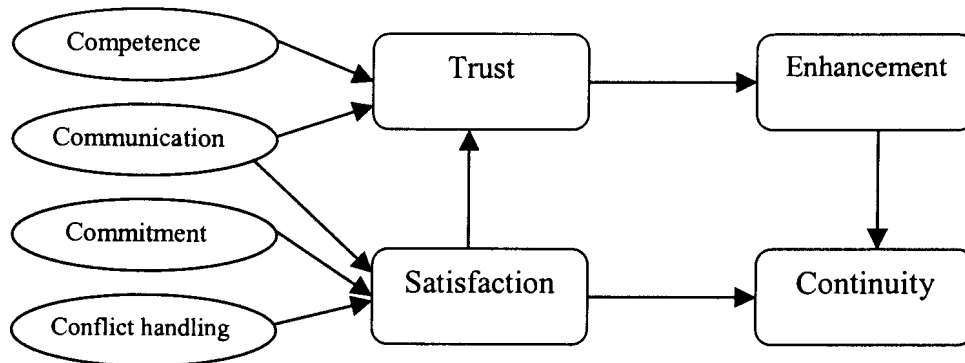


Figure 3.4: A theoretical model of antecedents and consequences of trust and satisfaction in buyer-seller relationships

Source: Selnes, 1998

This model illustrates that relationship continuity is a function of 'enhancement', the intention of the parties to extend the relationship, and satisfaction. However, Selnes (1998) found that trust is a function of satisfaction which both improve the likelihood for relationship enhancement and continuity. It is important to note that reliability, integrity and confidence are measures of trust and not the sources of trust. Deutsch is also criticised for his 'operational approach', which considers the sources of trust rather than the 'construct' of trust (Young and Wilkinson, 1989; and Selnes, 1998). However, the causes (sources) of trust indicated by Selnes (1998) as competence and communication and commitment and conflict handling provides a practical approach for the establishment of trust in day-to-day business relationships. Handfield and Nichols provide the following construct for ensuring trusting relationships between businesses:

- **Reliability**

As indicated earlier, trust depends on the prior contact that organisation or individual had experienced with another individual. The important guideline is to follow through on your commitment, and act in a predictable manner.

- **Competence**

Competence is a subjective estimation by one organisation or person of another's ability to meet its commitments. Organisations should choose a supply chain partner with a documented record of experience in the technology and also that the partner is assigning competent, knowledgeable, and experienced people to manage the relationship.

- **Affect-based trust “goodwill”**

Affect-based trust refers to the emotional investment that develops between individuals that trust each other. This bond defined by common mutual norms, sentiments, and friendship. It is therefore important to select an individual with a high level of knowledge of the technology or function, but also good people skills and good commonsense knowledge.

- **Vulnerability**

Any supply chain is susceptible to several vulnerabilities or risk in the supply chain. Vulnerability is an integral aspect of trust as discussed earlier. The perception of vulnerability needs to be carefully managed by supply partners through information sharing, which assures the other partner that its interests will be protected.

- **Loyalty**

In long-term relationships with other organisations a certain degree of faith is built up over time. This faith is based on the belief that the supply chain partner will also support you in adverse circumstances. A supply chain partner should show genuine responsiveness to the other partner's needs and demand the same if necessary to build an understanding of loyalty.

The concept of trust therefore reduces competitive behaviour in the sense that economic actors will pursue other goals than short-term profits alone. This presents the opportunity for a range of transaction governance structures other than that of a purely competitive market where actors make decision based on price alone. Actors therefore take a strategic and long-term perspective on their interaction and coordination. They trust each other to avoid short-term opportunistic behaviour in favour of long-term strategies and profitability. (Tregurtha and Vink, 1999; Trienekens and Zuurbier, 2000; and Furubotn and Richer, 1998)

3.6 Conclusion

In this chapter supply chain management is defined as the integrated planning, coordination and control of all logistical business processes and activities in the supply chain to deliver superior customer. The most important characteristic of supply chain management is inter-organisational cooperation and collaboration. Three broad dimensions to supply chains are defined namely product flow or logistics, information and supply chain relations or governance structure (detailed discussion in Chapter 4).

The product flow dimension utilises superior cost, quality, timeliness, delivery, and technological performance to enhance supply chain competitiveness. Adopting an integrated supply chain management approach provides the means to make a significant reductions in the cycle time required to move materials between supply chain members and the end customer.

Information sharing among supply chain participants is a fundamental requirement to the success of a supply chain. Information improves the efficiency of the supply chain and fulfils the need of the consumer for traceability, certification and quality assurance. Technology plays an important role in supply chain information and is reviewed in Chapter 5.

Trust is an essential component of closer collaboration and coordination between supply chain participants. The role of trust in supply chains is discussed as an introduction to governance structures in agribusiness. The advantages of trust are that it economises the specification and monitoring of contracts, it gives material incentives for cooperation and reduces uncertainty, it enhances flexibility as opposed to detailed formal contracts which are difficult to modify when the conditions change, it lowers costs of search and monitoring because trusting people are less secretive and it increases supply chain efficiency because of better information sharing between organisations.

Chapter 4: Governance structures in Agribusiness

Chapter 4: Governance structures in Agribusiness

“...The productivity of an economic system depends on specialization. But specialization depends on exchange. And the lower cost of exchange (transaction cost as they have come to be called) the more specialization there will be, the greater the economy and the higher the standard of living of people in that economy. However, the level of transaction costs depends on the institutions of a country, its legal system, its political system and its culture...” Ronald Coase (1998)

4.1 Introduction

In the previous chapter the different dimensions of the supply chain were discussed. The necessity to coordinate these activities and processes across firm and functional boundaries was pointed out.

In this chapter the evolution and nature of the institutions that facilitate vertical coordination are addressed. The purpose of this chapter is to show how relationships (vertical coordination) evolve over time, to identify the possible institutional structures for governing vertical coordination and to develop a theoretical framework analysing optimal governance structures.

North (1990:3) describes institutions as “the rules of the game in a society or, more formally, [are] the humanly devised constraints that shape human interaction.” These structures prohibit, permit, or require certain actions and provide the incentives for exchange on political, social and economic level. Institutions arise to reduce the costs of uncertainty, information and transaction. Institutions can be either formal or informal. Formal institutions comprise laws and regulations and informal institutions refer social conventions and codes of behaviour. (North, 1990, and Ortmann, 2000) Firms maximise profits by making choices within the constraints set out by formal and informal institutions. Governance structures are the set of choices used by firms, in the larger institutional context, to reduce transaction costs. Therefore governance structures are the institutions used by firms to align direction and control of resources across firm and functional boundaries. The nature and evolution of these institutions between firms in supply chains are discussed in this chapter.

4.2 Relationships in agricultural supply chains

Supply chain relationships have to be based on good reasons or benefits to the co-operating organisations to ensure the viability and sustainability of the co-operative relationship. The relevance and importance of cooperation is summarised by Zuurbier *et al* (1996) as:

- The considerable rate of technological development in products, processes, and information;
- Increasing capital intensity of production and product development;
- Increasing diversity in products under the pressure of technology push and market pull;
- Increasing (international) competition due to, amongst others, saturated markets and trade liberalisation;
- High commercial risks because of shorter product life cycles, diversity and capital intensive investments;
- High measure of mutual dependency due to the unique characteristics of agricultural produce; and
- High demands by consumers and society in terms of product safety, health, and environmentally friendly production processes.

Cooperation between firms aims to, and is observed, in the success of the technology-product-market-combination which is induced by the co-operative relationship. Additional consequences can result from:

- More technological possibilities;
- More products and product variations;
- Better products;
- Extended marketing opportunities; and
- More efficient production processes.

(Zuurbier *et al* 1996)

The most important ingredient for successful supply chain relationship is a trusting relationship (Handfield and Nichols, 1999). Supply chain management is built on a foundation of trust and commitment. Trust contributes significantly to the long-term stability of an organisation. Trust is conveyed through faith, reliance, belief, or

confidence in the supply chain partner and is viewed as a willingness to forego opportunistic behaviour. Trust is simply the belief that the supply chain partner will act in a consistent and predicable manner (Spekman *et al* 1998).

Co-operative (trusting) relationships between organisations entail dynamic interaction between the organisations. These relationships with other enterprises are built or evolve over time (Zuurbier *et al*, 1996). It therefore takes time to progress from a market supplier to collaboration with the supplying or buying organisation as a supply chain partner. This process is represented in Figure 4.1:

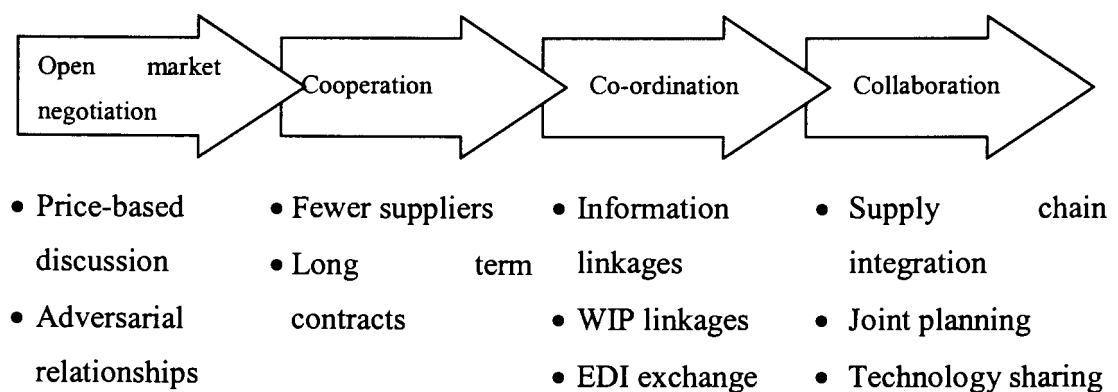


Figure 4.1: The key transition from open market negotiations to collaboration

Source: Spekman, Kamauff and Myhr, 1998

The transformation is presented as a linear process, but a step-wise process would give a better perspective of the organisations moving from one level to the next. The promotion from the one level to the next requires a mind set and strategic orientation change among the supply chain partners. Most firms co-operate and co-ordinate amongst each other in terms of contracts, information and logistical processes to a greater or lesser degree. However the movement from co-ordination to collaboration requires levels of trust and commitment that goes beyond mere co-ordination (Spekman *et al* 1998). The different forms of co-ordination are discussed later in the chapter.

Handfield and Nichols (1999) identify three dimensions to the development of successful coordination namely the strategic, process and operational dimensions. As

a coordinated relationship between firms develops these three dimensions go through different stages i.e. alliance conceptualisation, -pursuance, -confirmation and -implementation/continuity.

The strategic dimension involves the strategic expectations and evaluations of coordination effectiveness as the coordination effort progresses through the development stages. The process dimension outlines the stages of development that shows the required for formation, implementation, and maintenance of coordination. The operational component positions the development of search and selection criteria and operating standards for managing coordination (Handfield and Nichols, 1999).

The different levels of coordination development firstly involve the conceptualisation of the coordination effort. The reasons and envisaged benefits of collaboration are evident to the firm and recognised as an attractive alternative to the current arrangement. The second level is that of alliance pursuance where the firm establishes the strategic and operational considerations that will be used to select the coordination partner. The third level is concerned with coordination confirmation through negotiated strategic and operational expectations between the managers of the negotiating parties. In the final level of coordination implementation/continuity feedback mechanisms have to be implemented to assess performance continually to determine the efficiency and effectiveness of the coordinated effort. The general coordination development model is presented in Figure 4.2

The first level of coordination development is initiated when the organisations realise that a major strategic change is necessary to improve performance. These changes can be changes on the competitive actions of global forms, industry consolidation, alternative distribution and retail formats or major technological change in an industry. Changing market needs and seeking new ways to ensure consumer satisfaction is also a major driver of supply chain emergence. The changes in the agricultural sector driving the supply chain revolution are discussed in greater detail in the introductory chapter. These changes create the awareness of a problem, but managers must also be convinced that a possibility for an improved system exists. As with any change risk is also an important consideration and the possible benefits

should be weighed off against the risks that are incurred by the supply chain initiative (Handfield and Nichols, 1999).

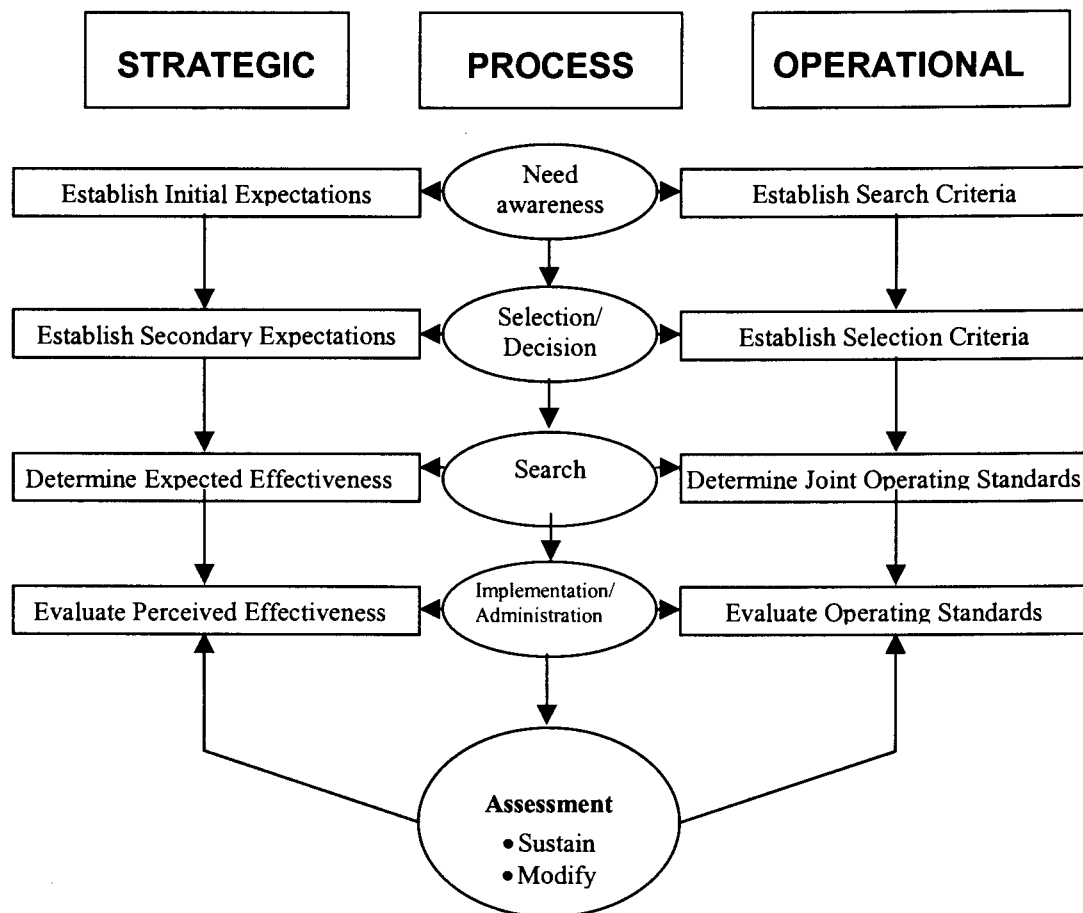


Figure 4.2: General Alliance Development Model

Source: Scmitz, Frankel, and Frayer (1995)

The second level of coordination development or pursuance entails the process of clarifying and defining new strategies for the coordinated relationship. Firms develop a clear view on the goals that they want to achieve in the alliance. These goals are used to develop criteria to enable the firm to effectively identify possible partners for an alliance. In this way the possible partners for coordination is reduced. This process is important to identify the priority areas for effective alignment between the organisations. Firms usually employ the following measures to evaluate the characteristics of a firm for successful alignment for the possibility of a partnership (Handfield and Nichols, 1999):

- Company profile information
- Management capability
- Personnel capabilities
- Cost structure
- Total quality management philosophy and programs
- Process and technological capability
- Environmental regulation compliance
- Financial capability/stability
- Production scheduling and control systems
- Information systems capability
- Supplier sourcing strategies, policies, and techniques
- Long term relationship potential

After the firm successfully identified a partner the two partners in the relationship has to determine the terms of coordination. The partners can use several forms of governance structure to manage the relationship. These governance structures are discussed in the next section. The factors that have to be managed by the governance structure are amongst others (Handfield and Nichols, 1999):

- The length of the relationship and under what conditions the alliance should be terminated;
- How to manage power imbalances when one party has more power than the other in the relationship;
- How to manage managerial imbalances when alliance partners fail to provide equal managerial support in terms of the number of key contacts within each of the organisations;
- How to manage conflict when one supply chain member acts contrary to the alliance understanding;
- How to share profits and costs that ensue from the efforts of the alliance;
- How to match the managerial styles and corporate cultures of the parties engaged in the alliance.

The partners have to operationalise these aspects in terms of the following aspects:

- Assignment of roles and responsibilities in the alliance
- How to measure, specify and quantify operational performance
- Extent and processes of information sharing and transfer
- Communication systems between the parties to ensure that employees understand and contribute to the goals of the alliance

On the final level of coordination formation the results from the previous three levels has to be implemented and continuity ensured. Partners should perform ongoing assessment of perceived alliance effectiveness, revise strategic goals and operating standards based on competitive conditions and changing needs, view the alliance as a permanent system that continually moves between assessment and administration, and to sustain the alliance until the alliance is modified or terminated because it has outlived its strategic competitiveness.

Hughes (1996) identified the following key factors for building successful commercial partnerships:

- Pick a winner – a partner with a track record of success and big aspirations
- Clear benefits for each partner
- Focus on a few partnerships – adopt the rifle approach, not the blunderbuss
- Partners must have good strategic fit – complementary strengths
- Quality leadership – make it difficult for others to follow by delivering quality products with quality service
- Build communication links at all levels between partners – not just at boss level
- Partners should hold same long term objectives
- Build flexible organisations that meet the specific needs of each partnership
- Basic business proposition must make long term commercial sense

The partnerships observed between firms is usually facilitated in some kind of institutional structure – spot market, contracting or vertical integration (Williamson, 1991). Peterson, Wysocki and Harsh (2001) expand these options into a range of possibilities for coordination namely spot/cash market, specifications contract,

relation-based contracts, equity-based alliances and vertical integration. These structures are also referred to as 'governance' structures i.e. the structures that govern the exchange relationships between firms.

4.3 Theoretical approaches for analysing governance structures

Vertical coordination can be defined as the alignment of direction and control across segments of a production/marketing system. The factors that are aligned and controlled are price, quantity, quality, and terms of exchange (Peterson, Wysocki and Harsh, 2001). Hobbs and Young (1999) adds that vertical coordination includes all the ways of harmonising the vertical stages of production and marketing.

The vertical coordination between firms is managed by an institutional structure which governs the actions, rights and responsibilities of the respective partners in the exchange. These institutional structures are known as 'governance structures', which can be arranged on a continuum ranging from spot-market transactions at the one extreme to vertical integration at the other. The extent of the administrative control seems to be the most basic distinguishing criterion that determines the degree of coordination between organisations: ranging from no control from A to B, to complete ownership and control of A over B (Zuurbier, 1996). Williamson developed the idea of a continuum in his writings on transaction cost economics (Zuurbier, 1996; Hobbs and Young, 1999; Peterson and Wysocki, 1997). In this section governance structures are discussed from a transaction cost, agency and strategic perspective.

4.3.1 Transaction cost approach to governance

In recent years, economists have given increasing attention to the microeconomic organisation between firms as the importance of institutions in economic performance become evident (Williamson, 1991, Coase, 1992). This new set of ideas used to explain the governance aspects of the agroindustrialisation process are collectively known as New Institutional Economics (Cook and Chaddad, 2000). Ronald Coase is generally regarded as the father of NIE with his seminal article "The Nature of the Firm" (Coase, 1937). Various writers started to publish on similar topics using roughly similar principles. It is only since the 1960's that the field have become

known under the general designation of New Institutional Economics (Dorward, *et al* 1998).

Coase (1992) indicates that most of the economic analysis in the neoclassical economics framework focused (and still focuses) on the determination of prices and output by the 'invisible hand' of the market. The firm is regarded as a 'black box' in which the factors of production are transformed into products and neither the firm, nor the market is clearly defined. Coase noted that most of the resources in the modern economy are employed within firms and the allocation of these resources are determined by administrative systems and not the market. The efficiency of the economic system therefore also depends on the efficient allocation of resources within firms and needs serious consideration (Coase, 1992; and Williamson, 1991). The question arose that if resource and output are guided by a system of prices, why do firms, and management within firms, exist? The simple answer to this question is that there are costs associated with using the pricing mechanism. These refer for example to the cost of discovering what prices should be, the cost of negotiating individual contracts for each exchange transaction and the costs of accurately specifying the details of a transaction in a long-term contract (Hobbs, 1996). These costs came to be known as transaction costs. The avoidance of these costs is the origin of the firm and the different governance structures between firms. (Coase, 1992). The limiting assumptions of neoclassical economics excludes the analysis of firms and their behaviour in exclusion of price behaviour. The single product firm, operating in a perfectly competitive environment is central to the neoclassic research paradigm. This approach assumes a large number of producers producing a homogenous product under similar conditions and cost conditions. The producers sell their produce to a large number of buyers exhibiting the same demand preferences and none of them large enough to have appreciable market power (Hobbs, 1996). The characteristics of a neoclassic transaction are (Hobbs, 1996):

- Homogeneous product and therefore no costs associated with quality measurement;
- Products with quality differences are regarded as distinct different markets;

- Economic agents possess perfect information and do not have to account for price-, product characteristic- or competitor and trading partner behavioural uncertainties;
- Transactions occur in present time between multiple buyers and sellers excluding the possibility of increased market power buy any of the buyers or sellers;
- Equilibrium and marginal cost focussed; and
- Transactions occur in a frictionless (transaction costless) environment.

Williamson (1996) argues that institutions in general have the effect of minimising transaction costs and thus improving economic performance beyond that which is possible in “neo-classical” markets. The economic institutions of capitalism have the main purpose and effect of economising on transaction costs. Williamson (1991:102) concludes that “(1) firms are not merely extensions of markets but employ different means, (2) discrete contract law differences provide crucial support for and serve to define each generic form of governance, and (3) marginal analysis is typically concerned with second-order refinements to the neglect of first-order economizing.” This implies that the New Institutional Economics is concerned with the qualitative institutional analysis in which structural alternatives are compared in stead of the quantitative equilibrium seeking analysis of the neoclassic Economics. The transaction, and the costs associated with transactions, are the unit of analysis for the New Institutional Economics school.

Hobbs (1996:17) define transaction costs as: “simply the costs of carrying out any exchange, whether between firms in a marketplace or a transfer of resources between stages in a vertically integrated firm, when the neoclassical assumption of perfect information is relaxed.” These costs arise whenever a transaction takes place whether it takes place in a market or command economy, or in a vertically integrated firm (Hobbs, 1996).

There are costs associated with transaction in the exchange process. The exchange relationship between actors in a supply chain are characterised by the following important stages (Jaffee, 1995:26):

- **searching** for exchange opportunities and partners,
- **screening** information about the products/parties one wishes to deal with,
- **bargaining** over the terms of trade,
- **transferring** the goods, services, titles, cash, etc.,
- **monitoring** the exchange to assess whether the agreed terms are complied with,
- **enforcing** the stipulated terms.

Table 4.1 Transaction costs in a commodity trading setting

Type of Transaction Cost	Source/Origin of Costs	Tangible Forms of Transaction Cost
Search Costs	Lack of knowledge about opportunities (e.g. products, prices, demand, supply, trading rights, market outlets)	Personal/Personnel Time Travel Expenses Communication Costs
Screening Costs	Uncertainty about the reliability of potential suppliers/buyers Uncertainty about the actual quality of goods/services offered	Consulting Service Fees Advertising/Promotion Cost Cost of Credit Ratings
Bargaining Costs	Conflicting objectives and interest of transacting parties Uncertainty about the willingness of others to trade on certain terms Uncertainty over transactor rights and obligations	Licensing Fees Insurance Premiums
Transfer Costs	Legal, extra-legal or physical constraints on the movement/transfer of goods	Handling/Storage Costs Transport Costs Bribery and Corruption Expenses
Monitoring Costs	Uncertainty about transactor compliance with specified terms Uncertainty about possible changes in the quality of goods and services	Auditing Fees Product Inspection Charges Investment in Measurement Devices
Enforcement Costs	Uncertainty about the level of damages/injury to a transacting party arising from contractual non-compliance Problems in exacting penalties through bilateral arrangements or through use of third parties	Arbitration, Legal, Court Fees Costs to Bring Social Pressure

Source: Jaffee (1995)

Transaction costs are incurred at each of the stages in the exchange process. These costs include the whole array of costs associated with buying, selling and transferring of ownership of goods and services. These costs are incurred when gathering information, when identifying and screening potential trade opportunities, outlets and partners, when negotiating trading agreements, transferring goods, services, and ownership rights, and when monitoring the conditions that were negotiated (Jaffee, 1995). The types of transaction costs, their origins and possible tangible forms these costs may take, are presented in table 4.1.

Discrete alternative governance structures

As shown earlier, economic institutions exist to minimise the cost of doing transactions in the market and thus improve economic performance. The economic institutions of capitalism have the main purpose and effect of economising on transaction costs. These institutions are discussed as discrete structural alternatives in this section.

Discrete structural alternatives are used to compare institutions in lieu of satisfactory means to describe the continuous variation over the spectrum of possible governance structures. Williamson (1996) identifies three generic discrete structural governance alternatives – market, hybrid, and hierarchy. The predictive ability of the transaction cost approach lies in the difference in transaction costs and competencies which discriminates between the optimal (minimised) alignment of these costs to governance structures.

Williamson (1996) argues that adaptation is central to the economic problem as the survival of the firm depends on its ability to adapt to changing circumstances. In the neoclassical paradigm this involves the process by which producers and consumers respond independently to price changes to maximise their respective profits and utility. This is autonomous adaptation denoted by (A). This kind of adaptation is efficient and sufficient according to the neoclassical approach. However, as pointed out earlier, the basic assumptions of the neoclassical economics are easily violated. Some disturbances in the economy will require coordinated adaptation because autonomous parties interpret and react differently to limited price signals. Actors in

exchanges sometimes need to coordinate to avoid sub-optimisation due to transactions that are maladapted to the environment during the bargaining interval. Firms should therefore employ other mechanisms to facilitate the efficient adaptation of processes, products and transactions to remain competitive in the changed environment. Williamson refers to this adaptation as (C) where (C) denotes cooperation. Cooperation implies a purposeful, deliberate and conscious effort to create adaptive internal coordinating mechanisms as independent adaptations would result in imperfect realignment and organisations could operate at cross-purposes.

Markets are very efficient and effective in facilitating adaptation in (A) respects. Incentives to guide the adaptation are transmitted clearly and strongly by market prices. “Other autonomous traders have neither legitimate claims against the gains nor can they be held accountable for the losses” (Williamson, 1996: 103). However, matters become more complicated in the case of (C) adaptation. Partners involved in the (C) adaptation are bilateral dependent. The use of other, more formal, governance mechanisms, like vertical integration, are more advantageous as bilateral dependency builds up. (C) adaptation, however, comes at a cost. Divisions in the firm can lay claim to the advantages realised, or avoid culpability for losses incurred, because of the vague causal profit or loss relationships to initiatives. The headquarters will have to allocate profits and losses, usually through arbitration, between the different actors involved. Autonomy is replaced by a hierarchical structure which result in degraded incentive intensity and added bureaucratic costs. (Williamson, 1996 and 1991)

Hybrid organisations display intermediate values for the type (A) and (C) adaptation, incentives and administrative controls. Autonomy between the actors in the exchange is preserved which enables firms to react in type (A) adaptation because of the effective translation of incentives. The bilateral dependency between the firms require long-term contracts to be safeguarded by contracts and administrative or bureaucratic apparatus. This, again, reduces the incentive intensity. The advantages that hierarchy enjoys over hybrid with respect to bilateral dependency is that internal contracts can be less complete. Adaptations to disturbances are less costly because (Williamson, 1996:105):

1. “proposals to adapt require less documentation,

2. resolving internal disputes by fiat rather than arbitration saves resources and facilitates timely adaptation,
3. information that is deeply impacted can more easily be accessed and more accurately accessed,
4. internal dispute resolution enjoys the support of informal organisation, and
5. internal organization has access to additional incentive instruments – including especially career reward and joint profit sharing – that promote a team orientation.”

Table 4.2: Distinguishing attributes of market, hybrid, and hierarchy governance structures

Attributes	Governance Structure		
	Market	Hybrid	Hierarchy
Instruments:			
Incentive intensity	++	+	0
Administrative controls	0	+	++
Performance attributes:			
Adaptation (A)	++	+	0
Adaptation (C)	0	+	++
Contract law	++	+	0

++ = strong; + = semi-strong; 0 = weak

Source: Williamson, 1996

The market and hierarchy are characterised by attributes at the opposite ends of the poles. The hybrid governance structure is characterised by semistrong incentives, an intermediate degree of administrative apparatus, and semistrong adaptive ability in both (A) and (C) adaptation, and it operates in a semi-legalistic contract law regime. (Williamson, 1991 and 1996)

Transaction cost economics describes transactions in terms of three dimensions namely (1) the frequency with which the transactions recur, (2) the degree and type of uncertainty to which they are subject, and (3) the condition of asset specificity

(Williamson, 1996). All of these are important in predicting governance structure, but economics attach special significance to asset specificity. Four distinct types of relationship specific investments are identified by Joskow (1993:126) to describe the variations in the importance of asset specificity:

1. Site specificity: The buyer and seller are in a “cheek-by-jowl” relationship with one another, reflecting ex ante decisions to minimize inventory and transportation costs. Once sited, the assets in place are highly immobile.
2. Physical asset specificity: When one or both parties to the transaction make investments in equipment and machinery that involves design characteristics specific to the transaction and which have lower values in alternative uses.
3. Human asset specificity: Investments in relationship-specific human capital that often arise through a learning-by-doing process.
4. Dedicated assets: General investments by a supplier that would not otherwise be made but for the prospect of selling a significant amount of product to a particular customer. If the contract were terminated prematurely it would leave the supplier with significant excess capacity.

Williamson (1996) adds brand name capital and temporal specificity which can be described as a kind of site specificity to which timely response by on-site human assets have been added. Bilateral dependency deepens as asset specificity increases. In the neoclassic market the identity of buyers and sellers is irrelevant as asset specificity is assumed to be insignificant. When firms invest in transaction specific assets identity starts to matter as assets lose productive value when reallocated to the second best alternative use by the second best user.

When classic markets work well, (A) type adaptation occurs at the lowest cost as independent actors adapt to exogenous disturbances. Internal organisation incurs higher costs as hierarchies are subject to higher bureaucratic costs to which no added benefit can be ascribed. When asset specificity, and consequently bilateral dependence, increases as the market require a more coordinated response to exogenous disturbances the high power incentive structure of the market impede effective adaptation. The cost of misalignment between parties increase as the need for type (C) adaptation increases up to the point where internal control or bureaucratic costs would be lower than the cost of misalignment. At this point the transactions

should be governed by a hierarchy rather than the market since the added bureaucratic costs are less than the bilateral adaptive gains that result.

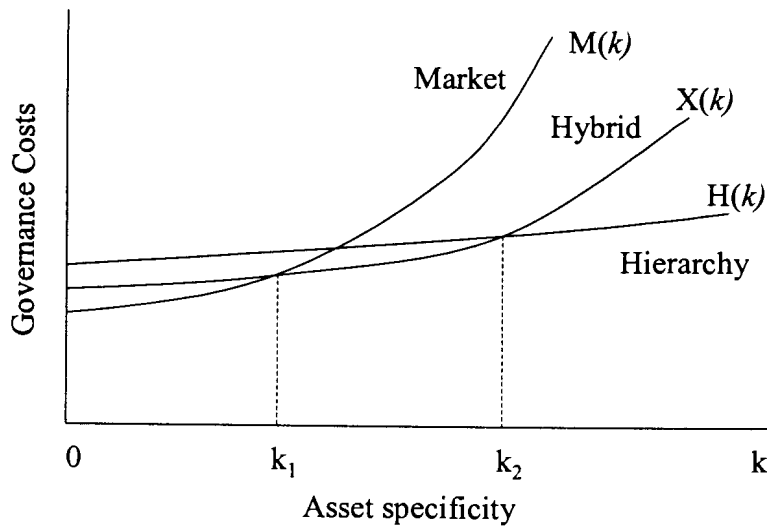


Figure 4.3: Governance cost as a function of asset specificity

Source: Williamson, 1996

Let the market governance costs be denoted by $M = M(k; \theta)$ and hierarchy governance costs by $H = H(k; \theta)$ with k denoting asset specificity and (θ) denote vector shift parameters. When each mode is assumed to choose the same level of asset specificity the following comparative-cost equations are obtained: $M(0) < H(0)$ and $M' > H' > 0$. $M(0) < H(0)$ denotes that bureaucratic costs of internal organisation exceed the costs of the market because the market's efficiency in facilitating type (A) adaptation (when asset specificity is negligible). $M' > H' > 0$ shows the inefficiency of the market to facilitate type (C) responses to exogenous disturbances. When asset specificity and bilateral interdependence becomes significant the costs of internal control is offset by bilateral adaptive gains. The hybrid structure is situated somewhere between the market and hierarchy. Transactions which require adaptation which are neither autonomous or coordinated can be organised in the hybrid mode. If $X = X(k; \theta)$ denotes the governance costs of the hybrid mode then it can be assumed that $M(0) < X(0) < H(0)$ and $M' > X' > H' > 0$ as observed in Figure 4.3. The most

efficient governance structure dictated by asset specificity (k) where k^* is the optimal level would therefore be a market for $k^* = k_1$; hybrid for $k_1 < k^* < k_2$; and a hierarchy for $k^* > k_2$.

The exogenous disturbances that requires adaptive actions by firms to remain competitive introduces uncertainty as another dimension with regards to governance structure. This uncertainty can take two forms namely an increase in the occurrence of the disturbance and the consequence intensity of the disturbance. All of the governance structures are influenced negatively by disturbances in the system, but the hybrid mode is the most susceptible to an increase in uncertainty. Hybrid adaptations cannot be made autonomously as with market governance, or by command as in hierarchical governance, but have to be made by mutual consent. This process takes time and an increase in disturbances or uncertainty render the hybrid mode nonviable. The influence of disturbance frequency and asset specificity on organisational form can be viewed in Figure 4.4.

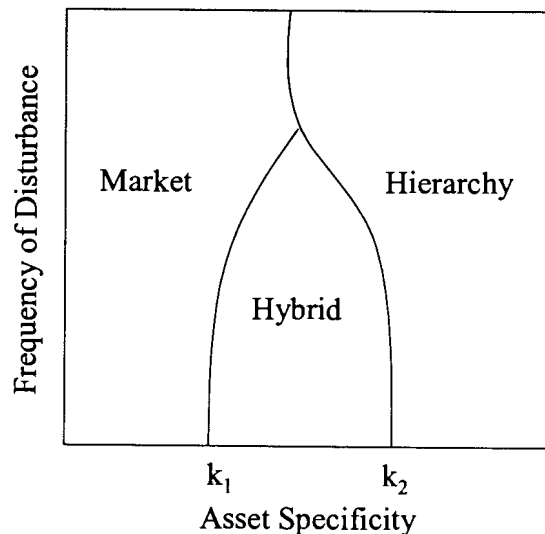


Figure 4.4: Organisation form responses to changes in frequency

Source: Williamson, 1996

4.3.2 Agency theory approach to governance

Transaction costs economics uses primarily asset specificity, environmental uncertainty and small numbers bargaining to predict governance outcomes. Agency theory uses asymmetric information and outcome uncertainty. The firm or supply chain is approached as a nexus of contracts among various participants. (O’Keeffe, 1999) Each link in the supply chain comprises a participant (the principal) that delegates an assignment to another (the agent). The theory deals with the contract between these two parties and seeks to determine the optimal contract. The challenge lies therein that the principal is assumed to have less information on the agent’s action than the agent self and the agent has the opportunity to pursue their own interests. The optimal contract will solve this problem of information asymmetry at the lowest cost. (O’Keeffe, 1999; and Sauvée, 1998)

Two main problems are addressed by agency theory namely the *agency problem* and *risk sharing*. The agency problem arises when (i) the goals of the principal and agent do not converge or are incompatible and (ii) when the principal cannot verify what the agent is doing. This problem is also based in precontractual opportunism where one of the parties has private information about an aspect of the contract that affects the other’s net benefit from the contract. This phenomenon is also referred to as *adverse selection*. The second problem is related to *risk sharing*. *Moral hazard* refers to the shirking on the part of the agent because the task is too complex to be completely monitored or controlled. Principals and agents could have different risk preferences and consequently prefer different actions in response to the risk. (Sauvée, 1998)

Eisenhardt (1989) argues that the trade-off between (a) the cost of measuring behaviour and (b) the cost of measuring outcomes and transferring risk to the agent forms the basis of the principal-agent theory. The focus therefore lies on control characteristics and mechanisms. The principal can either assess and measure the performance of the agent or attempt to minimise the divergence of interests and/or preferences of the members. The latter strategy requires principals and agents to understand and internalise goals. This can be achieved through training and proper selection of members. The assessment of the performance of the agent, either by the behaviour or the outcome of the agent’s actions, determines the ability of the principal

to control the agent. The cost of the performance evaluation depends on the information characteristics of the performed tasks. The task can be characterised according to the task programmability (ability to know the transformation process) or separability (ability to measure outcomes). Peterson and Wysocki (1997) explains these characteristics as:

1. Task Nonseparability

Low task nonseparability: The contribution of individual efforts can be clearly separated through output measurement; therefore, individual rewards can be fairly distributed and a manager is not required to monitor shirking.

High task nonseparability: The contribution of individual effort can *not* be clearly separated through output measurement; therefore, individual rewards can *not* be fairly distributed without a manager to monitor shirking.

2. Task Programmability

Low task programmability: The product transformation process is *not* well established or routine; therefore, input measurement is uncertain and not amenable to monitoring.

High task programmability: The product transformation process is well established or routine; therefore, input measurement is fairly certain and amenable to monitoring.

The ease of performance evaluation in terms of the task programmability and separability determines the choice between the two strategies as depicted in Table 4.3. The task characteristics and the measurement system characteristics are the key dimensions for explaining the choice of control strategy. (Sauvé, 1998)

Table 4.3: Organisational theory and control strategy

Outcome measurability	Task programmability	
	Perfect	Imperfect
High	Behaviour/outcome control	Outcome control
Low	Behaviour control	Socialisation (Clan control)

Source: Eisenhardt (1985) in Sauvée, 1998

Agency theory focuses on the contracts between participants in the supply chain. The theory is criticised as lacking in rigour and too narrow in application to apply to complex organisational systems. (O’Keeffe, 1999; and Heilbron and Roberts, 1995) However, it augments the transaction cost approach by providing insight into uncertainty, attitudes to risk and information. Agency theory treats risk information as a commodity which can be purchased at a cost. This implies that firms can invest in information systems in order to control agent opportunism. Uncertainty is treated in terms of the risk/reward trade-off and not as the mere inability to anticipate events. Outcome uncertainty and the participant’s attitude to risk would influence the contract between the principal and agent. (Eisenhardt, 1989)

4.3.3 The vertical coordination continuum: combining transaction cost and agency theories

Mahoney (1992) provides a general framework to predict and prescribe alternative governance structures of vertical coordination along a continuum of governance structures including spot markets, short-term contracts, franchising, joint ventures, and vertical financial ownership (hierarchy). The Mahoney framework is an integration of agency-related perspectives and transaction cost theory. The motives for vertical integration can be classified into three categories: strategic considerations, output and/or input advantages, and uncertainty in costs and/or prices:

Strategic Considerations

- Entry barriers
- Circumventing regulation
- Maintaining oligopolistic discipline

Output and/or Input Price Discrepancies

- Successive Monopoly

- Bilateral Monopoly
- Upstream Monopoly
- Price Discrimination

Uncertainties about Costs and/or Prices

- Reduce asymmetric uncertainty
- Reduce or transfer risk
- Assure supply (Demand uncertainty)
- Control quality and services
- Control the density of retail outlets
- Reduce shirking (Measurement uncertainty)
- Reduce technological uncertainty
- Appropriate R&D spillovers
- Trading of Technology

However, Mahoney finds that these factors explain the motivation for vertical integration, but are not sufficient to provide insight into the choice of organisational form. The existence of transaction costs contributes to the understanding of vertical organisational for coordination structure. The governance structure chosen to implement the vertical coordination strategy should minimise the costs of negotiating, adapting, monitoring, and enforcing supplier-buyer relationships. Mahoney combines asset specificity, task programmability and separability in his framework to predict eight possible governance structures as presented in Table 4.4.

Low levels of programmability, specificity and separability result in spot market coordination while high levels of the three conditions result in vertical integration. Mixed levels of the conditions result in hybrid governance structures. Peterson, Wysocki and Harsh (2001) presented this expanded vertical coordination continuum as depicted in Figure 4.5.

Table 4.4: Predicting the organisational form of vertical control

	Low Task Programmability		High Task Programmability	
	Low specificity	High Specificity	Low specificity	High Specificity
Low non-separability	1: spot market	2: long-term contract	5: spot market	6: joint venture
High non-separability	3: relational contract	4: clan (hierarchy)	7: inside contract	8: hierarchy

Definitions:

Low task programmability: Observing input (effort) is a poor measure for making rewards.

High task nonseparability: Observing output is a poor measure for making rewards.

High specificity: Human, physical and/or site firm specific investments are high.

Spot market: The price system works smoothly.

Long-term contract: Obligations of principals and agents are specified and enforced by third parties (courts).

Relational contract: Obligations of principals and agents are specified and self-enforced. Social conditioning is applicable.

Inside contract: A hybrid arrangement between a contract and hierarchy that is best described as a 'manager as monitor' setup.

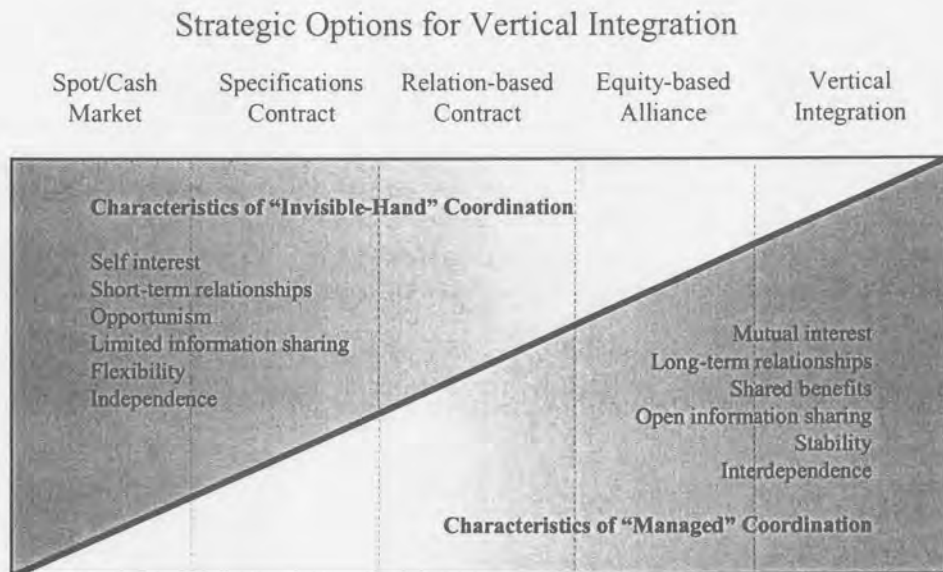
Joint ventures: An equity agreement whereby a separate entity is created.

Hierarchy: A superior-subordinate relationship; financial ownership.

Clan: Organisation that is based on a vital sense of human solidarity.

Source: Mahoney, 1992

The spot market and vertical integration are presented at the extremes of the coordination continuum. The spot market constituted the open market ideal of Adam Smith where the “invisible hand” coordinates market transactions. Individuals are assumed to act only on self-interest and pursue exchange agreements that are short-term, opportunistic, limited as to information sharing, flexible, flexible, and preserving actors’ independence. On the other end of the continuum coordination is managed on the basis of mutual interest for the exchange partners who pursue exchange agreements that are long-term, benefit sharing, open as to information flow, stable, and supportive of interdependence. As strategies are considered from left to right, coordination evolves from being dominated by invisible-hand characteristics through a changing mix of invisible hand/managed characteristics to being dominated by managed characteristics (Peterson and Wysocki, 1997; Hobbs and Young, 1999; Zuurbier, 1996 and 2000).



Note: The diagonal line represents the mix of invisible-hand and managed coordination characteristics found in each of the five alternative strategies for vertical coordination. The area above the diagonal line indicates the relative level of invisible-hand characteristics and the area below the diagonal indicates the relative level of managed characteristics

Figure 4.5: The vertical coordination continuum

Source: Peterson, Wysocki and Harsh, 2001

Coordination mechanisms to the left of the continuum have low intensities of control (“invisible hand”) while those on the right have high intensities of control (“managed coordination”). At the spot market end of the continuum control intensity is very low with *ex ante* control focussing on price negotiation. Both parties can terminate the transaction at this stage and the only *ex post* transaction decision would be to repeat the transaction or not. In a specification contract more *ex ante* control is exercised as the parties negotiate and agree on specific conditions for exchange beyond price. In relation-based alliances the parties adopt a longer term approach beyond the current transaction. Parties are *ex ante* interested in the mutual benefit that might arise from the transaction and *ex post* monitoring that the relationship continues and delivered the envisaged mutual benefits. There are usually several parties involved in equity based alliances which are for example joint ventures, partial ownership arrangement, and clans. The *ex ante* priority for equity-based alliances is to negotiate formal decentralised *ex post* governance structures i.e. the property rights of all the stakeholders. *Ex post*, the execution of governance policies and procedures, focus on the resolution of coordination concerns. Finally vertical integration *ex ante* control focuses on the integration of two entities into one organisation. The *ex post* control is

concerned with the internal implementation of policies and procedures. (Peterson, Wysocki and Harsh, 2001)

Table 4.5 Control intensity across the vertical coordination continuum

	Spot market	Specification contract	Relation-based alliance	Equity-based alliance	Vertical integration
Intensity of control	Low (ex ante dominate)	Moderately low (ex ante dominate)	Moderate (mixed ex ante and ex post)	Moderately high (ex post dominate)	High (ex post dominate)
Focus of control	Immediate transaction	Contract terms	Relationship	Property rights of stakeholders in limited joint entity	Property rights of stakeholders in full entity
Ex ante control	Price discovery	Setting specifications	Relationship building	Negotiating the formal decentralised ex post governance structure	Negotiating the formal centralised ex post governance structure
Ex post control	Yes/no decision to transact Yes/no decision to repeat the transaction	Setting incentives Decision to renew/renegeotiate contract, or seek third party enforcement	Setting informal parameters Mutual resolution or dissolution	Execution of governance policies and procedures in the limited entity	Execution of governance policies and procedures in the full entity

Source: Peterson, Wysocki and Harsh, 2001

4.3.4 Strategic management approach to governance

An enterprise seeks to increase its profits in most instances. Market share, -power and -sustainability are key considerations for any agribusiness in this regard. Competitive advantage can be vested in hard or soft assets. These assets only constitute a real competitive advantage to the firms if the assets are scarce and non-tradable. It is very difficult to achieve both these prerequisites and consequently competitive advantage based on assets are easily eroded. Hard assets are particularly difficult to use to build a competitive advantage since it is relatively easy for other enterprises to acquire similar assets. Immaterial (soft) assets, like brand names, unique location, and long term contracts are a little harder to come by or to establish and therefore constitute a stronger base for creating competitive advantage. (Zuurbier *et al*, 1996)

When it is difficult to establish a competitive advantage based on the soft and hard assets of the agribusiness, the enterprise can also have a recourse in managing the

market environment. The enterprise can strive to reduce the competition in the market or to establish a strong individual competitive position. A competition reducing strategy is usually based on the entry barriers to a specific market. The creation of entry barriers force competitors to make irrevocable investments in soft and hard assets to gain entry to the market. Therefore entrants face the risk of not recuperating their investments if their venture fails, which entails considerable financial risk. (Zuurbier *et al*, 1996)

Five categories of entry barriers are generally recognised (Zuurbier *et al*, 1996):

1. Scale of the enterprise. Scale economics plays an important role in the size of manufacturing plants, distribution, and product development. New entrants are forced to make enormous investments in assets to ensure reasonable returns to scale and then they are faced with the possibility of price-reducing strategies by existing firms in the market. The investment of poultry concerns in capital intensive production facility is an excellent example of an entry barrier based on the scope of the enterprise.
2. Product strategy of the enterprise. An enterprise can limit market access opportunities by serving the market with a wide assortment of products. An entrant will find it difficult to serve a market segment with a new product. Product differentiation is used to improve the competitive positioning of the firm in the market.
3. Organisational form of the enterprise. Vertical integration and exclusive contracting are examples of limiting market access by increasing the costs of entry in the market. A successful investment in the poultry industry, for example, will require huge investments in breeding, fattening, and distribution systems to enter the industry.
4. Manipulation of information by the enterprise. The enterprise can purposefully reveal or withhold information to create a certain perception of the competitive situation within the industry. This information will serve as a deterrent for new entrants to the industry by indicating, for example, that profit margins are extremely low, or competitors are exceptionally strong.

5. Technological dependency. Applicable technology prevents entry or creates dependency.

Reasonable firms will only rarely make considerable investments to influence the market for a product. These investments are usually based on scale economic considerations in production, distribution or manufacturing.

Agriculture in primitive times was a fully integrated system in itself. In subsistence agriculture, vertical integration is almost complete since production, processing and consumption is determined by the same person or group of persons. Subsistence farming evolved into a highly specialised market orientated system with every actor in the supply chain focussing on the activities which it can perform the most efficiently. Specialisation is one of the distinguishing features of present commercialised agriculture. Agriculture as a production industry is compelled to integrate more closely with the other actors due to the process of agro-industrialisation. Consequently, coordination and/or integration between farms and the other firms in the industry, both forward and backward, is inevitable. (Zuurbier *et al.*, 1996)

To understand how to achieve a competitive advantage and how to generalise about the relative position of individual firms within an industry, Porter (1980) developed the concept of generic strategies. These are categories of strategy that follow particular patterns. At the business level, two types of basic competitive advantage have been identified: low cost and differentiation. Though the key success factors of these strategies differ, any successful strategy must pay close attention to both types of advantage while maintaining committed to superiority on one. A differentiator's costs must not spiral out of control, while a low cost-producer should not compromise quality or service too much to maintain discount prices.

Porter (1980) argues that there is potential for a firm to exercise power when:

1. There is little rivalry amongst competing firms
2. No threat of new entrants (high barriers to entry)
3. Low bargaining power of suppliers
4. Low bargaining power of buyers

5. No threat of substitute products

Power is the ability to cause someone to do something that he/she would not have done otherwise. Gaski (in O’Keefe, 1999:20) adopts the following approach for power in distribution channels:

“..the power of a channel member is his ability to control the decision variables in the marketing strategy of another member in a given channel at a different level of distribution. For this control to qualify as power, it should be different from the influenced member’s original level of control over his own marketing strategy”.

The power used by channel members can take on five forms namely (Kotler, 2000):

- *Coercive power* – threat that resource or relationship will be terminated, usually effective when intermediaries are dependent on a single actor in the supply chain.
- *Reward power* – offer of an extra benefit for performing certain actions.
- *Legitimate power* – behaviour required by a contract between the parties, could be expensive to enforce.
- *Expert power* – member has specific knowledge that other chain members value.
- *Referent power* – member highly respected and other channel members conform in order to be associated with this member – usually a strong brand name.

Channel members are most likely to gain cooperation from other members when they use referent power, expert power, legitimate power, and reward power, in that order, and avoid using coercive power (Kotler, 2000).

It is clear from the discussion that firms use strategy and power to impose their goals and views on other channel members to improve their competitive position in markets. This is similar to Williamson’s adaptive response required from firms in an ever changing market environment. However, firms engage in this kind of behaviour for two reasons (1) to improve the responsiveness of supply chains to exogenous disturbances in the market and (2) to build monopolistic advantage by employing entry barriers.

4.4 Conclusions

Institutions are the governance structure which facilitate transaction amongst supply chain participants. The primary aim of supply chain governance structures are to reduce the costs and improve the efficiency of exchange between participants.

The first part of this chapter deals with the evolution of supply chain partnerships. It is clear that partnerships evolve over time to more complex arrangements as partners learn by transacting with each other. The informal institutions governing transactions between supply chain partners goes beyond formal institutions like laws and regulations. Significant relationship specific investments are made over time in these relationships. These relationships are therefore a valuable asset to agribusiness.

The second part of this chapter deals with the theoretical perspective on governance structures. Several characteristics are identified to describe and analyse transactions. These characteristics are related to the cost of transacting. A continuum of vertical coordination strategies are identified ranging from very little internal control (spot market) to complete internal control (vertical integration). Control however, is costly, as business resources have to be dedicated to measure and control the behaviour of the transacting partner. Agribusinesses will therefore only engage in control and monitoring if there is benefit in these activities. The optimal governance structure minimises the cost of control and maximises the benefit or value that arises from the governance of the transaction. The reasons for controlling transaction characteristics are discussed in the next chapter.