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MANAGERIAL DECISION MAKING IN AGRIBUSINESS: STRATEGIC ALLIANCES AS A GOVERNANCE CHOICE

by

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Abstract

Many changes in the global economy have increased the efficiency and speed with which individuals gather information and compete on a world scale. In the agricultural sector technological improvements have enhanced efficiency in the areas of food production, processing, transportation and handling. Information technologies have greatly facilitated a heightened individual awareness of competitors and consumer desires. As a result of these alterations, foreign competition is increasing, product life cycles are shortening, and markets are becoming more specialised. Traditional barriers for the firm such as: duties, tariffs and non-tariff barriers are being broken down or eliminated by new trade agreements such as GATT and NAFTA (Amanor-Boadu and Martin, 1992; Cohn, 1993).

One critical element of firm survival, in such a rapidly changing environment, is the governance structure of the firm. The hierarchical structure of a company and the degree, to which a company internalises decisions, greatly affects the efficiency of a company both internally and externally. In such a fast paced environment, low operating costs are a key to financial success, and quick, accurate decision-making is paramount. The necessity to respond to a situation quickly and easily but also cost effectively has induced managers to look outside their own company to other firms for co-operative agreements.

This formation of new business arrangements, in the form of strategic alliances, is the topic upon which this thesis is focused. Two new types of business agreements, which have been observed, are strategic contract-based alliances and strategic fuzzy alliances. While, contract-based alliances are new, in that firms are choosing non-

traditional partners, strategic fuzzy alliances are quite unique as they involve trust.

The aim of this thesis is to analyse these alliances and the role of trust in business-to-business relationships. This will be accomplished in two ways. First, using Shapiro et al.'s (1992) taxonomy of trust and a neo-classical framework, a theoretical model of governance choice involving strategic alliances is developed. Based on transaction theory, this model is then used to generate necessary and sufficient conditions for trust-based agreements and supports an empirical model.

The second component of this paper is an empirical model testing the above theory. Using a survey of horticultural and pork processing firms, a multinomial logit model that explains governance choice is developed. Results indicate that: 1) strategic fuzzy alliances are less common than previously thought; 2) asset and contract-based alliances continue to be the alliances of choice; 3) firm behaviour, vis-à-vis strategic alliances is consistent with neo-classical notions of the firm; and 4) risk is a major determinant of governance choice.

Résumé

L'économie globale a connu des changements qui ont, en conséquence, augmenté l'efficacité et la vitesse par lesquelles les individus rassemblent l'information et se concurrencient à l'échelle mondiale. Dans le secteur agricole, le progrès technologique a augmenté l'efficacité et l'éfficience de la production, la transformation, le transport et l'entreposage des produits alimentaires. La technologie de l'information a contribué - d'une façon remarquable- à renforcer la conscience individuelle de la compétition, et rehausser le désir des consommateurs. Les resultants de ces changements sont l'augmentation de la concurrence étrangère, la réduction du cycle de vie des produits et la spécialisation des marchés. Les barrières traditionnelles comme: les douanes, les barrières tarifaires et non tarifaires, sont de plus en plus atténuées ou éliminées par les nouvelles ententes commerciales comme les ententes du GATT et NAFTA (Amanor-Boadu and Martin, 1992; Cohen, 1993).

Dans un tel environnement en changement continu, l'élément critique de la survie d'une firme est sa structure organizationnelle, qu'elle soit interne ou externe la structure hiérarchique d'une companie et le degré par lequel elle internalise les décisions, affectent l'efficacité de celle-ci. Dans un environnement qui change si rapidement, la réussite financière d'une entreprise repose sur la diminution des coûts d'opération et le processus de prise de décision rapide et consistent. Pour rapidement réagir à une situation, aisemment et d'une façon économique, il est devenu nécessaire aux gestionnaires de chercher des ententes de coopération à l'extérieur de leur companie.

Cette thèse met l'accent sur les nouvelles ententes d'affaires comme les alliances stratégiques (AS). Deux nouveaux types d'ententes ont été analysées: des alliances strategiques basées sur des contrat (formelles) et des alliances stratégiques informelles. Les AS formelles sont choisies par des entreprises qui choisissent des partenaires non habituels, tandis que les AS informelles sont basées sur la confiance mutuelle entre les partenaires d'affaires.

L'objectif de ce travail est d'analyser ces alliances et voir le rôle de la confiance dans les relations d'affaires. Cela se fera en deux façons. Premièrement, en utilisant la taxonomie de la confiance de Shapiro et al's (1992), un modèle théorique de l'organisation d'une alliance strategique a été développé. Basé sur la théorie des transactions, ce modele genère les conditions nécessaires et suffisantes pour une entente basée sur la confiance.

La seconde partie de ce travail consiste en un modèle empérique testant la théorie ci-dessus. En utilisant un sondage auprès des processeurs horticoles et porcins, un modèle multinomil logit expliquant le choix organisationnel a été développé. Les résultats sont les suivants: 1) les alliances informelles sont moins communes que prévues; 2) les alliances formelles avec ou sans actifs continuent à être les alliances de choix; 3) le comportement des firmes vis-a-vis les alliances est consistant avec les notions néoclassiques de l'organisation; et 4) le risque est le détèrminant majeur d'un choix organisationnel.

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CHAPTER ONE

INTRODUCTION

1.1 Agriculture and Globalization

The world is becoming one large market place, foreign competition is increasing, product life cycles are shortening, markets are shrinking or becoming crowded (Vyas, Shelburn and Rogers, 1995; Chan and Wong, 1994). Agreements such as GATT and NAFTA are breaking down traditional barriers for the firm. Transaction costs such as duties, tariffs and non-tariff barriers are decreasing (Amanor-Boadu and Martin, 1992; Cohn, 1993), and technology is changing at break neck speeds (Van Duren and MacKay, 1993; Bamford, 1994). These worldwide changes lead to firms competing in the dynamic environment of global competition.

Traditionally the agricultural sector has been producer oriented. The producer grew or raised what was appropriate for his land or region; the consumer then chose food from what was available at the supermarket, taking it home for additional processing (Barkema and Drabenstott, 1995). Now, however, "...low population and economic growth rates along with inelastic demand have meant low rates of food market growth in most developed economies" (West and Vaughan, 1995). This has put pressure on food processors to be more cost-effective and innovative in their business decisions. To capture new markets, processors are listening to consumer's demands for quality, variety, nutrition and convenience. The agricultural sector is becoming a collection of "niche" markets; smaller sectors that concentrate on catering to a more precise portion of the population.

Technology advances enhance the processor's ability to take advantage of increased consumer wants. Changes in processing, distribution and organisation have affected almost every facet of the agribusiness sector. For example, improved refrigeration and packaging have made it possible for goods such as beef to be transported to processors anywhere in the world (Klein and Kerr, 1995). Other changes have occurred in the areas of: 1) transportation and handling, 2) processing, in the form of microfiltration, 3) communication, such as high technology information gathering and 4) production through the use of biotechnology (West and Vaughan, 1995).

Global and regional agreements have affected trade patterns and, by favouring specialisation, the location of production (West and Vaughan, 1995). The effects of these agreements, in conjunction with increased technology and market changes, have motivated the agribusiness sector to specialise in a variety of foods in order to stay competitive.

As a result of this highly fast paced and competitive environment, the market-power allotted to the consumer, within the marketing chain, is far greater than it has been in the past. Not only are demands greater, but consumer expectations are higher. Due to changes in consumer tastes (Barkema and Drabenstott, 1995; Boehljie, Akridge and Downey, 1995) and a greater number of alternatives in the marketplace, the consumer has become a powerful pulling force in the agriculture/agribusiness sector.

As a result managers and CEOs are discovering that an independent approach to business is costly and as a result is no longer viable (Vyas, Shelburn and Rogers, 1995; van Duren and MacKay, 1993; Symonds, 1995). At the present time, they are looking for ways in which to reduce costs, increase skills and knowledge, as well as maintaining their ability to be competitive.

Trust based strategic alliances provide an alternative to traditional neo-classical business behaviour. Traditional models of firm behaviour are based on competition (Vyas, Shelburn and Rogers, 1995). Transaction costs, associated with explicit business-to-business contracts, result from these arrangements. On the other hand alliances that are based on trust, replace written contracts with trust-based verbal agreements. Alliances that are based on trust behave differently than traditional business structures. Firms in an alliance believe that they can still maintain a competitive edge through the use of Co-operation. Individuals participating in a co-operating environment enjoy many advantages, such as: lower transaction costs, shared industry knowledge and business ties, as well as lower risk. Business *co-operation* by means of strategic alliances, for example, has a high potential for application in many business sectors including agriculture. For the agrifood sector to become more efficient and competitive in the global market, it is necessary to form stronger links between its component parts. (Van Duren, MacKay and Howard, 1996)

1.2 Objectives of the Study

The main objectives of this study are: 1) to charaterize trust-based business relationships within a neo-institutional framework in terms of necessary and sufficient conditions, 2) to broaden the scope of the continuum of governance and 3) to identify and analyse the determinants of a trust-based alliance, by empirically testing the developed theory.

1.3 Organization of the Study

The thesis is organised in the following manner. Chapter 2 contains a historical perspective of transaction cost economics focusing on the continuum of governance. Strategic alliances based on both contracts and trust are then presented and the main ingredients of a trust-based alliance are identified and discussed. Finally, a new theoretical model is presented reconciling institutional notions of governance and current understandings of trust. Chapter 3 presents background information on the empirical model. The multinomial logit approach is based on discrete choices and is thus used to model the governance choice decision-rule. Methods of testing the model and acceptable results are disussed in detail in this chapter. Chapter 4 discusses data sampling, the questionnaire design and the empirical model is presented. The final chapter presents the results of the empirical model and discusses them in detail.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL MODEL

In this chapter a transaction cost economics model of governance choice is introduced. Next, strategic and fuzzy alliances are defined and the relevance of trust is discussed. Finally, trust and the governance choice of fuzzy alliances are analytically modelled using transaction cost economics (TCE).

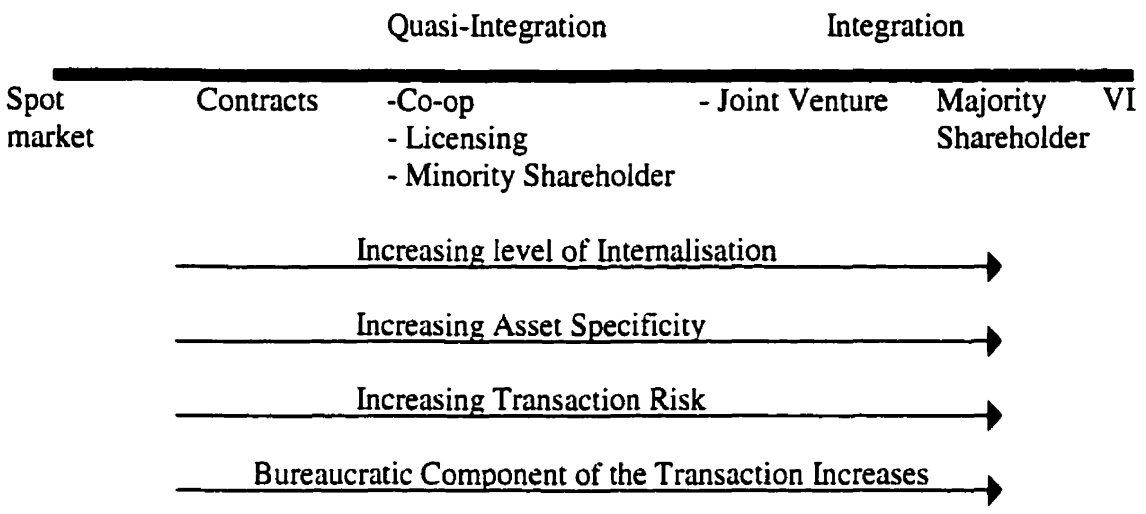
2.1 Transaction Cost Theory

Neo-classical economics deals with the firm as a production function, where profit is maximised and it explains these economic organisations by reference to class interest, technology and/or monopoly power. Conversely transaction cost economics describes these structures as having a main goal of minimising transaction costs (Williamson, 1985).

In TCE the basic unit of analysis is the transaction, and governance is the means by which order is accomplished (Williamson, 1996). The executive/firm is presented with a variety of governance choices, which are arranged along the continuum of governance choice (Figure 1). The spot market lies at one extreme of the continuum and vertical integration is found at the other end.

At the spot market end of the continuum transactions are governed by price signals (Sporleder, 1992). Property rights and ownership are fully defined, thus a contract is not necessary; an example of this would be farm market transactions. Future relationships are not considered in the spot market (Ouchi, 1980). Costs to the firm can

FIGURE 1: CONTINUUM OF GOVERNANCE



vary depending on the type of transaction taking place. Each time an entrepreneur has to buy an item a series of steps must take place: 1) a contact must be set up, 2) an individual agreement to buy/sell must be established then 3) finally, the transaction can be completed. If the transaction is simple then the cost is low; if however, the transaction is complex the costs may be quite high. Coase (1937 in Williamson, 1991) observed that a firm could decrease costs, with respect to time and money, by establishing a short-term contract. Each time a firm required a particular article for its business the item would be supplied automatically by another firm with which an agreement (contract) had been previously established. The end result is a decrease in the number of external transactions necessary to ensure the needs of an organisation and thus governance costs are reduced (Coase, 1937 in Williamson, 1991).

Moving along the continuum from the spot market to vertical integration, transactions are internalised decreasing the need to establish contracts or other formal arrangements for each transaction. In the area of vertical integration, where one firm controls two or more stages of production in a downstream and/or upstream direction

(Amanor-Boadu and Martin, 1992), there is 100% ownership a contract is not necessary. In this area of the continuum a firm enjoys unique characteristics caused by singular ownership. All business units within the vertical hierarchy have a similar overriding objective and a common culture, thus they have a commonality that may not be present among quasi-integrated firms.

In 1937, Coase hypothesised that a firm will continue to carry out all of it's transactions internally unless it is more efficient for the firm to contract work or buy the article needed from a specialised firm. Hence, according to Coase, the reason that there is more than one firm in a market is because it is bureaucratically inefficient for one firm to partake in *all* transactions necessary to run the business. By contracting out some activities or buying products from other companies, costs are still incurred, but these costs are lower than the costs the company would have incurred had it produced everything itself. Coase found that as the size of the firm increases, there are diminishing marginal management returns. This occurs when the firm is so large that a single manager can no longer maintain knowledge of all areas of the firm and is no longer involved in all the decision making. It is not beneficial to the firm to internalise more transactions when dealings in the market will be less costly.

Transaction cost economics studies the governance choice decision. It is a way of describing and interpreting organisations that do not fall into the mainstream of normal business practices. According to Williamson (1996) "...the main purpose and effect of non-standard forms are to economise on transaction costs." Thus by choosing a particular governance structure, agents are actively choosing what level of transactions they will be involved in.

> Intuition tells us that simple governance structures should mediate simple transactions and that complex governance structures should be reserved for complex transactions. Using a complex structure to govern a simple transaction incurs unneeded costs and using a simple structure to govern a complex transaction invites strain (Williamson, 1996; p.12).

Transaction cost economics takes into account the human element in a contract. Williamson reworked traditional economics of institutions to include behavioural traits of the individual. The two most important factors of his theory are: 1) bounded rationality and 2) opportunism without which complex economic problems would not exist (Williamson, 1996).

Herbert Simon (1957 and 1961) wrote about bounded rationality, which became a fundamental ingredient of Williamson's TCE theory. Simon based bounded rationality on two principles: 1) that all individuals have a limit to the amount of information that they can digest and interpret and 2) that the number of possibilities in any set of circumstances are so vast that at any one time all individuals face incomplete information when making decisions. (Dietrich, 1994)

Given the opportunity to take advantage of a situation, for the greater good of themselves an individual will not only contemplate it but may also act upon it. Opportunism can include obvious methods of deception such as lying, stealing or cheating but more subtle methods of misrepresentation are also included, such as "... the incomplete or distorted disclosure of information, especially calculated efforts to mislead, distort or disguise..." (Williamson, 1985). "...[W]ithout opportunism the economic rationale for co-ordinating an exchange within a hierarchy would be substantially reduced" (Hill, 1990; p.50)

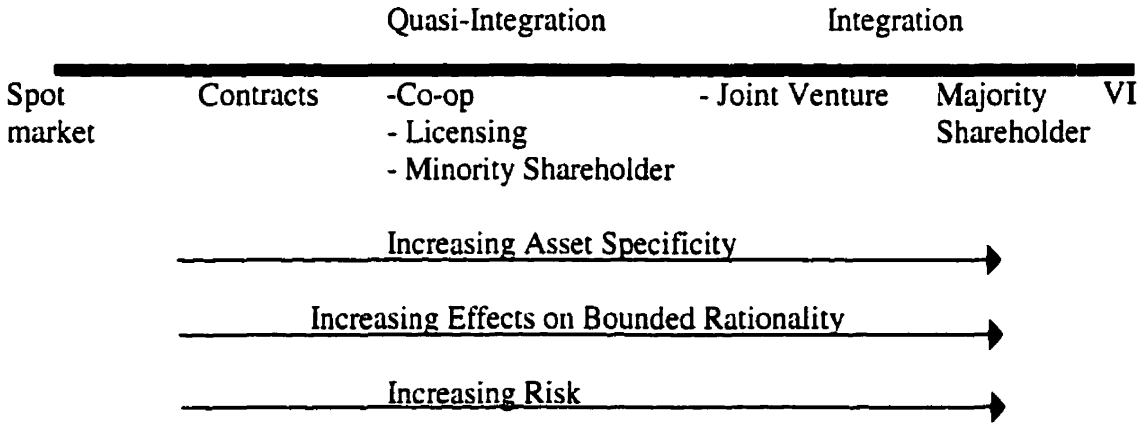
Bounded rationality and opportunism, the cornerstones of transaction cost economics, show that there is a need for contracts. With these negative traits of human nature taken into account, transaction cost economics effectively explains the progression of structures along the continuum of governance. Not only do individuals search for methods of reducing costs but also for methods of protection against opportunistic behaviour from their transaction partners. Williamson (1996) described the central region of the continuum from contracts to majority shareholders as hybrids. Quasi-integrated states or hybrids are not fully external as in the spot market or fully internal as found in vertically integrated business arrangements.

As the amount of risk increases, the intricacy of the transaction increases and governance structures become more complex. (Smith Ring and Van de Ven,1992) This happens as the assets involved in an agreement become more specialised to that agreement. The more specific an asset is to a particular agreement the less useful it is, to the firm, in alternative applications. The degree to which an asset cannot be redeployed, was termed by Williamson as asset specificity. Low asset specificity refers to assets that can be easily transferred to other areas of business should the agreement it was intended for breakdown. High asset specificity refers to assets that are highly specialised, thus they are useless or much less useful to the firm outside the application for which they were acquired.

Figure 2 displays the governance choice continuum with transaction cost attributes. Asset specificity increases as one moves from the spot market to vertical integration. The closer one is to the spot market, but not including it, the less specialised an asset becomes and, the closer one moves toward vertical integration the opposite is true. Moving in a similar manner, from left to right, the environment in which a

transaction occurs has an increase in factors that cause the effect of bounded rationality to be more pronounced, such as: increases in the length of contract and complexity of the contract. Thus, due to bounded rationality, at high levels of transaction complexity an individual is less able to accurately plan for the future. Combining this complexity with greater levels of asset specificity creates an environment of higher transaction risk.

FIGURE 2: CONTINUUM OF GOVERNANCE WITH TCE ATTRIBUTES



Opportunism also increases as the factors surrounding bounded rationality increase: the less able the firm is to foresee future opportunistic actions the possibility of them occurring increases. There is more to be gained or lost through opportunism as one moves from the spot market to vertical integration.

As asset specificity increases, the internal structure of a firm also increases. A high amount of prescribed structure in a relationship reflects the low level or lack of trust among partners (Amanor-Boadu and Martin, 1992). Where then do trust-based alliances, such as strategic fuzzy alliances, fall on the governance choice continuum?

2.2 Strategic Alliances

A universal definition for strategic alliances does not exist. They have been described as agreements between two or more firms, in the same sector, banding together to achieve a common goal (Vyas, Shelburn and Rogers, 1995; Troy, 1994; Reger, 1993). To help enforce the relationship, hostage assets and contracts can be used (Westgren, 1994; Borys and Jemison, 1989). Strategic alliances depend more, but not exclusively, on trust and co-operation, compared to other governance structures, which are explicitly designed to safeguard against asymmetric information and opportunism within a competitive economic environment. Thus, traditional business practices were highly independent and self-contained (Badaracco, 1991); alliances were viewed as a threat, which reduced control and power of the firm as well as affecting job security of the employees (Vyas, Shelburn and Rogers, 1995). When alliances took place they involved firms in the same competitive space, and the contracts employed were designed with every conceivable eventuality clearly defined.

Today it is generally agreed that a strategic alliance involves two or more firms, with a common goal, co-operating for the fulfilment of a project that will benefit both parties. However, strategic agreements have evolved from being sector specific and only contract based. Two newer types of strategic alliances have been observed: 1) Strategic contract alliances (SCA) and 2) Non-contract alliances or strategic *fuzzy* alliances (SFA), the focus of this study.

On the continuum of governance choice, strategic contract alliances reside between spot markets and vertical integration in the area of hybrid structures; this is because they have been described as joint ventures, equity partnerships, development

agreements, supply agreements, manufacturing collaboration and marketing agreements (Nohria, 1991). Previously, firms chose partners not conducting business in the same competitive space as themselves but, more often than not, in the same industry. Therefore a level of familiarity existed between them allowing contracts to be designed using a common experience set, thus, reducing the transaction risk of the agreement. More recently, however, firms have been aligning themselves with partners with whom they are less familiar such as: competitors, suppliers, distributors and non-competing firms (Troy, 1994; Bamford and Jamieson, 1989). For example: 1) Domino's Pizza uses networks set-up by Coca-Cola when entering new markets in other countries (Bamford, 1994), and 2) To save on cost Pillsbury, ships products on the same trucks as their competitors and then actively competing against them in the market place (Andel, 1996). Under these new arrangements a firm's knowledge base is less applicable, as past experience in their own industry may not be helpful when working with firms in another sector. Strategic contract alliances, formed within the same competitive space, have a higher level of risk than previous arrangements formed with non-competitors.

2.2.1 Strategic Fuzzy Alliances

While neo-classical economics is founded on the notion of competition and opportunism, which is the basis of behaviour for economic man, fuzzy alliances involve Co-operation and a trusting environment (Sporleder, 1994). The boundaries of neo-classical firms are strictly defined and distinct, whereas fuzzy alliances are highly flexible and their boundaries much less clear (Sporleder, 1994). In a fuzzy alliance there is shared control. The system is an open structure where knowledge flows easily between the two firms, as through a "membrane" connecting two living organisms (Hamel, 1991).

Success is based on co-operation, using each other's wisdom and ideas to advance both firms into the future. Innovation, learning and communication are encouraged, to allow firms to keep pace in a rapidly changing environment, innovation, learning and communication are encouraged (Vyas, Shelburn and Rogers, 1995). In the event of mistakes or misjudgements exit costs are low allowing firms to break relations quickly and easily (Sporleder, 1992). Each partner is a stakeholder but not necessarily a shareholder in the operation (Sporleder, 1994). A key feature of the non-contract-based alliance is trust. Maintaining trust in the relationship allows for a level of flexibility and rapid change, not attainable in traditional business alliances.

Being able to maintain trust in a business relationship can be highly advantageous to all parties involved. Through trust there is: 1) a decrease in transaction costs, 2) an increase in flexibility for both companies, 3) an increase in knowledge and 4) a decrease in risk (Maitland, Bryson, and Van de Ven, 1985; Shapiro, Sheppard and Cheraskin, 1992; Dodgson, 1993; and Parkhe, 1993). Interestingly, it was shown by Axelrod (Hill 1990, p.507) "...that over time actors whose decision rules stressed Co-operation and trust, rather than opportunism, came to dominate the population of players." Without trust a fuzzy alliance cannot exist; therefore to understand strategic fuzzy alliances completely it is necessary to analyse and discuss the key component of these agreements, trust.

2.3 Trust

Hosmer (1995; p.397) described trust as being :

> the expectation by one person, group, or firm of ethically justifiable behaviour - that is morally correct decisions and actions based upon ethical principles of analysis - on the part of the other person, group, or firm in a joint endeavour or economic exchange.

When one has attained trust there are expectations or advantages associated with it. First it is assumed that once trust has been granted to an individual he/she will act in a manner that is morally just (Zand in Hosmer, 1995), implying that actions taken consider the consequences of both parties involved and as such are not self-serving. The second asset of trust is that it brings clarity to complexity (Luhmann, 1988). In order to achieve trust the level of knowledge about a person or thing must have increased, so that an individual can make a rational decision whether or not to trust. Once trust has been achieved a situation may no longer be difficult to understand, due the increased level of knowledge. Finally, trust is a scarce resource that is depleted through lack of use (Gambetta, 1988). Whereas most assets are made scarce by being used, trust is an asset that grows through application, making a relationship stronger over time. Conversely if the parties involved do not work to maintain it, trust will disintegrate. Trust allows individuals to live with the possibility of negative outcomes, while transaction costs have been described as frictions caused by operating the economic system (Arrow, 1971), trust can be described as the grease which helps the system run more smoothly and efficiently.

Many "types" of trust have been described in the literature: contractual, goodwill, and competence (Dodgson, 1993); system, emotional and personal-based (Hosmer, 1995); social-based (Bhide and Stevenson, 1992); cognitive-based (Lewis and Weigert, 1985) and character-based trust (Gulati, 1995a). Shapiro, Sheppard and Cheraskin (1992) designed the most formal model of trust. They describe the development of trust, the transition from low to high forms, as an evolutionary process. Starting at a base level of trust where there is little or no knowledge of an individual/firm. The lack of knowledge hinders one's ability to predict future actions of another, which leads to a highly stressful

and risky environment. Over time, as an individuals gains better understanding of one another and gain more information about each other, familiarity increases. If the relationship keeps growing it will move from one level of trust to another eventually achieving the highest form of trust. At this level individuals identify with each other and share a common culture through knowledge, which has been gained over time, thus creating a safer environment. To fully understand Shapiro et al's model, it is first necessary to discuss the human elements of trust and the aspects that engender it.

2.3.1 Decision Making

Individuals are made up of two elements 1) a cognitive element and 2) an emotional element (Lewis and Weigert, 1985). For an individual to make the decision to trust, one must employ both features of their character. The cognitive component refers to the ability of an individual to make logical decisions. In reference to trust, it is the ability of an agent to determine rationally whether someone or something is worth the risk of being trusted. The emotional feature of the human psyche is related to the sensory responses elicited by all humans in acknowledgement of preferences or feelings for people or things. There is no logical reasoning for this except that which appeals to the agent. In regard to trust, an emotional bond is formed when one individual trusts another. There can be a psychological appeal to enhance someone's desire to trust; this is portrayed in the acts of a salesman, politician or huckster to convince a stranger or near-stranger to buy a product, cast a vote or give money (Bhide and Stevenson, 1992).

Researchers such as Hosmer (1995), Lewis and Weigert (1985) reason that cognitive and emotional thought are tied to each other, even as opposite sides of the same coin, and thus one cannot exist without the other. This statement is reasonable as people

are not only emotional beings but also have the ability to withhold trust based on logical deliberation. Therefore, in order to have *complete* trust both elements must exist.

2.3.2 Necessary and Sufficient Conditions

Within the context of cognitive and emotional decision making, the elements we believe to engender trust are: risk, predictability, freewill and knowledge (Figure 3). As stated previously, both cognitive and emotional elements of human behaviour must be present for trust to exist, this is indicated on the diagram with subscripts of C, c, E or e. A capital letter indicates that a high amount of the element is present while small letters indicate lower levels of the element.

Figure 3 can be described as a family of connections. The main heading under which all types of alliance relationships fall is *Strategic Alliances* (SA). This group splits into two minor groups, which are *Strategic Contract Alliances* and *Strategic Fuzzy Alliances*. Whether a SCA or a SFA is chosen is based on the discrete choice of the firm. The choice is made by an individual based on specific firm characteristics such as the amount of transaction risk associated with an agreement, both alliance types are sufficient for the formation of a strategic alliance. In a SFA trust is a necessary condition when forming the alliance. There are four primary building blocks (PBB) of trust: risk, predictability, freewill and knowledge. Independently they do not create trust, however when joined together in specific combinations they are sufficient in its formation. The PBB's of trust can be combined to form three trust determinants, which will be referred to as type ***X***, ***Y***, or ***Z***. The trust determinants are sufficient to create trust. Each primary building block has its own set of secondary building blocks: deterrents, knowledge, discretionary action, reciprocal action, co-operative behaviour, familiarity and reputation.

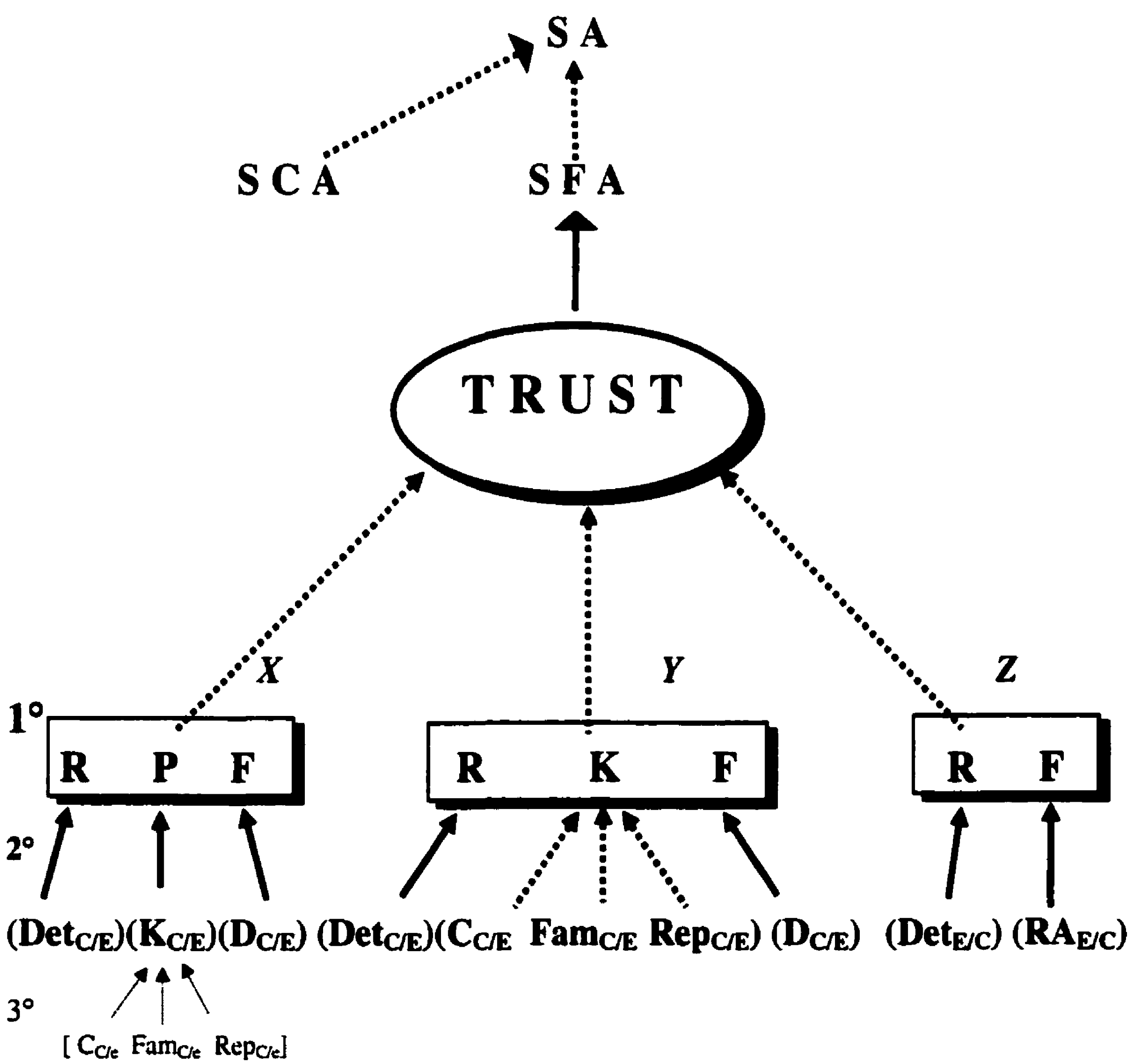
These will be discussed more completely below. As mentioned previously *complete* trust is achieved through the use of cognitive thought and emotional feeling. Thus, each of the secondary building blocks involves either a cognitive or emotional decision, the subscripts **C**, **c**, **E** or **e** represent this.

Secondary elements are described as being necessary or sufficient conditions in the formation of each primary element. Briefly, the existence of deterrents is a necessary condition in the formation of reputation, knowledge is a necessary condition in the formation of predictability. However, in order for knowledge to exist it must be formed; co-operative, behaviour, familiarity, and reputation are sufficient to form knowledge. Thus, although knowledge is a primary building block, it also shows up as a secondary building block in the formation of predictability. A tertiary level of elements results. Discretionary action or reciprocal action is a necessary condition in the formation of freewill. Each of the primary elements of trust and their associated secondary elements will be described and discussed below.

FIGURE 3: BUILDING BLOCKS OF TRUST

◄······ Sufficient Conditions	E - high levels of Emotion	C - high levels of Cognitive thought
◄—— - Necessary Conditions	e - low levels of emotion	c - low levels of cognitive thought

1° BUILDING BLOCKS	2° BUILDING BLOCKS	3° Building Blocks
R - RISK	Det - DETERRENTS	
P - PREDICTABILITY	K – KNOWLEDGE	C – Co-operative Behavior Fam - Familiarity Rep - Reputation
F - Freewill	D - DISCRETIONARY ACTION RA - RECIPROCAL ACTION	
K -KNOWLEDGE	C – CO-OPERATIVE BEHAVIOR Fam - FAMILIARITY Rep - REPUTATION	



2.3.3 Primary Building Block: Knowledge

Knowledge is found in two of the three trust determinants, they are trust determinants ***X*** and ***Y***. In ***X*** knowledge is utilized through predictability and in ***Y*** knowledge is a PBB. Knowledge is what is known about a person, group or firm before the decision to trust is made. There may or may not be adequate information on which to base a decision. Knowledge can be taken from previous experiences, research, reputation and conversation. It allows one to determine from the past what the future might hold, and in this way permits us to predict future outcomes. Through knowledge, one is able to learn how an individual or organisation acts under different circumstances and whether or not they are likely to act in a trustworthy manner.

Shapiro, Sheppard and Cheraskin (1992) make the point that knowledge can be acquired on a regular basis, not only through an understanding of past actions but through communication, which enables knowledge to be kept up-to-date. If companies or individuals communicate on a regular basis and if background information is accurate, predictability may be determined. Knowledge in itself does not cause trust, but it is an important ingredient (Lewis and Weigert, 1985). To come to a decision to trust it is necessary that knowledge be present, except in the case of reciprocal action, which will be discussed below. Knowledge can be either cognitively or emotionally based depending on the situation and the factors that create it. In the event of perfect knowledge trust is not necessary (Gambetta, 1988) and in the absence of knowledge a gamble has taken place; trust has not been formed (Lewis and Weigert, 1985). Knowledge is gained through the secondary building blocks: Co-operation (C), familiarity (Fam) and reputation (R) (Figure 3).

2.3.3a Secondary Building Block: Familiarity

Familiarity is a process by which people can increase their knowledge of each other. The more familiar people are with each other, the more they identify with each other. Shapiro, Sheppard and Cheraskin (1992) stated that the highest form of trust is identification trust, where people can empathise with others and understand their needs and wants. Familiarity is a form of knowledge. Nevertheless, it is not just information gathering; familiarity may also be cultural or socio-economic identification between individuals. People from similar countries, religions, language or even financial backgrounds may feel more comfortable with individuals, like themselves, rather than those that are unknown to them or different from them. Thus cognitive action is displayed through information gathering, while emotional thought is also evident through the identification with another individual. Familiarity is not a necessary condition in the formation of trust. It does, however, inspire trust through knowledge for which it is a sufficient condition. The level of trust initially presented, is determined by the level of familiarity already in place. For those who possess similar qualities trust is much easier to establish.

With respect to trust, firms follow an evolutionary process that results from familiarity. Gulati (1995a) found that: 1) the greater the number of past alliances that are asset-based, the less likely future alliances, with the same partner, are to be asset-based, 2) the more history firms have shared, the more likely they are to have alliances that are non-asset based and will form new alliances with each other and 3) international alliances were found more likely to be asset-based than domestic alliances.

2.3.3b Secondary Building Block: Reputation

Reputation is a proxy for knowledge (Parkhe, 1993). This is the amount of information one has gleaned about someone else based on hearsay, historical facts, and past performance. Through the use of reputation one can *form an opinion* about someone without ever having met him or her. Cognitively one decides what information to believe and emotionally one acts upon it. An individual that exhibits broken promises and opportunistic behaviour in the present is less likely to display co-operation in the future, thus creating and maintaining a negative reputation that others are less attracted to (Parkhe, 1993). According to Chiles (1996) reputation has economic value and it increases the reserves of information an individual already has. Through knowledge a positive reputation can be an integral force in creating trust. Reputation is a sufficient condition for knowledge, but it is not a necessary condition in the formation of trust.

2.3.3c Secondary Building Block: Co-operation

Co-operation entails the act of working with another person, group or firm to achieve a common goal. Gambetta (1988) stated that Co-operation takes place before trust is established and through repeated actions of Co-operation, trust will be created. Repeated actions enhance knowledge through experience. Increasing background information that one can analyse is a cognitive action, however, through Co-operation an emotional link to an individual is also created. Co-operation is a sufficient condition for acquiring knowledge, however it is not necessary in the formation of trust.

2.3.4 Primary Building Block: Predictability

Predictability is found only in trust determinant ***X***. It is the ability to rely on the actions of others based on prior knowledge, and to predict what future actions may be taken by such individuals. The more knowledge one attains, the higher ones ability to predict future outcomes is, and the more cognitive the decision becomes. Using predictable outcomes one can have a relationship regardless of whether or not the individual in question is trustworthy. By knowing that a person is not trustworthy we can predict that their action(s) will also be untrustworthy. Thus, they are predictable and can be *trusted* to act in an untrustworthy manner. Shapiro, Sheppard and Cheraskin (1992) used an example of sibling rivalry. Knowing that your brother or sister will tell your parents what you were doing, you can trust that their behaviour will get you into trouble. To trust/distrust someone, is much easier if his or her actions are predictable, then risk is reduced. An individual must have enough knowledge of an individual or firm to allow them to infer possible future actions from past events or information; it must be possible to predict an outcome *a priori*. Predictability is a necessary condition in the formation of trust.

2.3.5 Primary Building Block: Freewill

Freewill refers to the opportunity an individual has to make a choice of whether or not to trust another individual, group or firm. By using a combination of cognitive and emotional elements this decision is made either consciously (through logical decision making) or unconsciously. If an individual is given two choices: 1) that his/her company will decrease research and development costs by trusting a rival firm and forming an alliance or 2) that his/her company will fall behind the competition due to rising research

and development costs, by staying independent, the individual in question has the opportunity to choose either course of action. However, if the individual is in a position of duress, and economic death will result in a decision not to display "trust," then a *choice* does not really exist and trust is not apparent in the relationship (Nooteboom, 1996). Freewill is present in each of the three trust determinants, and thus it is a necessary condition for trust, without choice, trust cannot be formed (Figure 3). Freewill is expressed through: a) reciprocal or b) discretionary action.

2.3.5a Secondary Building Block: Reciprocal Action

Reciprocal action is a response to a display of trust from an individual that is unknown. Thus, when trust is exhibited a natural reaction is to return trust (Dasgupta, 1988). This is a unique scenario that assumes one is trustworthy due to a lack of information to the contrary (Gambetta, 1988). Reciprocal action is displayed when an individual instinctively trusts another, an unconscious choice to trust has been made. In this manner freewill has been displayed. Reciprocal action is considered a sufficient condition for freewill when the relationship is based on little or no knowledge (trust determinant ***Z***). In this case decision-making is based more on emotion than cognitive thought.

2.3.5b Secondary Building block: Discretionary Action

Discretionary action involves having the ability to make a choice between trust and distrust and is therefore based on logical decision-making processes. It also allows other strategic behaviour such as the choice not to be trustworthy. Axelrod found through game theory models (Hill, 1990) that if the end date of a previously established

agreement is known, there is an increased risk of opportunistic behaviour as the end of the relationship draws near. If, however, the end date was not previously established then trust is promoted. Discretionary action is a sufficient condition for freewill and is prevalent when there are low levels of emotional influences or comparative levels of cognitive and emotional thought (trust determinants X and Y).

2.3.6 Primary Building Block: Risk

A person is placing oneself in a situation of risk, when they enter into a relationship where perfect information is not available, future events are uncertain, and there is a possibility of injury and/or loss (Smith Ring and Van de Ven, 1992; Chiles, 1996 and; Lewis and Weigert, 1985). As described by Luhmann (1988) in order for trust to occur, risk must exist. Without risk, trust is not necessary as all information is present and the future can be determined with certainty.

If an individual enters a lottery and s/he knows with certainty the number of other tickets in the lottery and that the draw will be fair, the probability of their ticket being selected can be calculated. Trust is not necessary because one knows the event will take place and thus there is a fixed chance of winning. However, if someone enters a lottery and the number of tickets sold is unknown then the future possibility of winning is not possible to calculate. One must trust that it is a fair game because not all information is available and future events are unpredictable, therefore the expectation of winning has been decreased.

Risk can be emotionally based, as is the case when there are low levels of information, or cognitively based such as when one is able to predict future actions with some degree of accuracy. Risk exists because there is a lack of information, and the

individuals involved in a relationship cannot accurately determine future outcomes. A deterrent can be said to exist when the cost of being untrustworthy is higher than the benefit of being trustworthy (Gulati, 1995b). Risk is therefore a necessary condition in all forms of trust.

2.4 Summary of Necessary and Sufficient Conditions

The previous discussion show that there are two primary building blocks that must be present in all of the trust determinants, they are: risk and freewill. Three sets of determinants necessary to create an environment that will support trust, were identified, trust determinants ***X***, ***Y*** and ***Z***.

In type ***X***, risk, discretionary action (freewill) and predictability make up a type of trust that is based more on cognitive decisions than on emotional thought. Trust determinant ***Y*** is made up of risk, knowledge and discretionary action (freewill) which represents a type of trust where cognitive and emotional decision-making elements are available in comparable amounts. Finally trust determinant type ***Z*** is created when risk and reciprocal action (freewill) are joined, this results in a trust type that is based more on emotional thought than on cognitive choices.

The different types of trust are influenced not only by the combination of primary building blocks, as described above, but also on the levels of cognitive and emotional thought as well as the intensity of each of the PBB that make-up each trust determinant. This will be explained more fully in the following section.

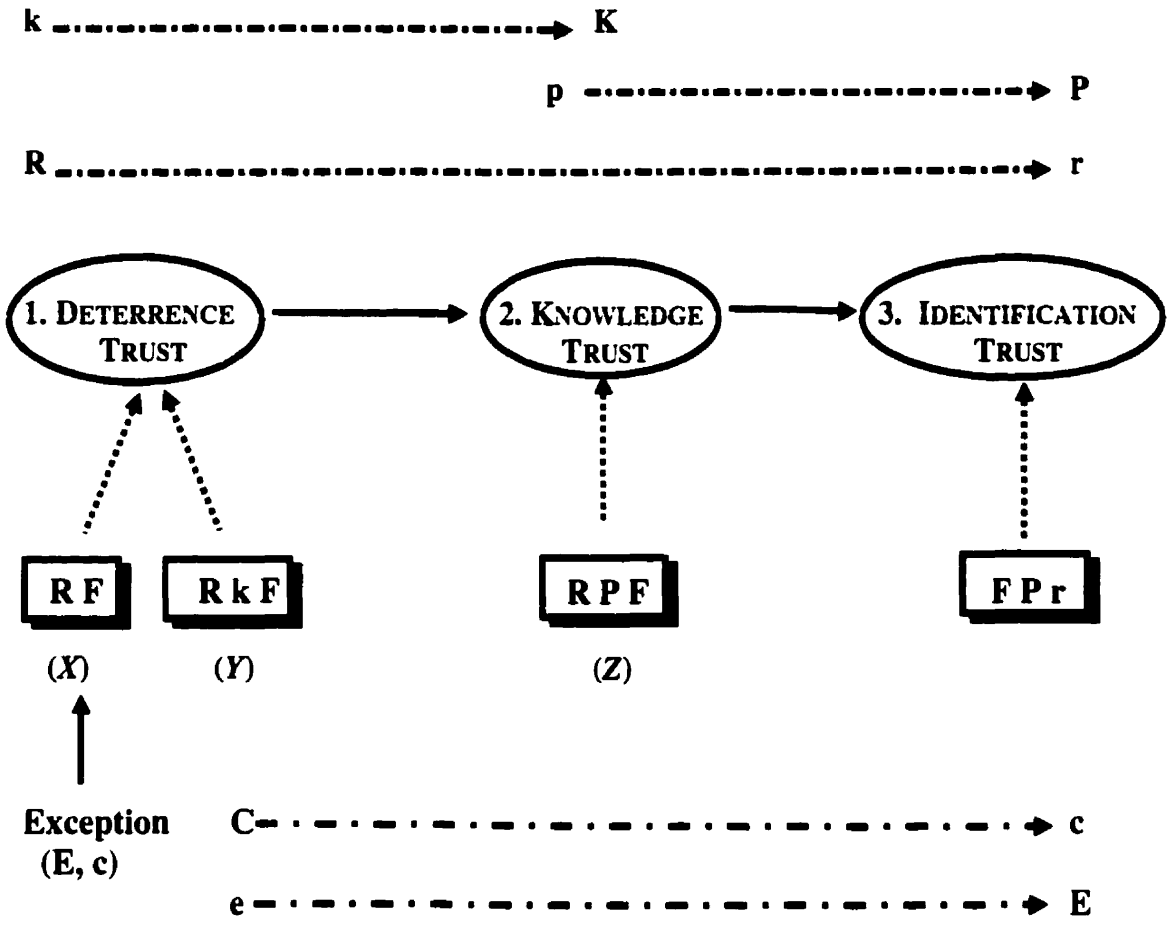
2.5 Types of Trust

The previous section outlines the necessary and sufficient conditions for trust. Trust however, is not a static concept but is best understood as an evolutionary process. Shapiro, Sheppard and Cheraskin (1992) describe three main categories of trust 1) Deterrent based, 2) Knowledge based and 3) Identification based trust. The authors state that "...each previous basis of trust is a necessary condition for the one that follows." This is supported by Nooteboom (1996), who found that trust tends to grow as a relationship proceeds successfully. To achieve a higher level of trust, it is necessary to pass through one level of trust before proceeding to the next stage. Thus deterrent-based trust comes before knowledge or identification based trust.

Figure 4, shown below, incorporates Fig. 3 (building blocks of trust) with the taxonomy of trust presented by Shapiro et al. According to Shapiro et al., the lowest form of trust is deterrent-based trust. Over time, however, firms are able to increase their knowledge base, which allows them to develop a higher, more robust form of trust, i.e. knowledge and identification-based trust. As one progresses from deterrence-based trust to identification-based trust, the influence of cognitive thought decreases and emotional decision-making increases over time. This is shown by line C to c and line e to E. The only exception to this is in the first building block where reciprocal action influences freewill. Moving from deterrence-based trust to identification-based trust, knowledge increases. This is indicated by line k to K, where k represents low levels of knowledge and K represents high levels of knowledge. In the middle area, around knowledge-based trust, the level of trust is high enough that an individual is able to predict future outcomes with some degree of accuracy, thus at high levels of knowledge there are high levels of

predictability. Over time, the ability of an individual to predict future outcomes, becomes more accurate and this is denoted by P, in the area of identification-based trust. As knowledge and predictability are increasing, the risk for an individual to trust another decreases. This is shown by line R to r, which indicates that in the area of deterrence-based trust risk is higher than in the area of identification-based trust. The changes in these elements are reflected in the arrangement of the trust determinants. Two necessary conditions for the formation of deterrence-based trust are the existence if trust determinants Z and Y. Trust determinant type Y shows low levels of knowledge present in this type of trust-based relationship. The only necessary condition for knowledge-based trust, is trust determinant X, and finally the necessary condition for identification-based trust is also trust determinant X, however at this level of trust there are low levels of risk, shown by r.

Figure 4: Merging Models



2.5.1 Deterrence-Based Trust

The existence of measures that prevent hostile actions is what Shapiro et al. define as deterrence–based trust. Trust is obtained by making alternative actions of the

individual undesirable. For example: Firm A and B agree to share facilities, however, firm B finds that firm C is willing to share research facilities and human resources. For firm B this is a better offer. Unless there are deterrents in place, firm B will end the relationship with firm A in favour of the one with firm C. The threat of legal action by A against B and the possible damage to B's reputation are two deterrents that may keep B in its previously established relationship.

Deterrence-based trust is necessary when the relationship is based on little or no knowledge. Necessary conditions in the formation of deterrence based trust are the building blocks: 1) risk and freewill, influenced by reciprocal action and 2) risk, knowledge and discretionary action (freewill).

In the case of risk and reciprocal action, knowledge is not present in the relationship. The trust involved in this relationship is simply reactionary, based mostly upon an individuals emotional response to another person. In a relationship of this type the individuals may not have identified the risks involved but, they are still important elements of the agreement. In order for an arrangement to be successful, risk must be decreased through the use of deterrents.

The second building block is similar to the first, however, some knowledge does exist as expressed by k (Figure 4). Again deterrents are necessary in a relationship of this nature because there is not enough knowledge present for individuals to effectively predict the future actions of their partner. At this stage the environment of the partners is uncertain and there is a high amount of risk. Parkhe (1993) found that partners at the beginning of a relationship with little shared history have low levels of trust and a high mutual fear of opportunism. According to Shapiro, Sheppard and Cheraskin (1992). Three

ways in which deterrents can evolve or be developed are through: a) repeated actions, b) multiple actions or c) by using reputation as a hostage.

2.5.1a Repeated Actions

Repeated actions refer to firms frequently being involved with each other. It does not necessarily mean that the same action must be repeated it simply implies that firms increase contact with each other through projects and research over time. By increasing personal interactions between firms, a history between the two is formed. Between firms that share a common background, a minimum level of courtesy and consideration is encouraged making it less likely for one firm to seek a narrow short-term advantage over the other. (Smith Ring and Van de Ven, 1992)

2.5.1b Multiple Actions

Unlike repeated actions, where a firm increases contact with another by repeatedly being involved in activities with them; multiple actions implies that a firm is involved in more than one activity with another firm at the same time. Thus the firm has more than one point of contact with another, in the form of projects, personnel exchanges and shared facilities. This enhances the work area and dissuades personnel from acting opportunistically should problems arise. Each firm's knowledge, that the other has much to lose from behaving opportunistically, enhances confidence in the other. (Gulati, 1995b)

2.5.1c Reputation

The last method of creating deterrents is by using reputation as a hostage. Since, reputation is an asset that has economic value, the threat of having a positive reputation destroyed and the loss of business that would accompany this eventuality is a useful

deterrent (Parkhe, 1993). In a trust-based relationship, one's reputation is highly valued, (Hill, 1990; Weigelt and Camerer, 1988). A positive reputation evolves over time through successful business ventures and by building familiarity and reliability with others. Having a positive reputation destroyed through opportunistic action would not only be costly due to a loss of business (Parkhe, 1993); the time it would take to rebuild this intangible asset is a useful deterrent.

2.5.1d Groups of Deterrents

Deterrents can be split into two categories: 1) naturally occurring and 2) artificially placed. A naturally occurring deterrent is one that is simply a factor of the agreement taking place. Risks that are considered to be indicative of the agreement and would exist in any circumstance are considered to be naturally occurring deterrents, for example: once assets necessary to implement the agreement have been purchased it is less likely a partner will renege on the agreement. Artificial deterrents are ones that have been orchestrated by the partners to exist in the agreement. These risks would not necessarily exist in the formation of the agreement, had it not been the desire of the partners to include them. Examples of artificial deterrents would include increased interest charges should payments not be received on time, or legal action should aspects of the agreement not be met. Written contracts usually include incentives for the partners to stay in a relationship and create high costs should it breakdown prematurely. As found by Parkhe (1993), the higher the expectation of opportunistic behaviour the more contractual safeguards will be embedded in the alliance. Artificial deterrents can also be woven into verbal agreements, but the ability of the partners to enforce such threats is limited, due to the nature of the agreement.

A shrewd businessman may deliberately create an environment where repeated actions and multiple actions are prevalent, though they may also occur by chance. Using reputation as a hostage asset is a more deliberate method of creating deterrents, as it is possible to threaten an individual with the destruction of their reputation. In trust-based relationships, however, it is naturally occurring as reputation has economic value and is created over time. An individual that is involved in a fuzzy alliance and acts opportunistically is in jeopardy of being labelled with a negative reputation which can destroy all future business transactions of this type.

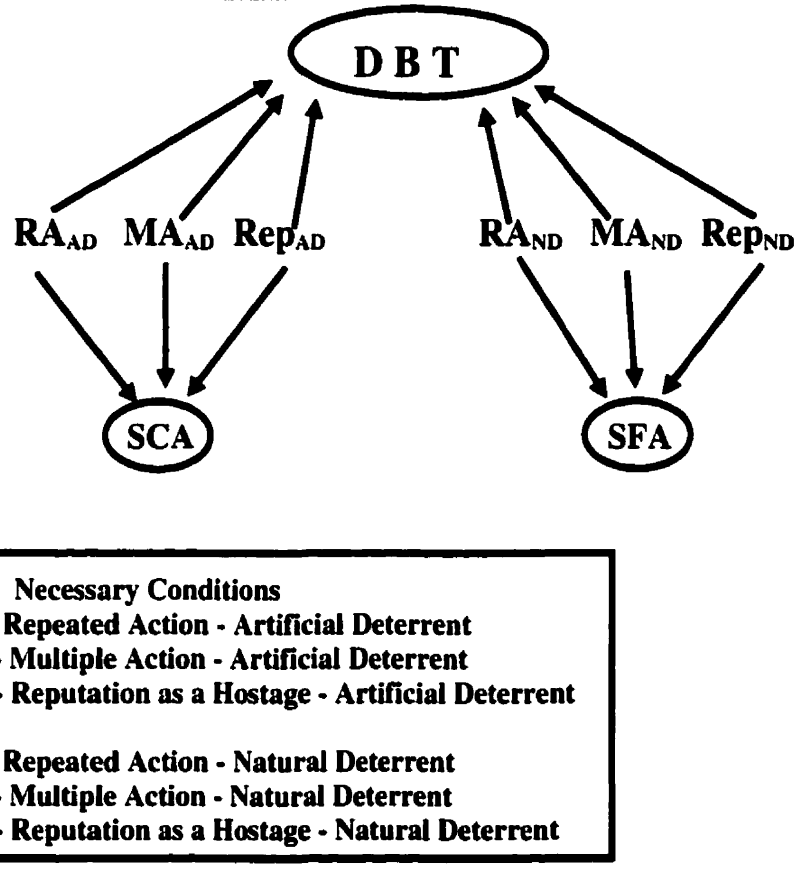
A trust-based relationship is only established if naturally occurring deterrents are in evidence. Naturally occurring deterrents are necessary for the evolution of trust, in both a cognitive and emotional manner because these types of deterrents build trust between two individuals over time. Deterrents that have been devised by the partners to keep the relationship together are not based on trust, but are strategically motivated. Thus, many alliances that call themselves SFAs are actually SCAs because they use artificial deterrents to create the *illusion* of trust. Creating relationships based on artificial deterrents does not elicit trust even though a working relationship has been established. By "creating" deterrents a message of distrust is conveyed (Nooteboom, 1996). In this case an agreement between parties in an environment of risk has been formed but an emotional "trusting" bond between the partners has not been formed.

As shown in figure 5, each of the three ways in which deterrents evolve or are created are sufficient to form deterrent-based trust. The type of alliance formed, however, depends on whether the deterrents evolved naturally or were created artificially.

2.5.2 Knowledge Based Trust

The necessary elements of knowledge based trust are risk, predictability and freewill based on determinant actions (freewill). As knowledge increases over time, predictability is formed allowing an individual to react with more certainty in regard to future events. As a result risk decreases as an individual moves from deterrent-based trust to knowledge-based

FIGURE 5: NATURAL AND ARTIFICIAL DETERRENTS



trust. Once predictability has been achieved, the deterrents that exist in a relationship still exist; however their importance has decreased.

Individuals are more certain about future events, the possibility of opportunistic behaviour decreases and the environment in which the individual is involved allows

bounded rationality to be less of a hindrance.This type of trust is based on prior information acquired through research, experience, and contact. By having a mental picture of the past it is possible to extrapolate to the future and make reasonable decisions as to the quantity and level of trust an individual or situation warrants. Gulati (1995b) found that trust between two firms emerged from prior contact, because it helped the "...firms learn about each other and develop norms of equity...." Through knowledge, one is able to learn how an individual or organisation acts under different circumstances, whether they are likely to act in a trustworthy manner or not. Through knowledge, risk is reduced, though, it is not dissolved (Lewis and Weigert, 1985).

2.5.3 Identification Based Trust

Freewill, predictability and low levels of risk are necessary for the formation of identification trust. It is based more on emotions than either deterrent-based trust or knowledge-based trust. Identification trust is described as the behaviour of an individual having the ability to internalise another's preferences (Shapiro, Sheppard and Cheraskin, 1992). The individuals that achieve this level of trust, have a long history together, thus knowledge has increased to a point where predictability is highly accurate; this greatly reduces the amount risk involved. At this point, the two firms/individuals are so enmeshed that it is second nature for one to take actions to protect the other and to act on their behalf. Identification trust is the highest level of trust attainable. In order to understand another's preferences without asking, one must identify totally with that person. It is as if the individual were an extension of oneself, the ability to predict future outcomes becomes accurate. There are four ways in which people identify with each

other: by 1) joint product/goals, 2) name, 3) proximity, and 4) shared values. (Shapiro, Sheppard and Chersakin, 1992)

2.5.3a Joint product/goals

People, who are involved in comparable activities such as producing similar products or obtaining similar goals, identify with each other more readily than they would under other circumstances. This is true for all individuals who work to achieve a common outcome, it is not restricted to those in upper or lower areas of a firm "...[T]he greater the homogeneity of the group, the higher the level of trust...." (Lewis and Weigert, 1985)

2.5.3b Name

Individuals from different backgrounds, placed in the same group thus sharing a common title, or name, make more of an effort to identify with each other than they would normally. "...[O]ne vehicle through which chemists and biologists began to converse more freely was with the emergence of the field of biochemistry. The simple acknowledgement of their overlapping interests helped to increase the rate of communication." (Shapiro, Sheppard and Cheraskin, 1992) In a firm the formation of business units/departments creates groups which help people to relate to one another. Lewis and Weigert (1985) also found that "the greater the interconnectedness of a social network the greater is the level of trust...."

2.5.3c Proximity

Proximity refers to both geographic location and relative location within the business structure. Gulati (1995b) found that the higher the number of third party ties,

individuals from unconnected firms had already established, the higher the probability that they would enter into an alliance together. Thus, through third parties a common link was found which decreased the distance between the firms within a business structure. He also found that the greater the distance between two firms in the alliance network, the less trust they share.

2.5.3d Shared Values

According to Shapiro et al. the most perfect form of trust is when "...one develops shared values with their partner at the same time as a shared sense of interdependence." When one finds that its own values are being mirrored by another and that their needs are being met, by acting in a selfless manner and meeting the needs of their partner, trust follows.

The importance of trust, and its ingredients, is that they are the basis of strategic fuzzy alliances. The different types of trust represent a hierarchy of different types of SFA's. By identifying the ingredients of each trust-type one improves the possibility of understanding and utilising these alliances to their benefit, for example; a deterrence-based trust alliance is not nearly as robust as a knowledge or identification-based trust alliances under conditions of transaction risk.

In terms of the effects of bounded rationality and opportunism, which are endemic characteristics in economic agents, knowledge-based or identification-based trust maybe capable of addressing their negative impacts. The effects of bounded rationality are mitigated by means of identification or knowledge-based trust arrangements because high levels of accuracy and thus near complete knowledge may exist in this area of the continuum thus firms effectively have greater predictability.

2.6 SFA's and the Continuum of Governance

When an agent makes a governance choice, trust-based alliances are among the structures from which they can choose. However, along the traditional continuum of governance, trust is not apparent, (figure 2) and it is difficult to determine where strategic fuzzy alliances should be placed. Previously, criteria for strategic fuzzy alliances have been presented. Using these characteristics, it is possible to determine whether or not an alliance can be termed a SFA or a SCA. To be involved in a strategic fuzzy alliances one must: 1) be in a relationship with at least on other firm, 2) have a business relationship which is based upon trust, and 3) have a non-contract based agreement. Comparing these criteria with aspects of the three main sections on the continuum, the spot market, hybrid arrangements and vertically integrated firms, one can determine where SFA's belong.

When firms choose the spot market as a governance choice, they are choosing to deal in a competitive market. There are many buyers and sellers, thus risk due to lack of quantity is low and because the market is commodity based, quality requirements are low. A transaction in this area of the continuum has low asset specificity and low transaction risk, therefore a contract does not exist. Due to a thick market, however, trust is not necessary to complete the transaction. So, although many firms are involved and contracts do not exist, the second criteria of a strategic fuzzy alliance, trust, is not present.

Trust does exist in a firm that is vertically integrated. This trust may range from deterrence-based trust to identification-based trust. Examples of each would be firms such as General Motors (deterrent based) where common values between management and labourers may not be shared, but a common goal exists. On the other-hand firms that

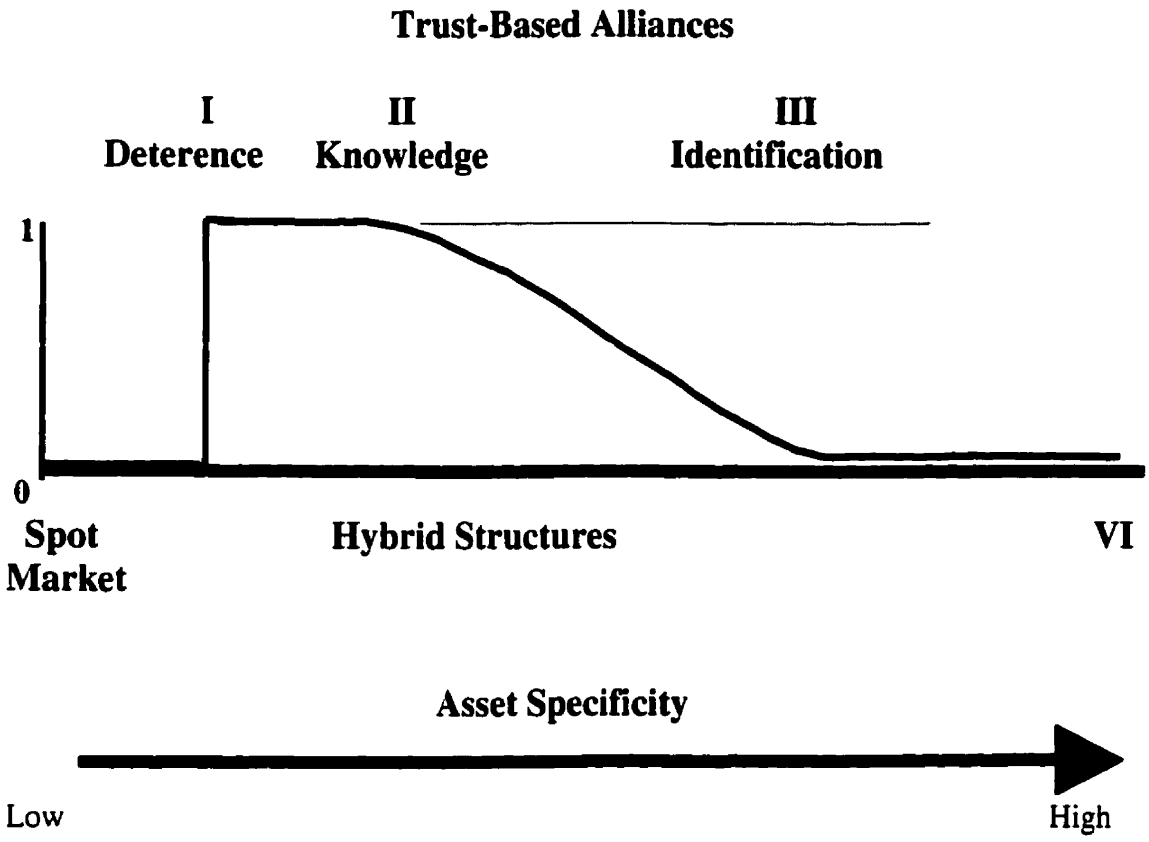
pride themselves on a common or democratic work environment achieve identification trust, such as family run organisations. Non-contract based agreements also exist in this governance structure, because a vertically integrated (VI) firm is one entity; where agents co-operate and co-ordinate within the firm with little formal governance. However, a VI firm is not a SFA even though it involves trust and non-contract based agreements, because in this type of arrangement only one firm is involved. Strategic fuzzy alliances involve two or more firms.

Throughout the central region of the continuum, SFA's are not found. Even though two or more firms bond together to form a relationship in the hybrid section of the continuum, written contracts are the foundation of the relationship, not trust. Therefore the contract is, in fact, a substitute for trust for the purpose of binding the parties to the agreement.

Since SFA's are not found in the spot market, hybrid or vertical integration regions of the continuum, an additional dimension needs to be added to the neo-institutional governance choice continuum (Figure 6).

Figure 6 shows a dual continuum, on the 1st plane the traditional continuum of governance, containing the spot market, hybrid structures and VI. On the 2nd plane one finds SFA structures. The dual continuum exhibits an increased set of choices for the firm. For each hybrid choice, on the neo-classical continuum, there is an equal and corresponding trust-based choice, which reduces the party's governance costs. The vertical axis reflects the probability, from 0 to 1, that a SFA has to replace a hybrid-governance structure. Moving from left to right, starting at the spot market the potential for substitution of a contract-based alliance for a trust-based alliance is 0.

Figure 6: A Dual Continuum



A higher probability for substituting of SCA's by SFA's exists at the beginning of the hybrid structures section, the further right one moves this potential falls asymptotically, eventually reaching zero again in the vertically integrated section of the continuum. This decrease in substitution potential reflects high levels of transaction risk, which may make informal agreements untenable, with higher levels of asset specificity.

At low levels of asset specificity, deterrence-based alliances (I) are dominant, while at high levels of asset specificity, if possible, identification trust-based alliances would be necessary to establish a feasible agreement. Over the middle range of asset specificity, high levels of knowledge and low levels of identification are needed to replace formal contracts/ownership arrangements. The strategic fuzzy alliance continuum falls moving from left to right reflecting the decreasing likelihood of formation given the

increasing transaction risk. On the right hand side of the continuum, transaction risk is so high that at a minimum, knowledge-based (II) or identification-based trust (III) would be required.

Although theoretically unlikely, strategic fuzzy alliances are possible at high levels of risk, explaining why the line does not fall to 0, until the area of VI is reached. An example is the case of Benetton. This textile company is considered to be the strategic centre of a web of companies world wide (Lorenzoni and Baden-Fuller, 1995). The structure of this company is such that each Benetton store is individually owned, and is therefore considered a company in its own right. Any losses incurred are absorbed by the individual, not the central company (Films for the Humanities and Sciences: The Benetton Story, 1993). The central company does play a role in that it is the leader of the web, it creates value for its partners and it simultaneously structures and strategizes, i.e., by encouraging rivalry between partner companies (Films for the Humanities and Sciences: The Benetton Story, 1993; Lorenzoni and Baden-Fuller, 1995). The Benetton web is unique in that is does not use legal contracts, instead it relies on unwritten agreements, which it claims saves time and money as well as focusing everyone's attention on making expectations clear (Lorenzoni and Baden-Fuller, 1995).

Overall, it was found that trust-based alliances do not exist on the traditional continuum of governance (Figure 2), instead a dual-continuum was created. This new continuum helps to explain the structure of trust-based alliances and their relationship to contract-based alliances. As explained previously, trust-based alliances start at a low level of trust (deterrence trust, I) and build up, over time, to higher levels of trust (knowledge, II, or identification, III). These trusting relationships parallel contract-based alliances on a one to one basis and depending upon the objectives of the firm, can be used

as alternatives to contract-based alliances. Characteristics that influence the firm's decision to use a SCA or a SFA are asset specificity and transaction risk. At higher levels of asset specificity, transaction risk is also high which results in very few trust-based alliances in the area of identification-based trust. Thus the potential for SFA's to be used as substitutes for SCAs is >0 where, deterrent-based alliances to identification-based alliances parallel the hybrid sector of the traditional continuum. On the other hand the potential for SFAs to substitute SCAs in the area of the spot market or vertical integration is 0.

Through the use of the dual continuum it is possible for a firm to choose firm structures that are different from traditional business structures. The theory for this model has just been presented, in the next chapter background information on the chosen empirical model will be discussed. Reasons for using this particular model will be addressed and methods of testing this type of empirical model will be presented.

CHAPTER THREE

EMPIRICAL MODEL – BACKGROUND

3.1 INTRODUCTION

For a firm to effectively determine the optimum governance structure, it must first assess its own business characteristics in terms of motives and preferences, which are part of the overall characteristics of the transaction. Secondly, it must make a discrete choice as to the appropriate governance structure, given the transaction involved.

The structures along the dual-continuum (Figure 4) are discrete and independent choices. For any particular firm, some structures are more appropriate than others are. Empirically, the best statistical model would be one that captures the discrete choice of the decision-maker. A multinomial logit model (MNL) is most often used in areas of study where researchers are investigating decision choices of individuals (Ben-Akiva and Lerman, 1985) and when the dependent variable is believed to be discrete, nominal or random (Liao, 1994).

3.2 Theory and Definition of the Model

The theory of the MNL is that an individual is faced with a problem requiring a solution chosen from a set of discrete choices, called the *universal choice set*, Y. From this set, the *actual choice set*, Y_n, for the individual is determined. The actual choice set refers to choices that are available to an individual. For example, if the universal choice set for modes of transportation includes a car, walking and public transportation, the individual's choice set would include only those possibilities available to the individual. If the individual in question does not own a car then the actual choice

set is walking and public transportation. Understanding an individual's choice set can be obtained through research, using the investigator's judgement, or through the use of a questionnaire. The number of choices contained in Y_n is represented by J, and the number of components feasible to an individual is shown by j_n (where $j=1,2,J$; $j_n \leq J$)[1]. The probability that any element of the universal choice set (y) will be chosen by the decision maker (n) is shown by the following formula:

$$\textbf{Prob } (U_{jn} \geq U_{Jn}, \textbf{ where } j \neq J) \qquad (3.1)$$

where the probability of the decision-maker choosing any element from the universal choice set (y) is determined by the utility of the element being chosen. If the utility of the components feasible to an individual, U_{jn}, exceeds the utility of the composite alternative, U_{Jn}, then y is chosen, otherwise it is not (Ben-Akiva and Lerman, 1985). Utility can be split into two components 1) a deterministic component (V_{in}) and 2) a random component (ε_{jn}). Which gives rise to the assumptions that all disturbances in this model are 1) independently distributed, 2) identically distributed, and 3) Gumbel distributed (For properties of Gumbel distribution see Appendix A; for the derivation of the MNL model see Appendix B). The general form of a multinomial logit model is

$$P_n(y=j) = \frac{e^{Vyn}}{\sum_{j \in Yn} e^{V jn}} \qquad (3.2)$$

where P_n (y=j) lies between 0 and 1 for all elements of an individuals universal choice set and the summation of the feasible choices made by the individual is equal to one.

[1] In this study all choices contained in Y are valid possibilities for the respondent, therefore $Y=Y_n$.

A multinomial logit is similar to a linear regression model in that there exists a dependent variable Y (the universal choice set) and a set of independent variables X_k (k=1,2,...K). These X_k's, the number of observable variables, comprise the right hand side of the model. As in a linear regression, the Y's are statistically independent of each other, the X_k's are not linearly dependent, implying that they must have some variance between them, and no two X's are perfectly correlated. However, unlike a linear regression model, the relationship between Y_j and X_k in a multinomial logit model is non-linear, in the parameters.

The MNL is estimated through a maximum likelihood estimator (MLE), whereas a linear regression model is estimated by using an ordinary least squares estimator. The objective of an MLE is to select a set of coefficient estimates that maximises the possibility of having observed a particular Y. The "MLE exhibits the asymptotic (large sample) properties of unbiasedness, efficiency and normality....for [logit] models large sample properties seem to hold reasonably well even in moderate-sized samples on the order of N-K=100." (Aldrich and Nelson, 1984) Although McFadden (1972) states that estimates are good even in the case of samples that are small.

3.3 Using the Model

When running the multinomial logit, one of the dependent variables is chosen to be the reference category. This is the element to which the other dependent variables are compared.

$$P_n(y=j) = \frac{e^{V_{yn}}}{\sum_{j=1}^{4} e^{V_{jn}}} \qquad (3.3)$$

For example when running the above model, j is indicated as being equal to 4, thus the universal choice set is equal to four independent choices (A,B,C and D) from which an individual must make a selection. If D was chosen to be the reference category, one would compare the likelihood of event A, B, and C with that of event D. In this case three non-redundant sets of parameter estimates are generated each associated with the first three alternatives (Liao, 1994). If it is necessary to compare the other alternatives with each other it is simply a matter of changing the reference category and rerunning the model (Liao, 1994).

3.4 Independence from Irrelevant Alternatives

"One of the most discussed aspects of the multinomial logit model is the independence from irrelevant alternatives property (IIA)." (Ben-Akiva and Lerman, 1985) The property of independence from irrelevant alternatives is that the choices made by an individual are not affected by any of the other choices available. There are both strengths and weaknesses associated with this property. The strength of this property is that a researcher can add or delete alternatives into the universal choice set and compute the resulting choice probabilities without having to re-estimate the parameters of the MNL model. A potential weakness, however, is that IIA is a highly restrictive property (Ben-Akiva and Lerman, 1985). When the characteristics of available choices are so closely related as to be almost indistinguishable to the firm, results found by an MNL model may be unacceptable (Cramer, 1991). Such as in the case of the red bus/ blue bus paradox.

The red bus/ blue bus paradox describes a situation where commuters are asked to choose a mode of transportation, the universal choice set is a car or bus. Thus, there are

two choices and the commuters are evenly split between the alternatives i.e. half choose the bus and half choose the car. The problem arises when another bus company is included in the equation increasing the universal choice set by one. Commuters must now choose between a car, a red bus and a blue bus. If commuters are evenly split between the choices available to them i.e. one third will choose a car, one third will choose the red bus and one third will choose the blue bus, this reflects a failed IIA. This answer, however, is unreasonable as commuters will not be able to distinguish between the two bus companies, and in effect would choose the bus as if it were a single alternative. A passing IIA would have the car choosers remaining the same and the bus choosers being split between two alternatives i.e., a quarter would choose the red bus while a quarter would choose the blue bus. The multinomial logit model is restricted if the alternatives of the universal choice are not considered to be distinct alternatives (Ben-Akiva and Lerman, 1985; Liao, 1994; Aldrich and Nelson, 1984; Cramer, 1991).

When modelling decision-choices concerning strategic alliances, one may run the risk of having alternatives that are too closely related. However, because each alternative on either plane of the dual continuum are defined by distinct characteristics, each choice is individual and independent of the others, thus a problem of inaccurate results should not occur. The appropriate test will be discussed below.

3.5 Testing the Model

Many of the tests associated with the multinomial logit are similar to that of a linear regression model. This study utilises two tests of coefficient estimates 1) the t-statistic and 2) a global test of predictors. It also uses four tests of goodness of fit, which will be discussed, in the next section.

3.5.1 Coefficient Estimates

3.5.1a T-statistic

The t-statistic in a linear regression model is used to test the null-hypothesis, which is that a coefficient is 0 or in other words to test that X does not have any effect on Y. The reasons for using the t-test is the same for the MNL model as in a regression model, and it is defined as:

$$t_k = b_k / s_k \qquad (3.4)$$

where: b_k is the parameter estimate and s_k is the estimates of its standard error. Degrees of freedom for the t-test are determined by N-K, where N is the number of observations and K is the number of parameters being estimated. For models with high degrees of freedom, the z-test and the t-test are comparable.

3.5.1b Global test of predictors

A global predictor test is used to determine if a particular predictor (X_l) has an effect on any of the logits being tested. Running the full model and then running a reduced model, which excludes the predictor the researcher wishes to test, performs the test. The chi-square value from the restricted model is then subtracted from the chi-square value for the full model, the degrees of freedom are M-1, where M equals the number of dependent variables. The null hypothesis is that X_l has no effect on any of the M-1 logits. The alternate is then, that X_l has an effect on at least one of the logits. If the test is significant, then Ho is rejected and provides the researcher with evidence that the predictor being tested has an effect on at least one of the logits.

3.5.2 Goodness of Fit

Testing how well a particular model estimates the dependent variables, is called testing for the goodness of fit. Four common tests for multinomial logit models are: 1) calculation of predicted outcomes 2) a chi-square test, which is comparable to an F-test in a linear regression 3) pseudo R^2, and 4) a testing for independence from irrelevant alternatives (IIA).

3.5.2a Predicted Outcomes

When a multinomial logit model is run, a matrix of frequencies of actual and predicted outcomes is generated. A hypothetical set of predicted outcomes, shown below in Table 3.1, will be used to explain the theory behind this analysis. In the table below there are three columns, the first is called actual, signifying what the data values actually were. The second column called predicted splits the data into three possible outcomes 0,1 or 2. In this case it was predicted that there were 20 0's, 15 1's and 15 2's, the total number of 0's that existed was 50. By taking all cases where the Y value was predicted accurately, a percentage of correctly predicted outcomes are determined, in this case it is 50%. This value was determined by adding the correctly predicted values for each variable category together i.e. 20+15+15=50 and dividing by the total, 100. Thus the researcher can state that the probability of Y being 0,1 or 2 is accurate 50% of the time. This prediction lies between 0 and 1; the closer to 1 the more accurate the model is, the closer to 0 the value, the opposite is true.

Table 3.1: Predicted Outcomes (example)

ACTUAL	PREDICTED 0	1	2	TOTAL
0	20	15	15	50
1	5	15	5	25
2	5	5	15	25
TOTAL	30	35	35	100

In this scenario the actual number of cases that were 0's was 50, the model predicted 30, while 1's and 2's were 25 each and overly predicted at 35, respectively. Thus this model is not very effective in predicting the correct outcomes.

3.5.2b Chi Square Test

The null hypothesis for this test states that all coefficients simultaneously equal 0, which means that none of the hypothesised independent variables have an effect of any of the logit models. The alternate hypothesis states that at least one of the predictors has a significant impact on one of the logits. The calculated chi-squared value, when testing the MNL model, is found by using the following formula:

$$\mathbf{c = -2log\ (L0/L1) = (-2log\ L0) - (-2\ log\ L1) = -2\ (log\ L - logL1)} \qquad \mathbf{(3.5)}$$

where: c is a random variable with the chi-square distribution under the null hypothesis, L1 is the value of the likelihood function for the full model and L0 is the maximum value of the likelihood function if all coefficients except the intercept are 0 (DeMaris, 1992; Aldrich and Nelson, 1984). The test is then performed by comparing the calculated value with a critical value taken from a table with K-1 degrees of freedom and a significance

level of α. If the test is significant, then Ho is rejected and the researcher can conclude that at least one of the predictors significantly affects at least one of the logits.

3.5.2c Pseudo R^2

The pseudo R^2 describes how well the predictors describe the dependent variables; similar to the R^2 used in linear regression, the pseudo R^2 ranges from 0 to 1. When the pseudo R^2 is 0, or close to it, the independent variables are completely unrelated to the dependent variable. However, the closer the value is to 1 the more related the predictors are to the dependent variables. "...[I]n a linear regression, under the assumption that the conditional distribution of errors is normal, the residual sums of squares for the fitted model is proportional to the log likelihood for the model (Hosmer and Lemeshow in Demaris, 1992). Thus the formula below:

$$\textbf{pseudo } R^2 = \frac{\textbf{-2log L0 - (-2 log L1)}}{\textbf{-2 log L0}} \qquad \textbf{(3.6)}$$

where: -2 log (L0) is similar to a total sums of squares and -2 log (L1) is analogous to the residual sums of squares, thus an R^2 type measure for the logit model is formed (McFadden ,1972).

3.5.2d Independence of Irrelevant Alternatives

As discussed previously, the IIA is an important property of the MNL model. If the choices an individual is presented with are too closely related the model might predict incorrect results. This can be tested by dropping one of the dependent variables of the model, the hypotheses being that if the reduced model does not predict the same sign results as the full model, then the choices presented are so closely related that respondents

do not distinguish between them. Thus, outcomes predicted by the model are not accurate. However, if the signs predicted in the reduced model are the same as those in the full model, the choices presented are not similar and the results of the model are accurate.

The mathematical background and theory for the empirical model as well as statistical methods of testing the model have been presented. In chapter 5 the research methodology will be discussed and the empirical model will be presented.

CHAPTER FOUR

RESEARCH METHODOLOGY AND EMPIRICAL MODEL

This chapter is divided into three sections. First, a discussion of the sampling design used in the study takes place. Second, an analysis and discussion of the questionnaire design is presented, and finally the empirical model and hypotheses are displayed.

4.1 Sampling Design

The aim of this thesis is to characterise the governance-choice decision for firms in the agricultural sector and to determine the primary motives of the firms involved in agricultural alliances. The data used in this research originated from a study, which gathered general data on strategic alliances. It was conducted by Patrice Dionne, Remy Lambert and Robert Romain of Laval University in conjunction with Garth Coffin from McGill University. The study was conducted between July and October 1996. Judgement sampling was used; this is a form of convenience sampling, with the candidates being included in the study based on the judgement and/or expertise of the researcher (Malhotra, 1996).

Pork and horticulture processors from Quebec, Ontario, Saskatchewan, Manitoba, Alberta and British Columbia were surveyed. Initially the study included processors from only Quebec and Ontario. However, to increase the number of pork processors surveyed, the western provinces were later included.

The sampling frame used in this study were listings of Canadian businesses found in Scott's Industrial Business Directory for Ontario (1994), Scott's Industrial Business

Directory for Western Manufacturers (1994), Business Opportunities Sourcing System Directories (1996), the Association des manufacturiers de produits alimentation du Québec (AMPAQ) Guide (1996) and the Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec (MAPAQ). Also member lists from various agricultural organisations, such as the Ontario Food and Processors Association (Fruit and Vegetable processors) and the Association des jardiniers maraîchers du Quebec were used. Those chosen to be included in the study fell into the SIC code category of canned fruit and vegetables, frozen fruit and vegetables and meat (SIC codes 2033, 2037 for horticulture and codes 2011 and 2013 referring to meat). As there is no specific SIC code for pork, candidates were chosen based on the listing of processed products, printed in the directory.

All horticultural processors listed in the 1994 Scott's directory for Ontario, excluding companies that produced only juice or dairy products and those with fewer than 5 employees, were used in the sample. All pork processors listed in the 1994 Scott's Industrial Business Directory for the western provinces and the 1996 BOSS directory for Canadian manufacturers, residing in Ontario, Alberta, Saskatchewan, Manitoba, and British Columbia were included in the sample. For Quebec, all pork processors listed by the AMPAQ Guide and MAPAQ were used and all horticultural processors that were members of the Association des jardiniers maraîchers du Québec were also included. This is not considered to be the full population of pork and horticultural processors, as only those individuals who voluntarily give information concerning their enterprise are included in the directories utilised.

The sample size was dictated by the response rate to questionnaires mailed out to respondents. Although conducting questionnaires by mail is known to have a low

The sample size was dictated by the response rate to questionnaires mailed out to respondents. Although conducting questionnaires by mail is known to have a low response rate (Malhotra, 1996), it was deemed most appropriate in this study due to the geographical diversity of the processors, it was also the most cost and time efficient method of conducting the survey. Questionnaires were sent to the president or vice-president of each firm, their names and addresses were obtained from the afore-mentioned business directories and associations. Questionnaires were administered in both French and English: follow-up calls were also made. A sample letter of introduction and questionnaire are shown in Appendices C and D respectively. Questions that pertained to geographic area of operation were changed accordingly. There were a total of 138 questionnaires distributed; 63 were sent to horticultural processors in Ontario, 45 to horticulture and pork processors in Quebec, and 30 questionnaires were sent to pork processors in Ontario and the western provinces. The return rate for Ontario processors was 29% for horticulture and 43% for pork. In Quebec the overall return rate was 43%. For pork processors in the western provinces the return rate was 38%. In total, 45 questionnaires were returned (a response rate of 33%), of these 31 firms were involved in, or had been involved in, a strategic alliance. The number of sample cases used in the study was dependent upon the number of strategic alliances in which each firm had been involved. The questionnaire allowed each firm to answer questions for up to three alliances; thus the maximum number of possible cases or observations was 93. The actual case number was 53; four cases were dropped due to incomplete or inconsistent information, resulting in a sample size of 49[2].

[2] Preliminary results showed that responses from horticultural processors and pork processors were similar and therefore were analyzed together.

4.2 Questionnaire

Although the questionnaire was not designed for this specific study, it was felt that it adequately dealt with the subject matter. The questionnaire was comprised of 3 sections, of which only the first two were used. The first section consisted of two questions designed to split respondents into two groups those that had participated in strategic alliances previously and those that had not. The respondents that had been involved in a strategic alliance were then asked to fill out section A and those that had never participated in a strategic alliance were asked to fill out section B (this section was not analysed and was later discarded). Section A was comprised of 11 questions (see Appendix D).

4.2.1 Discussion of Questions

The first question was the basis for the development of a multinomial logit model (MNL), supplying the dependent variable. The other questions were used for frequency analysis or as independent variables in the MNL model.

4.2.1a Dependent Variables

The first question asked individuals to rank their primary motives for becoming involved in a strategic alliance. The universal choice set consisted of eleven choices (shown in Appendix F). For the statistical analysis, these categories were grouped together to form 3 dependent variables that represented different types of strategic alliances they were: 1) tangible asset based alliances (TA) 2) intangible asset based alliances (IA) and 3) mixed alliance (MA).

A tangible asset-based alliance is one where the partners utilise physical assets that are jointly held, such as facility sharing and/or human resources. The agreement created is bounded, through the use of a contract or is held together through the use of common or hostage assets. In a tangible asset-based alliance there is measurable return on investment (ROI), through which individuals gauge the success of the alliance. Combining choices 1a, b and c created this dependent variable together see table 4.1.

An intangible based alliance is one where physical assets are not a feature of the agreement, instead the alliance is based on intangible assets such as: shared knowledge or data. This type of alliance is not specifically bounded, in fact in may be difficult to determine where one firm begins and the other ends, benefits for one partner may not the same for the other. The advantages gained from this type of alliance are also intangible and as such difficult to calculate through usual measures such as ROI. Combining choices 1d-i created this dependent variable, see table 4.1.

The final alliance type is a mixed alliance. It combines characteristics of both IA's and TA's giving it a hybrid structure. Though having some measurable characteristics, such as in a tangible asset-based alliance, a mixed alliance may also have characteristics that are not assignable or bounded like that of an intangible asset-based alliance. This category was created using choices from respondents that identified a preference for an alliance that reduces risk and operating costs. The reduction of operating costs are highly measurable, however unlike a tangible asset-based alliance where the sharing of assets bound the agreement, the sharing of costs may not. On the other hand if the alliance is designed to decrease risk it may or may not be supported by specific tangible assets. Return on investment may be possible to calculate in this type of

alliance but it is not guaranteed. This variable was comprised of choices j and k from question one, see table 4.1 below.

TABLE 4.1 - DEVELOPING DEPENDENT VARIABLES

Dependent Variables			
a	sharing assets	→	Tangible asset-based Alliance
b	sharing physical resources		
c	sharing human resources		
d	penetrate a new market	→	Intangible asset-based Alliance
e	increasing market share		
f	research and development		
g	increase quality		
h	co-ordinate marketing		
i	joint advertising program		
j	decrease operating costs	→	Mixed Alliance
k	decrease risk		

4.2.1b Independent Variables

The remainder of the questionnaire was used to ascertain about the alliance both objective information, questions 2 through 5, and subjective information, questions 6-11, (Appendix F).

Question 2, the basis of the variable *International*, was used to determine where the alliance was situated. Respondents were given three possible answers a) situated in home province b) situated somewhere else in Canada and 3) situated outside Canada. Responses a and b were combined to pertain to domestic alliances while c refers to a foreign alliance. The variable was coded 0/1 where 1 identified a Canadian alliance and 0 denoted a foreign enterprise, see table 4.2.

Question 3, which was the basis for the variable *Position*, refers to the role of the allied enterprise in the alliance, this information was used to describe the type of move, either vertical or horizontal, in which the alliance was involved. Responses to 3a,b and c

were combined making up the category of vertical moves, while 3d was used to describe horizontal moves. This variable was coded 0/1, where 1 pertains to vertical movement and 0 refers to horizontal movement.

In question 4, variable named *Judi*, the respondent was asked to describe the juridical form of the alliance. Respondents were given 5 possible choices to pick from, ranging from short-term contract to joint venture, coded as 1-5 respectively. One of the shortcomings of this study was that these responses represented only alliance forms that reside on the traditional governance-choice continuum, other alternate structures were not included, such as strategic fuzzy alliances.

Question 5 was the basis for variable *Effect*, was used to determine if the alliance in question is still being used, yes was coded as 1 while no was coded as 0. Table 4.2, below, summarises the adjustment and coding of the independent variables from question 2-5.

TABLE 4.2 - DEVELOPING INDEPENDENT VARIABLES (QUESTIONS 2-5)

Question	Modification	Coding	Variable Name
2a enterprise in home province 2b enterprise in another province 2c enterprise outside Canada	2a and 2b Combined 2c	1 0	**International**
3a supplies services 3b supplies inputs 3c buys products 3d competitor	3a,b and c combined d	1 0	**Position**
4a joint venture 4c majority shareholder 4b minority shareholder 4d long-term contract 4e short-term contract		5 4 3 2 1	**Judi**
5a alliance still exists 5b alliance no longer exists		1 0	**Effect**

In question 6, the variable name was *First*, individuals were asked to state whether or not the results that were obtained by the alliance were expected, yes was coded as 1 and no was coded as 0, see table 4.4.

In question 7, the basis of the variable *Trust*, combinations of responses were grouped to form, different levels and varying degrees of trust, ranging from full and complete trust, (response a), to a low level of trust reflected only by the competence of a partner in the alliance (response b). The possible levels of trust were coded from 0-5, highest to lowest. For a more complete description see Table 4.3, below.

TABLE 4.3 – DETERMINING TYPES OF TRUST

Types of Trust			
	Trust	**Respect**	**Competence**
0-High	**X**		
1	**X**	**X**	
2	**X**	**X**	**X**
3		**X**	**X**
4	**X**		**X**
5- Low			**X**

Question 8, asks the respondent to choose characteristics that made his/her experience with the alliance positive. Three variables were gleaned from this question they were: increasing sales and profits (which were combined to form one variable, *SP*) decreasing *Cost*, and decreasing *Risk*. Each variable was coded as 0/1, 1 refers to a positive response and 0 to a negative response see Table 4.4.

Question 9, was the basis for the variable *Before and After*, asks the respondent to determine if the performance of the firm was better before or after the alliance. The possible responses ranged from greatly superior to greatly inferior, and were coded from 1-5, respectively.

Question 10, was the basis for the variable *Rate*, asks a similar question to that of question 9, however, the respondent is now asked to rate the firms performance with that of other in the sector. Choices presented were the same as in question 9, and they were coded accordingly.

TABLE 4.4 - DEVELOPING INDEPENDENT VARIABLES (QUESTIONS 6-11)

Question	Modification	Coding	Variable
6a desired results		1	**First**
6b not desired results		0	
7 see table 4.3			**Trust**
8a increasing sales	8a and b grouped	1/0	**Sales and Profit**
8b increasing profit	c	1/0	**Risk**
8c decreasing risk	d	1/0	**Cost**
8d decreasing costs			
Before and after performance is:			**Before & After**
9a greatly superior		1	
9b slightly superior		2	
9c identical		3	
9d slightly inferior		4	
9e greatly inferior		5	
Compared with others alliance is:			**Rate**
10a greatly superior		1	
10b slightly superior		2	
10c identical		3	
10d slightly inferior		4	
10e greatly inferior		5	
11a had knowledge	11b and c grouped	0	**Knowledge**
11b did not have knowledge	a	1	
11c do not know			

Finally, in question 11, the respondent was asked if they had knowledge of others alliances in the same sector. The variable obtained from this question was named *Knowledge*. There were three possible responses a) yes, b) no and c) do not know, responses from b and c were combined. The variable was coded as 0/1, 1 indicating that

a respondent knows of other alliances in his/her sector and 0 showing that he/she did not. Table 4.4, below summarises the adjustments and coding of variables obtained from questions 6-11.

Variables *First* and *Effect* were used only in the frequency analysis, all other independent variables were initially included in the multinomial logit model, shown in linear format, equation 4.1.

4. 3 Empirical Model

The objective of this model is to determine the governance choice, in terms of the type of alliance formed, based on firm characteristics. The dependent variables are alliance types and the independent variables are alliance attributes. The empirical model created for this study is shown below in linear format, equation, 4.1:

$$\log O_i = \alpha^i + \beta_1^i I + \beta_2^i HV + \beta_3^i Judi + \beta_4^i Trust + \beta_5^i SP + \beta_6^i Risk + \beta_7^i Cost + \beta_8^i BA + \beta_9^i Rate + \beta_{10}^i Know \quad \textbf{(4.1)}$$

The characteristics of the dependent variables i = {1,2,3}

where: 1 = Tangible asset-based Alliance
2 = Intangible asset-based Alliance
3 = Mixed Alliance

were determined by testing the likelihood of a dependent variable being influenced by the following independent variables, which represent characteristics of an alliance:

I = The Alliance is either international or domestic

H/V = The expansionary movement of the alliance is either Horizontal or Vertical

Judi = Conveys the juridical form of the alliance

Trust = The level of trust displayed in the strategic alliance

SP = Motivation of the alliance related to increasing sales and profit

Risk = Motivation of the alliance related to decreasing risk

Cost = Motivation of the alliance related to decreasing cost

BA = Performance of the firm before and after the alliance

Rate = Performance of the firm, after the alliance, as compared with other firms in the same sector

Know = Is an industry standard showing the knowledge of the processor for the existence of strategic alliances in the same industry

4.3.1 Hypotheses

From the theoretical model - a set of hypotheses have been established defining a relationship between firm characteristics and governance choice, table 4.5.

Mixed alliances do not appear in all the hypotheses because they are assumed to lie between the other two alliances, as it has been defined as a hybrid of tangible and intangible-based alliances. Specific theory related to these types of alliances does not exist.

Table 4. 5: Hypotheses of the Model

HYPOTHESES			
Dependent Variables			
	IA	MA	TA
H_I	-		+
$H_{H/V}$	?		?
H_I	?		?
H_T	+		-
H_{SP}	-		+
H_R	+	+	-
H_C	?		?
$H_{B/A}$	-		+
H_E	-		+
H_K	+		-

4.3.1a International (H_I)

Gulati (1995a) found that non-asset based alliances were more likely to be domestic, while asset based alliances were more likely to be international. This is explained by the fact that those individuals involved in intangible-based alliances tend to have a shared history, thus it is easier for individuals to attain this type of relationship within their own country. Those involved in tangible asset-based alliances rely on contracts to enforce the relationship, thus a previous past between the partners is not necessary and it is easier to sustain a foreign based relationship than for IA based relationships. It was hypothesised that international relationships would be positively correlated with tangible asset-based alliances and negatively correlated with intangible asset-based alliances.

4.3.1b Horizontal/Vertical Movement ($H_{H/V}$)

This variable dealt with the topic of vertical and horizontal expansionary movement and governance choice. Choices 3a, b, c were grouped to characterise vertical moves while, 3d is representative of horizontal moves. Theory as to governance choice based on trust does not distinguish between vertical and horizontal relationships; what is critical is not the direction but the proximity of the partner. Gulati (1995b) found that the greater the distance between firms in an alliance structure the less trust they shared. Also, the higher the number of third party ties the partners shared, before a relationship was established, the more likely they were to be involved in an alliance together. As this variable does not address the question of proximity, and the literature does not distinguish between vertical and horizontal firm movement, this variables was deemed to be irrelevant.

4.3.1c Juridical Form (H_J)

This variable dealt only with traditional governance structures and did not reflect alternate structures. As previously discussed, trust is a contract substitute for some governance structures, however these forms were not included in the original question. Thus the hypothesis between juridical form and governance choice is deemed to be irrelevant.

4.3.1.d Trust (H_T)

In an intangible asset-based alliance a contract is replaced through the use of trust in the relationship, whereas in a tangible asset-based alliance a written contract is used and thus trust is not a necessary ingredient of the arrangement. Thus trust in a relationship between firms will increase the probability that the alliance is an intangible asset-based alliance. It was hypothesised that trust would have a positive correlation with intangible based alliances and a negative correlation with tangible asset-based alliances.

4.3.1e Increasing Sales and Profit (H_{SP})

Individuals involved in any governance structure are interested in increasing their sales and thus their profit margin. However, individuals involved in an intangible asset-based alliance expect changes in areas of the relationship that may be immeasurable or difficult to discern, thus measurable changes such as increased sales and profit may occur slowly. For those involved in tangible asset-based alliances, changes that occur are expected to have immediate effects on the firm. As sales and profit are highly measurable they were hypothesised to be positively correlated to TA's and negatively correlated to IA's.

4.3.1f Decreasing Risk (H_R)

An aim of both tangible asset-based alliances and intangible-asset-based alliances is to reduce risk. Those involved in tangible asset-based alliances reduce risk by being involved with other firms, this disperses risk over a number of businesses and reduces individual firm risk. However, a contract covers contingencies for all conceivable problems not, all possible problems. Without trust, and a higher level of firm identification, risk is a variable that is highly unpredictable.

In an non-asset based alliance individuals decrease risk by relying on a past shared history, which allows them to determine future events, enabling them to form a level of trust. An alliance that has trust as a component is more flexible than one that is contract based, and as such reduces the problem of bounded rationality and risk because it is more adaptable. (Maitland, Bryson and Van de Ven, 1985)

Risk is also a variable that is difficult to measure; due to this intangibility, it is more likely to be a characteristic of an IA or an MA (which exhibits some IA characteristics) than a TA. It was hypothesised that decreasing risk would be positively correlated to IA's and MA's while being negatively correlated to TA's.

4.3.1g Decreasing Cost (H_C)

An aim of any firm is to reduce costs of one type or another, as previously mentioned, however, there are different types of costs such as governance costs and production costs. The question, from which this variable was determined, was presented in an open-ended manner, not distinguishing between the different costs present in a business arrangement. Thus, two opposing hypotheses can be stated for this variable.

Tangible asset-based alliances reduce costs by sharing them with partners with whom they ally themselves with. As seen in Figure 2, the governance choice continuum, governance costs increase to match increasing transaction risk derived from increasing asset specificity. Intangible asset-based alliances, reduce governance costs as they substitute trust-based agreements for formal legal agreements. Having trust as an element of the agreement bureaucracy costs are also decreased as the agreement is verbal, not written (Dodgson, 1992). This allows a firm to be involved in a business arrangement that has the same level of risk as a contract-based agreement, but with lower total costs and a more efficient governance structure. One hypothesis might be that cost is positively correlated to intangible asset-based alliances and negatively correlated to tangible asset-based alliances. However, cost is a measurable or tangible variable. Individuals involved in a tangible asset-based alliance may prefer measures of the alliance that are perceivable. Whereas those involved in an intangible-asset-based alliance may not be so concerned with discernible results, and prefer immeasurable improvements to the alliance. Therefore an alternative hypothesis is that cost is positively correlated to tangible asset-based alliances and negatively correlated to intangible asset-based alliances.

This question was written in an open-ended manner, it cannot be determined how the respondent viewed the question. Therefore the hypothesis for this variable is ambiguous.

4.3.1h Before and After ($H_{B/A}$)

The question from which this question was gleaned asked the respondent to compare results of the firm before and after the alliance. Thus only one firm is involved and the individual must determine what changes have occurred for the benefit or

detriment of that firm. For an individual closely involved with a firm discerning changes in that firm caused by an alliance may be very difficult, unless the changes are very bad or very good. Thus individuals may be unable to identify changes that are intangible in nature, thus incorrectly answering question pertaining to this variable. As a result this variable was dropped from the analysis due the possibility of obtaining inaccurate information[3].

4.3.1i Rate (H_R)

The question related to this variable asked the respondent how their firm compares with other firms in the same sector after the alliance. Although it is possible to get intangible results from either alliance type, it is more likely to happen in an IA due to the nature of the alliance. Therefore it may be difficult for an individual to accurately state how their performance compares with others in the same sector, especially if those they are being compared to are tangible-asset-based alliances. On the other hand those involved in a TA are more likely to have measurable results that are easily compared with other firms in the same sector. Thus, it was hypothesised that a firm's perceived expertise would be positively correlated to tangible asset-based alliances and negatively correlated to intangible asset-based alliances.

4.3.1j Knowledge (H_K)

Individuals involved in IA's are more likely to have information concerning their sector due to the nature of the alliance, whereas for those involved in TA's it may not be so crucial. It was, therefore, hypothesised that knowledge would be positively correlated

to intangible asset-based alliances and negatively correlated to tangible asset-based alliances.

4.4 Model

After evaluating all the variables to be used in the analysis, and reviewing the theory of these variables, it was deemed appropriate to exclude three variables from the analysis they were: Position, Judi and Before and After. The reasons for not including these variables were discussed above. The model used in this study is shown below in linear format:

$$\log O_i = \alpha^i + \beta_1{}^i FD + \beta_4{}^i Trust + \beta_5{}^i SP + \beta_6{}^i Risk + \beta_7{}^i Cost + \beta_9{}^i Expert + \beta_{10}{}^i Know \quad (4.2)$$

The methods of gathering data and determining the emirical model have been presented. The following chapter presents the results, which will be discussed in detail.

[3] The results in Questions 9 and 10 were not consistent with each other. It appeared that the individuals were too close to the firm to see any improvements or that they viewed the changes that occurred as being better than those of their competitors. As a results, question 9 was not used in the analyses.

CHAPTER FIVE

RESULTS AND DISCUSSION

Results from the frequency analysis, tests for goodness of fit, and the coefficient estimates will be presented first, and then a discussion of the results, in relation to the literature presented previously, will ensue.

5.1 FREQUENCY ANALYSIS

When analysing a questionnaire using a frequency analysis, one breaks the responses of any given question into categories; each category represents an answer of the question being analysed. The number of responses per possible answer can then be determine. The frequency is determined by dividing the actual number of responses by the number of possible responses for each question. For example: If the researcher posed the question. What is you hair colour? And then provides four responses a) blonde b) black c) brown and d) red. Each hair colour would represent a category so if 10 people said that they had blonde hair and there was a total of 50 people in the study the frequency of people having blonde hair in the study would be 10/50 or .2. By analysing a questionnaire using a frequency analysis a researcher can determine what response was most prevalent in any given question. In this type of analysis one cannot assume anything from the observed frequencies, no rankings can be determined and the responses are not a representation of the population as a whole. However, a frequency analysis is useful as it characterises respondents in a particular study, this information may be used later when interpreting results from other statistical tests that have been conducted. In this study the software package Statistica 5.1 was used to determine variable frequencies.

5.1.1 Results of the Frequency Analysis

Question 2-5 of the questionnaire asked factual information about the alliance questions 6-11 asked the respondent for more subjective information.

5.1.1a Results from Questions 2-5

Question 2 asked if the firm was involved in foreign or domestic alliances. It was found that 73% of the respondents were involved in or had been involved in a domestic alliance and 26% were involved in a foreign alliance (Figure 7). When asked to describe the position of the alliance (question 3), the majority of respondents (82%) described their alliance as being involved in vertical moves, while 6% described their firm as being in horizontal moves (Figure 8). Question 4 asks the respondent to identify the governance choice the firm made; these results were varied: 39% opted for a short-term contract, defined as being less than 5 years, 24% said they were involved in a joint venture while 21% were in a long-term contract. The respondents, however, were not given the option of choosing a less conventional structure such as a strategic fuzzy alliance, (Figure 9). Question 5 asks whether the alliance still exists or not. It was found that 94% of the alliances still existed, while 6% have disbanded (Figure 10).

FIGURE 7: DOMESTIC VS FOREIGN ALLIANCES

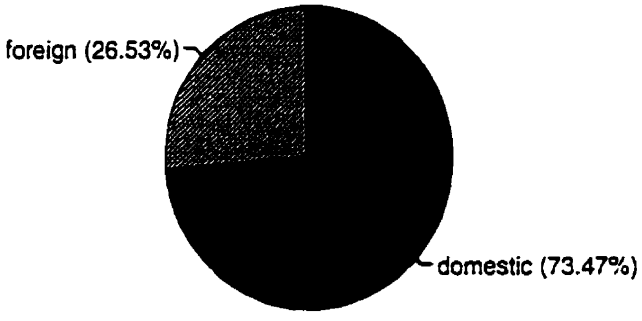


FIGURE 8: HORIZONTAL VS VERTICAL MOVES

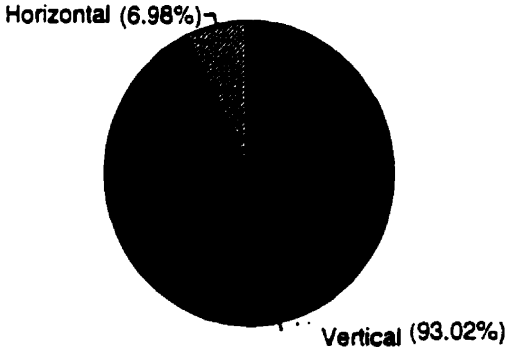


FIGURE 9: JURIDICAL FORMS

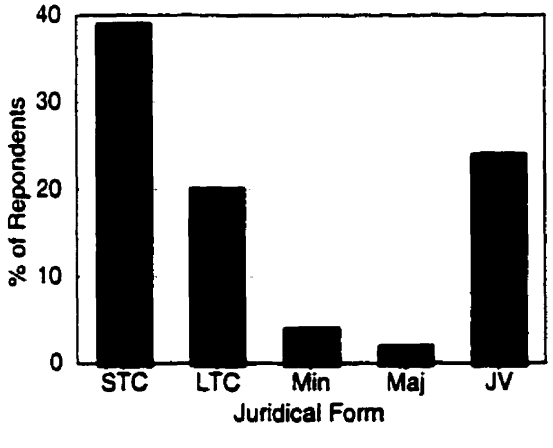
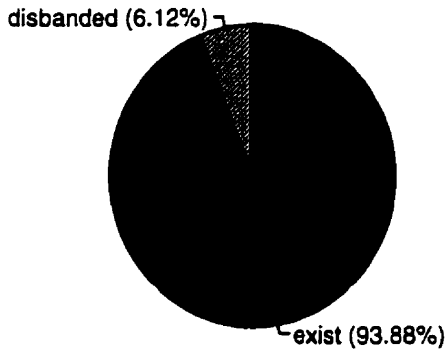


FIGURE 10: PERCENTAGE OF DISBANDED ALLIANCES VS THOSE THAT STILL EXIST



5.1.1b Results from Questions 6-10

In Question 6, respondents were asked if the results obtained from being involved in an alliance were in accordance with their expectations. It was found that 76% of the respondents felt that the desired results had been achieved by being involved in the alliance, and 22% said they were not satisfied with the alliance results (Figure 11). Question 7 asked respondents to identify motives that they felt effected their degree of satisfaction in the alliance. A mid-level of trust (Table 4.3) was chosen by 33% of the respondents as being integral in their satisfaction of the alliance. A high level of trust was selected by 27% and 14% said a low level of trust influenced their satisfaction with the alliance (Figure 12). In question 8, when asked what performance criteria best illustrated the respondents satisfaction, 63% said sales and profit had increased, 24% felt that risk had been reduced and 43% said that costs had been decreased (Figure 13). Question 9 asked the respondents about the performance of the firm after the alliance, as compared with before the alliance; 71% of the respondents felt performance had improved, 16% found that there had been no change, while 10% reported that performance had decreased (Figure 14). Question 10 asked how the firm compared with other companies in the same sector after the alliance, 79% thought their

performance levels had improved, while only 10% felt there had been no improvement and 6% felt their performance had decreased (Figure 15). Question 11 represents an industry standard designed to determine the knowledge of the respondent in terms of alliances in their sector; 76% of the respondents said they had previous knowledge of alliances in their industry, while 14% did not (Figure 16).

FIGURE 11: THOSE SATISFIED VS THOSE NOT SATISFIED WITH RESULTS FROM THEIR ALLIANCE

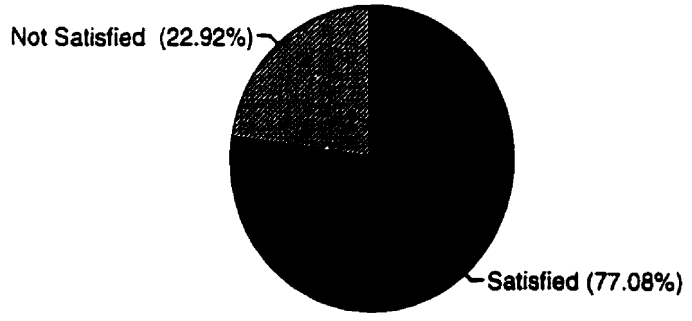


FIGURE 12: VARYING LEVELS OF TRUST

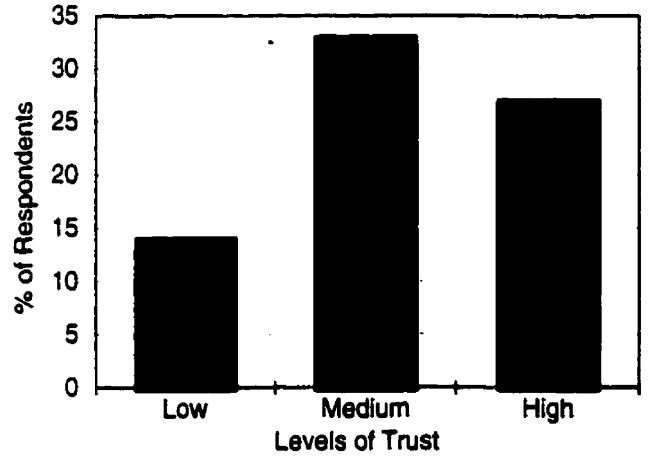


FIGURE 13: INDIVIDUAL PERFORMANCE CRITERIA

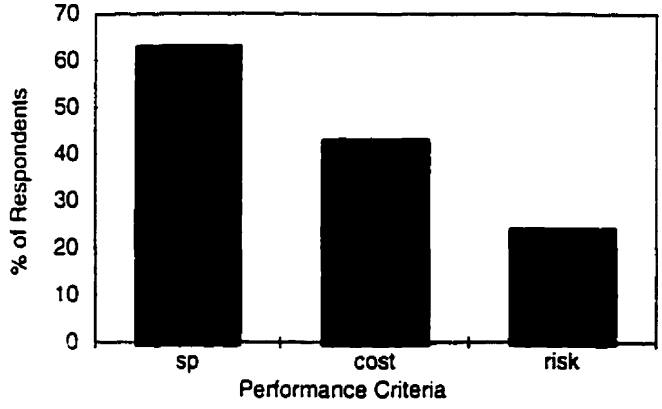


FIGURE 14: PERFORMANCE LEVELS OF THE FIRM BEFORE AND AFTER THE ALLIANCE

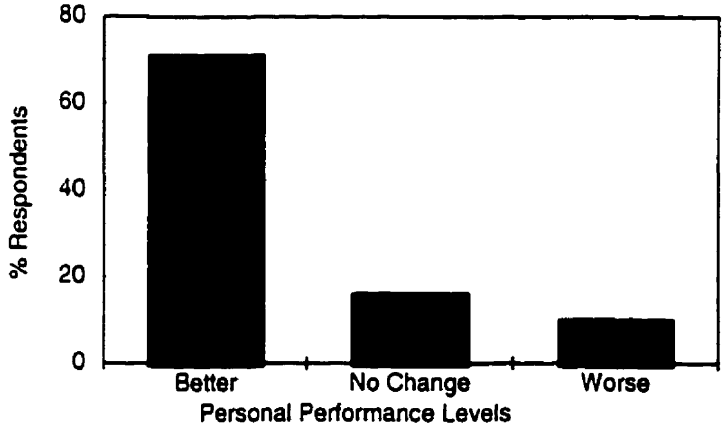


FIGURE 15: COMPARING PERFORMANCE LEVELS OF FIRMS IN THE SAME SECTOR

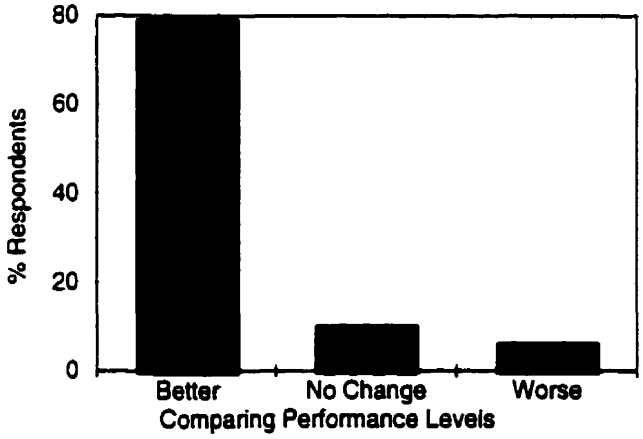
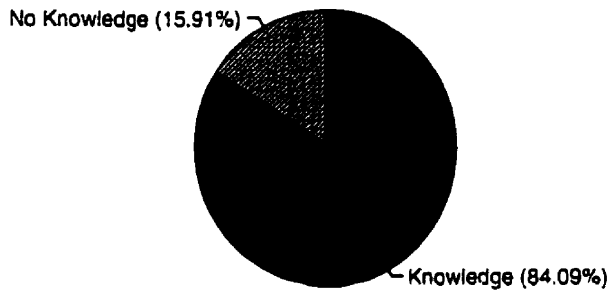


FIGURE 16: INDUSTRY STANDARD



5.1.2 Limitations of the Questionnaire

The main problem for the designers of the questionnaire, was the limited amount of information on strategic fuzzy alliances. Thus creating an adequate questionnaire was a challenge. The questionnaire used in this study was not designed for this study but for broader purposes and can be applied to strategic alliances in general. Some of the questions in the questionnaire, although useful for this analysis, could have utilised responses that included a wider realm of economic theory. For example, question 4 includes responses that only consider business arrangements on the traditional governance choice continuum, excluding intangible-based alliances. It also did not reflect the possibility of substitution between the two alliance types, which would have been an interesting observation. Question 7 is misspecified, in that it only allows respondents 3 possible motives that could be responsible for a firm's satisfaction in an alliance. The question only reflects one small segment of the continuum.

Some items that could have been included were information about the allied partner such as; performance, geographic location, technical know how, amount of technology available through the alliance and levels of communication. As there are

many ways to interpret the motives that people find satisfactory when analysing an alliance another way to approach this question would have been to split the individuals motives into categories of formal and informal communication. Formal communication is information that is conveyed by physical means such as that is displayed through contracts and electronic information. As opposed to informal communication which conveys information through oral agreements, by the identification of common needs and through non-verbal interchange.

It may have been easier for respondents to answer questions 9 and 10 based on a scale rather than trying to rank the choices presented. It may be difficult for a firm to determine an increase in performance when dealing with an intangible asset-based alliance, which by definition is fuzzy and not bounded. Results from an alliance of this type may be immeasurable. The relationship between the alliance and changing variables such as an increase in market share or decreasing risk may be difficult to assess, thus a numerical result may not be attainable. Individuals involved in tangible asset-based alliances may be in a better position to determine performance changes using more measurable variables such as penetrating a new market, increasing sales and profit or decreasing operating costs.

For those individuals that were not satisfied with the alliance (Q6) it would have been interesting to find out what changes they would have made to improve their situation. In question 8 it would have been useful to ask the respondents what their expectations were before the alliance to have a point of comparison (which was probably the intention of part B of the questionnaire). It would have been advantageous to know what type of technical information firms made use of. This may have been reflected in their satisfaction of the alliance or their knowledge of the sector, i.e., the more

technologically advanced the firm is, performance of the alliance may be higher thus feelings towards the alliance may be more positive. Finally, it would have been beneficial to have questions that tried to measure the level of risk that was perceived by the respondent, the amount and duration of knowledge the processor possessed. Section B of the questionnaire might have provided insights into expectations of non-alliance users but because there were not enough parallel questions, i.e., questions that are asked in both sections to get responses from both sides of a situation, section A could not be compared with section B.

5.2 GOODNESS OF FIT

In this study the empirical model was evaluated using tests for goodness of fit which evaluates how well a chosen model estimates the overall performance of the model. Four tests for goodness of fit were used in this study they were: 1) predicted outcomes 2) chi-square test 3) Pseudo R^2 and 4) a test of independence from irrelevant alternatives. The statistical package Limdep 4.0 was used to determine goodness of fit for this study. Each of these tests will be discussed in detail in the following sections. First, however, it is important to understand how the dependent variables in a multinomial logit model are utilised.

When a multinomial logit model is run, one of the dependent variables is dropped and it becomes the reference category; this is the element against which the other dependent variables are compared. For this study, there were three dependent variables: tangible based-alliances (T), intangible-based alliances (I) and mixed-base alliances (M). These three variables comprise the discrete choice set available to the agents. The choice that was to be the reference category was coded with a (0), while the other variables were

coded (1 & 2). The first variable in each choice set was the reference category, i.e., IMT, I = the reference category, or 0. The three models run were 1) IMT 2) TMI and3) MTI, in each case the first letter is representative of the reference category.

5.2.1 Predicted Outcomes

The percentage correctly predicted is determined by adding the number of accurately predicted observations for Y together, and dividing by the total number of observations. For the dependent variable IMT (where I is the reference category compared to M and T individually), shown in Table 5.6, 0 represents intangible asset-based alliances, 1 represents mixed alliances and 2 represents tangible asset-based alliances. In this case 21 out of 28 cases were accurately predicted to be an IA, 8 out of 12 cases were correctly determined to be a MA and 6 out of 10 cases were rightly predicted to be a TA. By dividing the total of these correct predictions, 35, by the total number of cases, 49, the percentage accurately predicted was found to be 71%. This is the same for all of the models run, shown below in tables 5.1 to 5.3 respectively. This means that the probability of Y being 0,1 or 2 was correct 71% of the time, implying that the model used was correct 71% of the time.

TABLE 5.1: PREDICTED OUTCOMES FOR DEPENDENT VARIABLE IMT

	PREDICTED			
ACTUAL	0	1	2	TOTAL
0	21	1	2	24
1	4	8	2	14
2	2	3	6	11
TOTAL	27	12	10	49

TABLE 5.2: PREDICTED OUTCOMES FOR DEPENDENT VARIABLE TMI

ACTUAL	PREDICTED 0	1	2	TOTAL
0	6	3	2	11
1	2	8	4	14
2	2	1	21	24
TOTAL	10	12	27	49

TABLE 5.3: PREDICTED OUTCOMES FOR DEPENDENT VARIABLE MTI

ACTUAL	PREDICTED 0	1	2	TOTAL
0	8	2	4	14
1	3	6	2	11
2	1	2	21	24
TOTAL	12	10	27	49

5.2.2 Chi Square

A chi-square tests whether or not all coefficients equal zero simultaneously. For this study, the log likelihood function for the full model, L1, was 36.78 and the log likelihood function of all the coefficients except the intercept are 0, L0, was 51.10. The chi-square value is determined by subtracting L1 from L0, as shown in equation 3.5. For this model (χ^2 = 22.36, df = 13, $p < 0.05$), the alternate hypothesis, which states that at least one of the predictors has a significant impact on at least one of the logits, is accepted.

5.2.3 Pseudo R^2

The pseudo R^2 determines how related the predictors are to the dependent variables. This test also uses log likelihood values as described above; however, for the pseudo R^2, the chi-value found above is divided by L0 as shown in equation 3.6. The

pseudo R^2 for this model was found to be .28. It should be noted that this method of predicting the pseudo R^2 tends to underestimate the underlying continuous variable (DeMarris, 1992). In this model the predictors explain 28% of the variance in the dependent variables.

5.2.4 Independence from Irrelevant Alternatives

The test for IIA is used to determine how closely related the variables in an MNL model are to each other. If the variables are too closely related the results of the MNL may not be accurate. In the case of the above model, it tests for the discreteness of the governance choices. This test was conducted by dropping one of the dependent variables at a time, running a reduced model and then comparing the signs to those of the full model. When the model was run without the mixed alliance that all variables were predicted to have the same sign except for sales and profit. In this model, sales and profit is ambiguous, thus the sign change is not very important. When the model was run without the tangible asset-based alliance, all variables carried the same sign as the full model except international and expert. These variables were ambiguous and not significant thus, the sign change is not of concern. The last model run was without intangible asset-based alliances, again all variables carried the same sign as in the full model except international. However, international was again ambiguous, thus the sign change is of little concern. Overall, the reduced models predicted the same results as the full model: thus, one can conclude that the dependent variables are sufficiently different from each other, and do not present a problem for respondents to distinguish between them. The model satisfies the IIA condition.

5.3 Coefficient Estimates

Two coefficient tests were used in this study, they were 1) a global test of predictors and 2) the t-statistic. The statistical package Limdep 4.0 was used to determine the coefficient estimates for the MNL model.

5.3.1 Global Test of Predictors

The global test of predictors is used to determine if any particular predictor has an effect on any of the logits, as discussed in section 3.4.1b. The degrees of freedom for this model were 2. When the predictors were tested individually, cost was significant at the 5% level; sales/profit, risk and knowledge were significant at the 1% level of significance. Thus, these variables have a significant impact on at least one of the dependent variables. Although trust was not significant at the 1% level, it was significant at the 1.5% level; therefore, it may also have some impact on the dependent variables. The other variables used in the model were not significant.

5.3.2 T-test

A t-test was used to determine if the predictors have any effect on Y. The degrees of freedom, in this model, were 42. In a multinomial logit model, the sign of the coefficient signifies which, dependent variable the independent variable is most likely to influence. If the sign is negative the independent variable influences the reference category. If the sign is positive the independent variable influences the dependent variable being tested. The results of the multinomial logit model are shown below in table 5.4.

Table 5.4: Results of the Multinomial Logit Model

Variable	T vs I†	M vs I†	M vs T††
Intercept	-0.926 (-0.465)	-2.708 (-1.232)	-1.782 (-0.789)
International	-1.157 (-0.969)	-0.246 (-0.243)	0.912 (0.728)
Trust	-0.403 (-1.369)	0.089 (0.349)	0.491 (1.704)*
Sales/Profit	0.200 (0.168)	-1.045 (-1.136)	-1.245 (-1.121)
Risk	-1.980 (-1.401)	0.274 (0.274)	2.254 (1.658)*
Cost	3.961 (2.900)**	2.336 (2.605)**	-1.625 (-1.174)
Expert	0.785 (1.147)	0.393 (0.681)	-0.392 (-0.620)
Know	-1.86 (-1.591)	1.050 (0.724)	2.914 (1.904) *

Summary of statistics:
Number of cases = 49
L(0) = -51.10
L(1) = -36.78
-2 [L(0)-L(1)] = 28.65
degrees of freedom = 13
Pseudo R^2 = .28
Percent Correctly Predicted = 71%

† - The dependent variable was IMT (I was the reference category)
†† - The dependent variable was TMI (T was the reference category)
The values in parentheses are the t-values for the respective variables
*Significant at the 10% level of confidence
** Significant at the 1% level of confidence

5.3.2a International (H_I)

As was hypothesised, this variable was found to be positively correlated with intangible asset-based alliances, and negatively correlated with tangible asset-based alliances. Mixed alliances were negatively correlated to international, implying that individuals involved in this type of alliance prefer foreign alliances to domestic alliances. For all three models, international was not found to be significant at the 5% level of significance.

5.3.2b Trust (H_T)

Trust was found to be positively correlated with intangible asset-based alliances and negatively correlated with tangible asset-based alliances, this was also hypothesised correctly. Mixed alliances were found to be negatively correlated to trust which is understandable as those involved in these alliances were found to prefer foreign agreements. However, trust is preferred more in a mixed alliance than in a tangible asset-based alliance, when comparing M vs T, trust was found to be significantly different from zero at the 10% level of confidence. For the model comparing T vs I, trust was not found to be significant; however, as stated by Ben-Akiva and Lerman (1985), "...that the inability to reject the hypothesis that some coefficient is zero at a particular significance level does not imply that the hypothesis must be accepted." This variable, although not significant at the 10% level of confidence, was found to significant at the 17% level of confidence, and may therefore have some influence on the model. In the last model M vs I, trust was not found to be significant.

5.3.2c Sales and Profit (H_{SP})

In accordance with the hypothesis sales and profit were positively correlated with tangible asset-based alliances and negatively correlated with intangible asset-based alliances. This variable was not found to be significant in any of the models.

5.3.2d Risk (H_R)

It was hypothesised that decreasing risk would be positively correlated to IA's and MA's while being negatively correlated to TA's. This was accurate as risk was positively correlated with intangible asset-based alliances and negatively correlated with tangible asset-based alliances. When comparing M vs T, it was found that risk was positively correlated with the mixed alliances, and was significantly different from zero at the 10% level of confidence. Comparing T vs I, risk is not found to be significant at the 10% level of confidence, however it is significant at the 17% level of significance and therefore my have some bearing on the model.

5.3.2e Cost (H_C)

Cost was positively correlated with both tangible-asset and mixed based alliances, and negatively correlated with intangible asset-based alliances. The hypothesis for this variable was ambiguous because there was more than one type of cost that the respondent could have taken into consideration. Cost was found to be significant at the 1% level of confidence when T and M were compare with I. For the last model, cost was not significant.

5.3.2f Rate (H_R)

The question from which this variable was determined asked the respondent to compare their firm with others in the same sector. It was hypothesised that rate would be positively correlated to TA's and negatively correlated to IA's, as rate is a measurable variable. Rate was positively correlated with tangible asset-based alliances, and negatively correlated with intangible asset-based alliances, which is what was hypothesised. However, this variable is not significantly in any of the models.

5.3.2g Knowledge (H_K)

This variable was used as an industry standard to determine if alliances were so prevalent as to be common. It was hypothesised that individuals involved in IA's were more likely to have information of their sector due to the nature of the alliance. Knowledge was found to be positively correlated with intangible asset-based alliances, and negatively correlated with tangible asset-based alliances. This variable was found to be positively correlated to mixed alliances, and significant at a 10% level of confidence.

5.4 Discussion

As is shown in the literature, strategic fuzzy alliances are not very common among those in the business community. This survey although not assessing the level of strategic fuzzy alliances in the industry, found that respondents tend to prefer tangible asset-based alliances. This is based on answers given by respondents in reference to the juridical structure of the alliance, all of which were contract based, and the fact that the majority of respondents chose measurable variables to express their satisfaction in the alliance. The MNL showed that measurable variables, (i.e., SP and Cost) were positively

correlated to tangible asset-based alliances. Many of the respondents did use measured performance criteria such as increasing sales and profit (63%) and lower cost (43%), rather than the more intangible criteria of risk (24%) to describe their satisfaction in the alliance. Thus, it can be inferred that a measurable alliance type may be preferred at the present time.

Although many respondents seem to prefer tangible-based alliances, the survey does show that there is a potential for SFAs in the future in both the business and agribusiness sectors. As argued by van Duren and MacKay (1993), it is vital for Canada's agrifood sector to forge stronger links in order to compete efficiently on a world-scale. Although the literature shows that SFA's are not common in either the business or agribusiness, respondents did demonstrate three distinct characteristics that are suggestive of SFA's. They are: 1) a preference for domestic alliances 2) a preference for trust in a business relationship and 3) a preference for short-term contracts and joint ventures, when involved in an alliance.

The multinomial logit model inferred that domestic alliances were more likely to be governed by intangible asset-based alliances (SFA's) than international alliances. At the same time, the frequency analysis shows that 73% of the respondents preferred an alliance in Canada. Thus, for these alliances, knowledge will be high, communication easier and trust greater. Secondly, the MNL statistically supported a causal relationship between trust and the choice for an IA. This is also supported by 41% of the respondents who said that they desired a moderate to high level of trust in their business agreements. Therefore, trust based governance structures may be viewed positively by individuals in the agricultural sector, which is interesting because 23% chose tangible asset-based

alliance. This indicates that individuals may be unsure of the role trust plays in an alliance.

Finally, the dual continuum (Fig. 6) highlights the substitution of IA's for traditional governance based structures. Under a cost minimisation assumption, 34% of respondents chose STC and 24% chose JV. Thus, theoretically, it is possible for firms to substitute their formal agreement for an informal one. It must be recognised that to replace a contract with an IA, a moderate level of knowledge or a high level of deterrent trust must exist. To replace a JV, which is theoretically less probable, a higher level of identification would be needed between the partners.

The fact that 94% of the respondents said that the alliance still existed and that 76% of the respondents were happy with their alliance bodes well for strategic alliances. Thus, these tangible asset-based alliances appear to be fairly durable. This, however, does not address the problem of whether or not an intangible asset-based alliance is durable.

Respondent knowledge of the industry in regard to strategic alliances is high, 76% of respondents said they knew of strategic alliances in the industry, thus implying that strategic alliances are common. There are two ways to view this. First, tangible asset-based alliances may over time evolve into an intangible asset-based alliance, the logic being that, by increasing knowledge, and trust, a contract can be substituted by trust. This is supported by empirical research done by Gulati (1995a). On the other hand, if the firm is satisfied with the tangible asset-based alliance, they may not be motivated to change governance structures. An alliance that is trust based may seem to have barriers that traditional business structures do not. The high level of knowledge or trust needed to initiate and pursue an alliance of this type may deter individuals more familiar with the traditional governance structures.

When asked about the success of the firm before and after the alliance, 71% said the firm was doing better than before the alliance. This success bodes well for strategic alliances in general, although it may be more accurate for tangible asset-based alliances. The MNL indicates that measurability is a characteristic of a tangible asset-based alliance, as shown in table 5.4 individuals involved in a tangible alliance prefer variables SP and Cost to variables that are more difficult to assess i.e. risk. Intangible asset-based alliances, may not measure success in the same manner making it is difficult to determine how positive this result is in regard to intangible asset-based alliances.

5.5 CONCLUSIONS

The motivation for this study was to determine the characteristics of different alliance types, and firm motives in relation to the governance choice continuum. First, traditional firm structures were examined and the logic behind Williamson's governance-choice continuum was explored. An element of human nature seemed to have been passed over in regard to the traditional governance-choice continuum. Although not overly common, alliances involving trust are gaining more recognition, as firms try to find ways to compete on a world scale, reducing cost and increasing efficiency. To determine if this was indeed a viable alternative to traditional structures, trust-based alliances were examined thoroughly, first by evaluating and defining trust and its components, and then by exploring the possible placement of these alliances on the traditional governance choice continuum. It was determined that trust was indeed a possible substitute for contract-based alliances. Trust-based alliances reduce costs, increase efficiency, and allow flexibility necessary for success in a rapidly changing market place, which is not realised by traditional governance structures. However, it was

found, that the trust-based alliances could not be placed on Williamson's governance-choice continuum, thus making it necessary to create a dual-continuum, which included both traditional and trust-based structures.

Finally, the hypothesis concerning tangible and intangible-asset-based alliances was tested. Through the use of a multinomial logit model the characteristics of IA's, TA's and some characteristics about MA's were determined. It was shown by the MNL and the frequency analysis that there is a potential for strategic fuzzy alliances in an agricultural setting.

Axelrod (in Hill, 1990) stated, that individuals who stress co-operation and trust rather than opportunism dominate the population of players. Although, this does not seem to be the case in this sample there is a potential for trusting relationships, such as strategic fuzzy alliances, in the agricultural sector in the future. Individuals involved in this sector are looking for ways to remain competitive on a world-scale. Barkema and Drabenstott (1995) remark that the new food system has tighter channels and with consumers becoming more specific about their desires, firms must be more efficient in order to keep pace. The survey showed that, although the majority of respondents prefer tangible-based alliances at the present time. There are underlying processor preferences that suggest SFAs may be more popular in the future. Overall the respondents: 1) preferred domestic alliances, 2) believed that trust should be involved in a business relationship. There were also a substantial number of respondents that have agreements in the hybrid area of the continuum where trust-based structures can be substituted for contract-based structures fairly easily. Thus, the potential is there. Knowledge of this type of alliance as a governance choice may not be prevalent in the agribusiness sector at

the present time, however the positive attributes provided by a trust-based alliance may be the next step for these firms, if they are to remain competitive.

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APPENDIX A

The Basic Properties of Gumbel Distribution as shown by Ben-Akiva and Lerman, 1985, pp. 104-106.

If ε is Gumbel distributed then:

$F(\varepsilon) = \exp[-e^{-\mu(\varepsilon-\eta)}]$, $\mu>0$
and

$f(\varepsilon) = \mu e^{-\mu(\varepsilon-\mu)} \exp[-e^{-\mu(\varepsilon-\eta)}]$,

where η is a location parameter and μ is a positive scale parameter. This distribution has the following properties:

1. The mode is η

2. The mean is $\eta + \gamma/\mu$, where γ is Euler constant (~0.577)

3. The variance is $\pi^2/6\mu^2$

4. If ε is Gumbel distributed with parameters (η,μ) and V, and $\alpha>0$ are any scalar constants, then $\alpha\varepsilon + V$ is Gumbel distributed with parameters $(\alpha\eta + V, \mu/\alpha)$

5. If ε_1 and ε_2 are independent Gumbel-distributed variates with parameters (η_1, μ) and (η_2,μ), respectively, then $\varepsilon^* = \varepsilon_1 - \varepsilon_2$ is logically distributed:

$$F(\varepsilon^*) = \frac{1}{1+e^{\mu(\eta 2-\eta 1-\varepsilon^*)}}$$

6. If ε_1 and ε_2 are independent Gumbel-distributed with parameters (η_1,μ) and (η_2, μ), respectively, then

   $\max(\varepsilon_1, \varepsilon_2)$

   is Gumbel-distributed with parameters

   $[1/\mu\,(e^{\mu\eta 1} + e^{\mu\eta 2}),\mu]$

7. As a corollary to proposition 6, if $(\varepsilon_1,\varepsilon_2,....\varepsilon_J)$ are J independent Gumbel-distributed random variables with parameters $(\eta_1, \varepsilon_1,....\varepsilon_J)$ is Gumbel-distributed with parameters:

   $[1/\mu \ln \sum^J_{j=1} e^{\mu\eta j}, \mu]$

APPENDIX B

Derivation of the Multinomial Logit as shown by Ben-Akiva and Lerman, 1985, pp.106.

From the properties of the Gumbel-distribution the multinomial logit can be derived in a straight-forward manner. Assumptions: $\eta=0$ for all the disturbances, and the alternatives are ordered such that i = 1, then

$$P_n(1) = \Pr[V_{in} + \varepsilon_{in} \geq \max(V_{jn} + \varepsilon_{jn})]$$

Define:

$$U_n^* = \max(V_{jn} + \varepsilon_{jn})$$

From property 7, U_n^* is Gumbel distributed with parameters

$$[1/\mu \ln \textstyle\sum_{j=1}^{J} e^{\mu\eta_j}, \mu]$$

Using property 4. We can write $U_n^* = V_n^* + \varepsilon_n^*$, where

$$V_n^* = 1/\mu \ln \textstyle\sum_{j=2}^{J} e^{\mu V_{jn}}$$

and ε_n^* is Gumbel-distributed with parameters $(0,\mu)$.

Since:

$$P_n(1) = \Pr(V_{1n} + \varepsilon_{1n} \geq V_n^* + \varepsilon_n^*)$$

$$= \Pr[(V_n^* + \varepsilon_n^*) - (V_{1n} + \varepsilon_{1n}) \leq 0]$$

by property 5 we have:

$$P_n(1) = \frac{1}{1 + e^{\mu(V_n^* - V_{1n})}}$$

$$= \frac{e^{\mu V_{1n}}}{e^{\mu V_{1n}} + e^{\mu V_n^*}}$$

$$= \frac{e^{\mu V_{1n}}}{e^{\mu V_{1n}} + \exp(\sum_{j=2}^{J_n} e^{\mu V_{jn}})} \qquad = \frac{e^{\mu V_{1n}}}{\sum_{j=1}^{J_n} e^{\mu V_{jn}}}$$

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APPENDIX C

Claire-L. Adams
McGill University

October 25, 1996

Dear Respondent:

I am writing on behalf of myself (Claire-L. Adams) and my supervisor, Dr. Garth Coffin from McGill University, Quebec, to request your help in a study we are conducting on strategic alliances in the Canadian agri-food sector. The objective of the study is characterize and examine alliances in the pork and horticultural sectors, to identify the principal factors that inspire firms to form alliances. We are conducting this research jointly with colleagues at Laval University and with financial support from the Social Sciences and Humanities Research Council of Canada.

Please find enclosed a new questionnaire dealing specifically with British Columbia. As you will see, the questions are of a general nature which should not take more than 10 minutes or so to complete. We would really like to have your response. The information for individual firms will be treated as confidential. However, in appreciation of your participation, all those returning the completed questionnaire will receive a summary of the results of the survey.

Thank you for your consideration and for your time in responding to the survey. We would appreciate receiving your reply ,by fax or mail preferably by November 15. If you have any questions you may contact Dr. Garth Coffin at (514) 398-8380 or Claire-L Adams at 398-7820. Our fax number is (514) 398-8130. Thank you for your consideration and assistance.

Sincerely,

Garth Coffin
Associate Professor

Claire-L. Adams
Research Assistant

APPENDIX D

QUESTIONNAIRE

Topic:
Strategic alliances in the Canadian agribusiness sector

McGill University
July 1996

ALL THE INFORMATION PROVIDED WILL BE KEPT CONFIDENTIAL

Name of the enterprise:_____
Respondent:_____
Function in the enterprise:_____

Definition of a strategic alliance :

A strategic alliance is defined in the scientific literature as a voluntary business relationship between two or more independent organizations that are sharing risks and benefits in order to attain a common objective. On a legal basis, strategic alliances range from joint ventures to short or long term contract agreements (input supplies, etc.).

1) Do you believe that alliances could be favorable to your enterprise? (circle)

a) Yes
b) No

Why? _____

_____

2) Since the enterprise has existed, has it realized any strategic alliances with other firms? (circle)

a) Yes (go to section A)
b) No (go to section B)

SECTION A

NOTICE: This section concerns the most recent alliances realized by your enterprise. If more than three alliances were concluded, please write the rest of the information in the margin or on the back of the page.

When ranking, number 1 corresponds to your first choice, number 2 represents your second best choice, etc.

		Alliance #1	Alliance #2	Alliance #3
1)	Identify and classify your principal motives for realizing a strategic alliance:			
	a) To share assets (factory, warehouse, etc.)	_____	_____	_____
	b) To share physical resources (inputs)	_____	_____	_____
	c) To share human resources	_____	_____	_____
	d) To penetrate a new market	_____	_____	_____
	e) To increase your market share	_____	_____	_____
	f) For research and development	_____	_____	_____
	g) To increase quality	_____	_____	_____
	h) To co-ordinate marketing	_____	_____	_____
	i) A joint advertising program	_____	_____	_____
	j) To decrease operating costs	_____	_____	_____
	k) To decrease risk	_____	_____	_____
	l) Other, specify: _____	_____	_____	_____

		Alliance #1	Alliance #2	Alliance #3
2)	Specify the origin of the allied enterprise:			
	a) The allied enterprise is situated in			
	b) (appropriate province)	_____	_____	_____
	c) The allied enterprise is situated somewhere else in Canada	_____	_____	_____
	d) The allied enterprise is foreign	_____	_____	_____
	Specify the origin: _____			

	Alliance #1	Alliance #2	Alliance #3

3) Specify the position of the allied enterprise:

a) The allied enterprise supplies me with services _____ _____ _____
b) The allied enterprise supplies me with inputs _____ _____ _____
c) The allied enterprise buys my products _____ _____ _____
d) The allied enterprise is a competitor _____ _____ _____
e) Others, specify: _____ _____ _____ _____

4) Specify the juridical form of the alliance:

a) Joint venture _____ _____ _____
b) Minority shareholder _____ _____ _____
c) Majority shareholder _____ _____ _____
d) Long term contract (5 years or more) _____ _____ _____
e) Short term contract (less than 5 years) _____ _____ _____
f) Other, specify: _____ _____ _____ _____

5) Is the alliance still in effect?

a) Yes _____ _____ _____
b) No _____ _____ _____

6) Are the results that you have obtained or still obtaining meeting the level that was desired when the alliance was first created?

a) Yes _____ _____ _____
b) No _____ _____ _____

7) Facing this fact (question 6), indicate and classify the motives that seem to be responsible for your degree of satisfaction concerning the alliance :

a) Trust between parties _____ _____ _____
b) Competence of the allied enterprise _____ _____ _____
c) Respect of the alliance terms by the allied enterprise _____ _____ _____
d) Other, specify _____ _____ _____

	Alliance #1	Alliance #2	Alliance #3

8) Identify the performance criteria that best illustrates your degree of satisfaction in the performance of the alliance:

a) Increasing sales	____	____	____
b) Increasing profits	____	____	____
c) Decreasing risk	____	____	____
d) Decreasing costs	____	____	____
e) Other criteria, specify :	____	____	____

9) According to the previously chosen criteria (question 8), the strategic alliance of your enterprise allowed it to attain a _____ performance level compared to the one obtained by your enterprise before the alliance:

a) Greatly superior	____	____	____
b) Slightly superior	____	____	____
c) Identical	____	____	____
d) Slightly inferior	____	____	____
e) Greatly inferior	____	____	____

Now, on the basis of the same criteria and comparing your enterprise to other enterprises in your area of expertise, your alliance enabled you to reach a _____ performance level, compared to that of other enterprises.

a) Greatly superior	____	____	____
b) Slightly superior	____	____	____
c) Identical	____	____	____
d) Slightly inferior	____	____	____
e) Greatly inferior	____	____	____

11) In your branch of industry, do you know if other competing firms have formed strategic alliances? (circle)

a) Yes
b) No
c) Do not know

THE END

THANK YOU FOR ANSWERING THE QUESTIONNAIRE

SECTION B

NOTICE: When ranking, number 1 corresponds to your first choice, number 2 represents your second choice, etc.

1) `Identify and rank the principal motives that would make your enterprise seek a strategic alliance:

a) To share assets (factory, warehouse, etc.) _____
b) To share physical resources (inputs) _____
c) To share human resources _____
d) To penetrate a new market _____
e) To increase your market share _____
f) For research and development _____
g) To co-ordinate marketing _____
h) A joint advertising program _____
i) To increase quality _____
j) To decrease operating costs _____
k) To decrease risk _____
l) Other, specify:_____ _____

2) If you were to create an alliance with another enterprise, what would be the origin of that enterprise? (circle)

a) An enterprise situated in Quebec
b) An enterprise situated outside Quebec
c) A foreign enterprise

3) With what type of enterprise would you like to create an alliance? (circle)

a) An enterprise that supplies services _____
b) An enterprise that supplies inputs _____
c) An enterprise that buys my products _____
d) A competing enterprise _____
e) Others, specify:_____. _____

4) Indicate and classify the juridical forms of alliance that you prefer:

a) Joint venture
b) Minority shareholder
c) Majority shareholder
d) Long term contract (5 years and more)
e) Long term contract (less than five years)
f) Others, specify :_____.

5) Among the following choices, indicate and rank the reasons that prevent you or make you hesitant to form a strategic alliance.

a) Lack of opportunities _____
b) Lack of interests _____
c) Lack of trust toward the potential ally _____
d) Lack of competence from the potential ally _____
e) Doubts about the potential ally respecting the alliance terms _____
f) Other, specify:_____ _____

6) According to you, a strategic alliance tying you to another firm would allow you to attain a _____ level of performance, compared to a situation without an alliance? (circle)

a) Greatly superior
b) Slightly superior
c) Identical
d) Slightly inferior
e) Greatly inferior

7) In your branch of industry, are there others firms that have formal strategic alliances? (circle)

Yes
a) No
b) Do not know

THE END

THANKYOU FOR ANSERWING THE QUESTIONNAIRE