

**TRANSACTION COST AS A BASIS FOR DECIDING ON MARKETING  
CHANNELS IN THE RURAL MEAT MARKETS OF THE NORTHERN  
COMMUNAL AREAS OF NAMIBIA**

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Thesis presented in partial fulfilment of the requirements for the degree of Master of Agricultural  
Administration (MAGricAdmin) at the University of Stellenbosch.

## **Declaration**

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any university for a degree.

Signature:

Date:

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## **ABSTRACT**

Transaction cost economics has travelled a difficult and long path to general acceptance in current economic opinion. The general theory of transaction cost has however developed in various paradigms with little or no empirical backing. It is mostly the difficulty of measurement that caused economists to shy away from empirical testing and rather, to quote Coase (1992), "to write in prose".

The last 10 years there has been a renewed thrust for the empirical measurement of transaction cost. This study is an attempt to measure transaction cost by using case study data gathered in the run of the NOLIDEP study in the meat markets of the Northern Communal areas of Namibia.

Until recently the method of data analysis that has been used in most empirical studies was variations of the regression technique. Regression as a tool is most useful in economics, giving quick answers and general trends to the researcher. It is however a technique that is linear in nature and therefore some information in the data will always be sacrificed. In general- and multi industry surveys this do not pose a great problem as general trends can usefully be applied in making policy recommendations.

In smaller and especially rural industries this is not the case. The dynamic interactions within the industry and its dynamic linkages with the rest of the economy will surely be underrated when using a linear method.

Consequently, a non-linear technique was applied in this study – the Non-linear Dynamic Model. This model gave the interactions between all variables enabling one to describe the dynamics of the market.

As mentioned elsewhere the first aim of this study was to measure transaction cost so that the second aim could be fulfilled. The second aim of this study was to prove that transaction cost has an important influence on marketing channel decision.

The analysis of the data satisfied the above two aims: Firstly it showed that it was possible to measure transaction cost. Secondly that transaction cost has a large and sometimes overriding influence on marketing channel decisions.

A third and last point that became apparent was that a non-linear method of data analysis allows for better description of a dynamic market.

# **TRANSAKSIE KOSTE AS 'N BASIS VIR BEMARKINGS KANAAL BESLUIE IN PLATELANSE VLEIS MARKTE VAN DIE NOORDELIKE KOMMUNALE GEBIEDE VAN NAMIBIA**

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## **OPSOMMING**

Dit het 'n lang tyd gevat vir transaksie koste om as konsep in ekonomie aanvaar te word. Die algemene teorie van transaksie koste het egter ontwikkel binne verskeie paradigmas sonder werklike empiriese ondersteuning. Dit is meestal die meting van transaksie koste wat empiriese werk in die rigting belemmer het.

Daar is egter in die laaste 10 jaar hernude pogings gewees om transaksie koste empiries te meet. Hierdie studie is 'n poging om transaksie koste te meet deur gebruik te maak van data wat verkry is gedurende die NOLIDEP studie in die noordelike kommunale gebiede van Namibia.

Tot onlangs was die metode van data analise vir empiriese studies variasies op die regressie tegniek. As 'n hulpmiddel is regressie baie bruikbaar in ekonomie waar vinnige antwoorde en algemene tendense verwag word. Die tegniek is egter inhierent liniêr en daarom sal daar altyd interpretasies rondom data opgeoffer word. In algemene studies is dit egter nie 'n probleem nie en kan voldoende beleidsaanbevelings gedoen word.

Dit is egter nie die geval in kleiner en plantelandse industriëe nie. Die dinamiese interaksies binne die industrie en die dinamiese skakels met die res van die

ekonomie word dan onderskat met die gebruik van 'n liniêre metode. Daarom is 'n nie-liniêre metode gebruik, die Non-linear Dynamic Model. Die model neem die interaksie tussen veranderlikes in ag wat die beskrywing van dinamika moontlik maak.

Soos reeds genoem is die eerste doel van die studie om transaksie koste te meet sodat die tweede doelwit van die studie bereik kan word. Die tweede doel is om te bewys dat transaksie koste bemarkingskanaal besluite beïnvloed.

Die data analise het beide bogenoemde doelwitte bevredig. Eerstens dat transaksie koste meetbaar is. Tweedens dat transaksie koste 'n groot en selfs oorweldigende effek het op bemarkingskanaal besluite.

'n Derde punt wat sterk na vore gekom het is dat nie-liniêre metodes 'n beter beskrywing van dinamika toelaat.

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## **CHAPTER 1**

### **INTRODUCTION AND OUTLINE OF THE STUDY**

#### **1. LITERATURE REVIEW**

##### **1.1 INTRODUCTION**

When selling slaughter cattle farmers have a number of alternative marketing channels to choose from. Further more a farmer can choose to sell all, a proportion or none through a particular channel. What factors however do effect the selection of a marketing channel(s)? One explanation for a cattle producer's choice of marketing channel(s) may be the transaction cost that alternative outlets impose on the seller (Hobbs, 1997).

##### **1.2 TRANSACTION COST AS THE BASIS FOR DECIDING ON MARKETING CHANNELS.**

Over the past forty years the neoclassical general equilibrium model formalised by Arrow and Debreu (1954) has become the “standard” model for ascertaining maximum social welfare in a society, the benchmark against which other models may easily be compared, both with respect to their assumptions and conclusions. In that model all individuals have the same information, and there are no transaction costs. It is therefore assumed that markets for all goods exist, including markets for future goods and for all risks. There is thus no place in this model for institutions other than markets and property rights.

Unlike neo-classical economic theory, transaction cost economics recognises that transactions do not occur in a frictionless environment. Information, negotiation, and monitoring cost arise in any transaction and can influence the vertical co-

ordination outcome (Cheung, 1998). Transaction costs can be divided into three main classifications: information cost, negotiation costs and monitoring (or enforcement) costs. Firms and individuals face costs in the search for information about products, prices, inputs, and buyers or sellers. Negotiation costs arise from the physical act of the transaction, such as negotiating and writing contracts, or paying for the services of an intermediary. Monitoring or enforcement costs arise after an exchange has been negotiated. Information plays a key role in all three cases, however the lack of information prior to a transaction is explicitly considered to be an information cost. Transaction cost affects the service that is provided. Transaction costs are thus simply the costs of carrying out any exchange. For both parties it is important to take transaction cost into account. If the cost of making an exchange is greater than the gains which that exchange would bring, that exchange would not take place (Coase, 1992).

### **1.3 TRANSACTION COST ANALYSIS (TCA)**

The development of TCA has drawn from an extensive base of disciplines including psychology, political science and economic history. These associated disciplines have largely given rise to four key concepts that underpin TCA. They are: bounded rationality, opportunism, asset specificity and information asymmetry (Hobbs, 1996).

#### **1.3.1 Bounded rationality**

Although people may intend to make a rational decision, their capacity to evaluate accurately all possible decision alternatives is physically limited. This limitation is referred to as bounded rationality (Douma & Schreuder, 1992). This can be best explained in the analogy of a chess game where a player can see the position of all the pieces on the board but can only guess the next move. The situation becomes even more complex when future moves are contemplated (Hobbs, 1996). Therefore in situations of complexity or uncertainty bounded rationality poses a problem because rational decisions are impeded.

### **1.3.2 Opportunism**

Williamson (1979) has defined opportunism as self-interest seeking with guile. Individuals and businesses will sometimes seek to utilise a situation to their own advantage. This is not to say that it will be true in all situations, but the risk of opportunism will be ever present. This risk is more acute when associated with a small numbers bargaining problem. A small numbers bargaining problem can best be explained with the following scenario: The fewer the number of alternate suppliers available to a buyer, the more likely it is that an existing supplier will act opportunistically to alter the terms of the relationship to their own advantage.

### **1.3.3 Asset specificity**

Asset specificity arises when one partner (A) to an exchange has invested resources specific to that exchange which have little or no value in alternative use (Hobbs, 1996). Knowing that firm A has made a specialised investment, and is therefore locked-into the exchange, firm B could renege on the previous agreement by offering firm A, a lower price for the product. If the lower price offered still covered the operation cost and also contributes towards the fixed cost of investment, A will have little choice but to accept B discounted price offer (Klein et al, 1978). In most countries firm A will have legal recourse to sue for damages if the contract was reneged on. This action however carries the probability of legal costs and uncertainty of the outcome. If the transaction cost incurred with the above mentioned action is higher than the potential benefits gained, firm A will again have no choice but to accept the discounted offer (Hobbs, 1996).

### **1.3.4 Information asymmetry**

Transaction cost analysis also allows for the relaxation of perfect information assumptions of neoclassical theory. TCA therefore recognises that many business transactions are characterised by incomplete, imperfect or asymmetrical information (Akerlof, 1970).

Information incompleteness refers to the situation where all parties to a transaction face the same but incomplete levels of information. Given that the levels of information incompleteness are the same, the risk to all parties will also be the same.

Information asymmetry arises when all parties have access to the same level of public information but not to private information, which is only available to selected parties. The level of total information accessibility is therefore not equal. Informational asymmetries can lead to opportunistic behaviour in two ways.

The first involves *ex ante* opportunism where information is hidden prior to a transaction. This is known as adverse selection as first analysed and defined by Akerlof (1970). Suppose there is a good (e.g. a second-hand car) that can vary in quality and whose lower quality is only known to the seller. As a result the seller can act opportunistically by failing to reveal the lower quality or defects of the good to a potential buyer prior to a transaction. Buyers of second-hand cars always face the risk that the seller is acting opportunistically trying to sell them a "lemon". Since buyers cannot tell the difference between a good car and a "lemon", both cars must sell for the same price. At this price there will be a reduced incentive for owners of quality cars to sell them on the second-hand market. But the withdrawal of these high quality cars causes the average quality of the remaining cars in the market to fall. Consequently potential buyers will rationally lower the price they are prepared to pay for the remaining cars. Akerlof (1970) used this reasoning of self-selection of "lemons" to explain why the value of new cars depreciates so rapidly once they have been sold.

Moral hazard also arises from information asymmetry. This is *ex post* opportunism, which occurs after a transaction because of the hidden actions of individuals or firms. These parties may have the incentive to act opportunistically to increase their economic welfare because their actions are not directly observable by other parties. The most classical example of moral hazard is found in the insurance industry. Insurance companies cannot observe the actions of their clients. Once individuals have obtained insurance they take less care in preventing harm to the

insured items. This leads to higher incidents of insurance claims, which leads to an increase in insurance premiums. Alternatively they may act opportunistically to damage items intentionally in order to collect insurance payments. In either case, information asymmetry exists because the actions of the individual are not directly observable by the insurance provider. In this study all transaction where a once off matter. Ex post transaction cost where thus ignored in the analysis. The above is only mentioned for the sake of a complete theoretical review.

#### **1.4 METHODOLOGICAL ISSUES IN MEASURING TRANSACTION COST.**

One criticism of transaction cost economics is that its theoretical development has not been accompanied by successful measurement of transaction costs (Cheung, 1998). Unlike physical production costs, transaction costs are not easy to separate from other managerial costs. The complex nature of institutions means that the costs of their operation are not easy to quantify (Hobbs, 1997).

Economists have instead turned to other ways of “measuring” transaction costs. These applications can be divided into three broad types, each representing different methodologies with different data requirements and each varying in the type of information, which they provide about transactions (Mahoney, 1992):

- Those that evaluate the effect of transaction cost on vertical co-ordination across industries using secondary data sources (Levy, 1985; Frank & Henderson, 1992).
- Industry-specific investigations of the impact of transaction cost on vertical co-ordination using secondary data (Lieberman, 1991; Globerman & Schwindt, 1986).
- Industry-specific investigations of the impact of transaction cost on vertical co-ordination using primary data.

### **1.4.1 Measuring the effect transaction cost on vertical co-ordination using primary data.**

Evaluating the determinants of vertical co-ordination at a general or multi –industry level is extremely difficult due to data limitations. The available data sources often require the researcher to construct indirect and potentially confusing proxy measures of transaction costs (Levy, 1985; Frank & Henderson, 1992; Lieberman, 1991; Globerman & Schwindt, 1986). For this reason, most empirical work in the realm of transaction cost has been done on an individual industry level or on a case study basis.

This approach also faces data limitations. Subsequently, it has been criticised on the grounds that the results are not necessarily representative of a wider economic environment (Hobbs, 1996). For the development of a credible empirical alternative, the necessary transaction cost information would have to be collected on a routine basis, which is not the case. Therefore taking into account the limitations associated with secondary data, a more appropriate method would be to use data that measures different transaction cost at firm level. Unfortunately transaction cost data is largely not part of management or accounting practices. Thus primary data need to be collected by researchers them selves through surveys of industry participants. The researcher therefore faces the trade-off between better measurement and faster analyses.

To collect primary data the potential transaction cost that participants will face, needs to be identified by developing an industry profile. An industry profile includes the structure and vertical co-ordination linkages between industry participants. The process is often easier if transaction costs are separated into information, negotiation and monitoring costs. Before a questionnaire is compiled, two questions need to be answered. Firstly what type of information should be collected and secondly how should this information be analysed. These two questions are clearly related because they both point to the problem of quantifying transaction cost variables.

While it is possible to obtain monetary valuations of some transaction costs (e.g. transportation cost to auction markets), most survey respondents will find it difficult, if not impossible to provide monetary estimates of most transaction costs. Given the fact that most transaction cost can not be quantified in monetary terms, Cheung (1998) suggests that measurement be done by an assignment of numbers for the ranking by different observers or in this case farmers. If we are therefore able to say, *ceteris paribus*, that a particular type of transaction cost is higher in situation A than in situation B, and that different individuals consistently specify the same ranking whenever the two situations are observed, then transaction cost are measurable (Cheung, 1998). Hobbs (1997) used this approach to measure the transaction cost imposed by alternative marketing channels in a survey of 100 farmers in north-eastern Scotland. Although there have been attempts to measure transaction cost in economic literature, most are of a theoretical nature, creating a paradigm around the problem but not giving a practical solution. In the study done by Hobbs (1997) she gave a solid guide to solve the problem of measuring transaction costs. The framework for the transaction cost analysis in my study thus draws largely on the work done by Hobbs.

The second question pertaining to how the information is analysed is now of importance. In the neoclassical general equilibrium model one would look no further than simplest of linear programming or regression techniques to analyse the primary data collected. As the assumptions of the neoclassical model have been relaxed, economists have grown the applications and permutations of regression techniques available (Levy, 1985; Frank & Henderson, 1992; Lieberman, 1991; Globerman & Schwindt, 1986; Hobbs, 1993, 1996). This has happened in order to come to grips with the new problems associated with these relaxed assumptions.

For regression to be applied to data it has to adhere to the following assumptions: Firstly the error value that is used in testing the significant effects in the regression must be independent. Secondly this error variance must be homogeneous. Thirdly the distribution of the error term must be normal. It is argued by Dorward (2001) that not only do transaction cost have a influence on a market outcome but they

them selves are influenced by what Jaffe and Morton (1995) termed as “transaction characteristics”. Asset Specificity as defined by Williamson (1979) is an example of a “transaction characteristic”. This implies that the transaction cost framework is one of dynamics. Further in any system there tends to be an equilibrium where vectors have different effects on each other. Vectors as per definition have both direction and magnitude. Regression techniques only measure the direction of these vectors and not there magnitude. No dynamic interactions between variables can thus be measured. The true nature of an economy- dynamic interaction- is thus ignored. Therefore by applying regression to transaction cost analyses the data is sacrificed as a compromise between transaction cost and neoclassical economics.

The only way to analyse the data without any sacrifice is to use a technique that is non-linear in nature. The method used in this study is the NON-LINEAR DYNAMIC MODEL (NLDM). The model introduces dynamics in to the system and has its roots in the theory of chaos or non-linear dynamics. A full discussion on this model will follow in section 2.3.

## **2. BACKGROUND TO THE STUDY**

The analytical work on transaction cost, which will be done in my study, forms part of a broader research project done on behalf of the Northern Regions Livestock Development Project (NOLIDEP). The general terms of this study is to do a analytical survey of livestock producers marketing strategies and the informal trade in live animals, meat, hides and skins in the Northern communal areas of Namibia (The following section draws largely on the final report compiled for the NOLIDEP study).

### **2.1 THE RESEARCH AREA**

The study covers the northern communal areas of Namibia, namely the Kunene Region; the North Central Division (the Omasuti, Oshana, Oshikoto and Ohangwena Regions); the Kavango Region; and the Caprivi Region, some 169

000 square kilometres. These areas are demarcated in the North and East by international borders, in the West by the coast and in the South by the veterinary cordon fence. Agriculture supports some 70% of Namibia 's population directly or indirectly. More cattle are owned in the Northern Communal areas than in the commercial areas. Livestock farming contributed to 9% of GDP and 16% of exports in 1995. Some 80% of production are exported, mainly to South Africa and the EU. Namibia is the single largest source of beef imports to South Africa, with more than 70% of the market. The commercial sector contributes more than 90% of exports. Trade with the EU falls under the provisions of the Lomé IV agreement.

## **2.2 TARGET POPULATION**

In the narrowest sense livestock producers are the focal point of the research. In the broadest sense the target population would include all sellers, traders and buyers of cattle and meat that present an alternate marketing channel for producers. Buyers of meat, their motives and their circumstances are important to the study, as their behaviour influences prices, as well as the relative throughput in the formal and informal markets. Sellers of meat are likewise important, as their motives determine the regularity and extent of informal and formal sales. Traders are important as the link between buyers and sellers. Producers are important, as they are the origin of the marketing channel.

The research on transaction cost restraints only focuses on livestock producers as a focal group. The data gathered on the other focal groups was used to identify and validate transaction cost variables concerned with livestock producers.

## **2.3 METHOD OF DATA COLLECTION AND ANALYSIS**

This research method used combines the advantages of well-known anthropological research techniques with those of the modern approaches to participatory appraisal. The purpose is to ensure that sufficient data of a satisfactory degree of representation is obtained, and that these data are at the same time as detailed as is usually obtained through more traditional participant

observation techniques. For the data required, concerning the ranking of transaction cost variables, a questionnaire was compiled for the fieldworkers to complete during interviews with producers. The variables were identified by using data collected in the first round of the project according to the guidelines stated by Hobbs (1993). These data were also used in the identification of alternative marketing channels, namely: sales to MEATCO (a government owned parastatal), livestock traders, butcher and lastly own sales (i.e. producers slaughtering animals and selling the meat themselves).

Enumerators were employed in each of the 10 sites, and a mechanism whereby their observations were fed back regularly to the team was put in place. The enumerators was then redirected to obtain further detail on the basis of their report-back, or to focus on new issues. Fieldworkers were also trained to understand the research problem; and to understand the research process, and the difference between quantitative and qualitative methodologies.

This research method has a number of advantages apart from the fusion of the best features of survey and observation methods, in that more qualitative information especially related to motives and perceptions, can be obtained.

As mentioned in the literature review, in the choice of data analysis technique there are two broad categories that can be applied in dealing with transaction cost. The first is of a linear nature (e.g. regression) that gives quick answers where general trends are required. The dynamics of the system is however ignored giving only part of the truth. The second choice is non-linear in nature therefore taking into account the dynamic interaction in the system. This gives the researcher a true picture of the represented data.

In this study it became apparent after receiving the first group of the questionnaires that regression could not be applied to the collected data. The data did not adhere to the assumptions of regression. The error value was not independent, the error variance was not homogeneous and the distribution of the

error term was not normal. Further it became apparent that general trends would not be satisfactory to describe the dynamics of the rural meat trade.

The model that will be used to analyse the data is the Non Linear Dynamic Model (NLDM). This is a cause and effect {input-output} model that introduces dynamics into the system, and is related to the theory of deterministic chaos {non-linear dynamics} (Barndorff-Nielsen *et. al*, 1994). The model was developed at the Agrimetrics Institute of the Agricultural Research Council, specifically for the analysis of interactive systems. In such systems there are a tendency for drift to occur in the equilibrium state, which causes difficulties in the application of statistical methods based on regression techniques.

Transaction costs take place in an interactive system. In a general interactive system, within the framework of contemporary knowledge, there are different phases - namely creation, evolution and destruction (Thom, 1975; Thomson, 1982; Cohen & Stewart, 1994; Winfree, 1980; Casti, 1989). Within the system, the structural stability and non-stability form a very important paradigm in the changing process to different phases (Woodcock & Davis, 1978; Casti, 1989). This dynamic process of the phases is difficult to put into mathematical form, even if it is possible to measure attributes (variables) within each of the three phases over time (Thomson, 1982; Woodcock & Davis, 1978). The reason is quite simple. When three and more variables interact dynamically, the mathematical solutions tend to be complex with a level of uncertainty in the outcome (Thomson, 1982). Statistical Methods try to overcome this problem, but the statistical nature of the methods, does not take dynamic changes and directions (vectors) into account. Regression techniques also measure only direction and not the magnitude of the changes (vectors). Due to the interactions between the different measurable variables, there is a tendency for each phase, to form an equilibrium that is related to a multivariate normal density distribution, within a deterministic border - also known as an attractor in system dynamics or deterministic chaos (Thom, 1975; Cohen & Stewart, 1994). Natural equilibrium is not a completely closed system and external interference causes disturbances resulting in dynamic vector changing effects.

An incremental state simulation model was developed in Visual Basic 5, based on goal sorting and grouping orientation, to simulate the dynamic vector changes in the deterministic chaotic area. Each variable produced a cause and effect column, within the Non Linear Dynamic Model vector matrix in the computer. The vector direction, that is the positive and negative change, was controlled by the goal orientated sorting process. In general the vector changes describe the non-linear dynamic vector effects over the goal variables. The dynamic matrix vector, increases the degrees of freedom to  $n^2$ , and in this process get more information out of the data (Where  $n$  = the number of variables). In this survey example, the degrees of freedom for the total of 18 goals were  $18 \times n^2$ . In this process 18 non-linear dynamic vector matrix and their changes over the sub-goals 1-2,2-3,3-4...6-7 (each with  $n^2$  degrees of freedom) were formed. The vector matrix in Table 2 is an example of the dynamic vector sum of changes over all the goals and sub-goals (from 1 to 18 goals and 1 to 7 sub-goals as vector effects), given the cause for the variables in an increasing mode. This method has frequently and thoroughly been tested against conventional multi-variant statistical methods where applicable. In complex studies the conventional analysis cannot produce satisfactory solutions due to the restrictions in their assumptions (de Bruyn & Lourens, 1997; Barndorff-Nielsen *et. al*, 1994; Zimmerman, 1984).

The non-linear dynamic model puts the analyst in a position:

- to get more inference out of the data by increasing the degrees of freedom,
- to draw inferences based on the interactions between the data,
- to add complexity without sacrificing the original simplistic approach.

## **2.4 FORMULATION OF HYPOTHESIS**

The development of the livestock industry in the northern communal areas of Namibia depends critically on a positive symbiosis between the formal and informal marketing systems. Hence, livestock owners' decisions regarding when, where, at what price and in which marketing chain (formal or informal) are an important indicator of the direction in which the market is heading.

When selling slaughter cattle, farmers have a number of alternative marketing channels to choose from. This study departs from the assumption that the decision by a livestock owner to sell his or her animals in a particular market depends on the costs incurred during the sale of the animal. These costs involve more than only the direct selling costs, and also include factors such as the gathering of information relevant to the final decision and the risk involved in realising an expected price. These are typically called transaction costs. In the literature, transaction costs also include post-sale costs involved in the monitoring of contract compliance (i.e. they also include a risk element). However, the typical transaction in the Northern Communal Areas is a once-off matter. Thus, post-sale costs were ignored in this analysis. The hypothesis is thus that transaction cost influenced the marketing channels decisions made by live stock farmers

## **2.5 THE SURVEY AND TRANSACTION COST QUESTIONNAIRE.**

The hypothesis that a producer's choice of marketing channel is influenced by transaction cost and producer/farm characteristic variables is tested, using data collected from a survey of rural producers in Northern Namibia.

To measure the transaction costs, a questionnaire was compiled (Appendix A) and completed in the field by the field workers. The idea behind measuring the transaction cost is that it influences a producer's choice of marketing channel. The possible channels that were identified include sales to Meatco (a government-owned parastatal), sales to butchers, and sales to livestock traders and the slaughtering of cattle for the sale of meat. Table 1.1 shows a summary of the questions that were asked and the variables that were identified. These variables are only transaction costs and do not include the actual selling price of cattle. The reason for this is that it is the perception of the expected market price that has an influence on marketing channel choice and not the actual price.

Table 1.1 An explanation of the variables

	Variable	Variable question	Measurement
Y			Proportion of cattle sold to MEATCO
X1		Caprivi =1, Mukwe = 2, Okahao = 3, Okongo = 4, Onesi = 5, Ruacana = 6, Rundu = 7	Area
X2			Age of farmer
X3			Years formal education +1
X4			Average size of cattle herd
X5			Average size of sheep flock + 1
X6			Average size of goat flock + 1
X7			Percentage of time spent tending livestock
X8	Price uncertainty MEATCO	Is the prices offered by MEATCO known before arriving at the buying point?	NA =1, No=2, Yes=3
X9	MEATCO price information cost	Did you spend time discovering likely MEATCO price prior to sale? (hours)	NA=1, No=2, Yes=3
X10	Transportation costs (MEATCO)	Cost of transporting stock to the MEATCO buying	NA=1, 0 Or <1=2, or Km + 2
X11	Transportation costs (Own sales)	Cost of transporting stock to the local market or distance to the local market?	NA=1, 0 Or <1=2, or Km + 2
X12	Auction transportation effort	Is transport to the MEATCO buying points a problem?	NA = 1, No problem =2, Minor problem = 3, Problem = 4, Significant problem = 5, Major problem = 6
X13	Direct sale transportation effort (Own sales)	Is transport to the local market a problem?	NA = 1, No problem =2, Minor problem = 3, Problem = 4, Significant problem = 5, Major problem = 6
X14	Frequency of MEATCO sales. (per year)	How many times per year does MEATCO visit the local buying point?	NA = 1, 1-2 times = 2, 3-4 times =3, 5-6 times =4, 7-8 times = 5, 9-10 times = 6, 11-12 times = 7
X15	Time spent at buying point. (hours)	How many hours do you spend at the MEATCO buying point?	NA = 1, 1-2 hours = 2, 3-4 hours = 3, 5-6 hours = 4, 7-8 hours = 5, 9-10 hours = 6
X16	Direct cost of own sale.	Is a fee is payable to slaughter and sell at the local market?	NA = 1, No = 2, Yes = 3
X17	Unequal bargaining power. (MEATCO)	Does having to take whatever price MEATCO offers, present a problem?	NA = 1, No problem =2, Minor problem = 3, Problem = 4, Significant problem = 5, Major problem = 6
X18	Risk of non-sale. (MEATCO)	Is the risk that animals will be not be bought and have to be transported back to your home a problem?	NA = 1, No problem =2, Minor problem = 3, Problem = 4, Significant problem = 5, Major problem = 6
X19	Auction shrinkage loss	Is the loss of weight of animals, through herding to the buying point, a problem?	NA = 1, No problem =2, Minor problem = 3, Problem = 4, Significant problem = 5, Major problem = 6
X20	Direct sale shrinkage loss (own sales)	Is the loss of weight of animals, through herding to the local market, a problem?	NA = 1, No problem =2, Minor problem = 3, Problem = 4, Significant problem = 5, Major

			problem = 6
X21	Grade uncertainty (MEATCO)	Is it a problem that cattle may not be graded as expected when selling to MEATCO?	NA = 1, No problem = 2, Minor problem = 3, Problem = 4, Significant problem = 5, Major problem = 6
X22	Grade uncertainty (Traders/livestock speculators)	Are your predictions of livestock prices, compared to the final selling price,?	NA = 1, always lower = 2, often lower = 3, equal = 4, often higher = 5, always higher = 6? (1-5)
X23	Grade uncertainty (butcher)	Are your predictions of carcass prices, compared to the final selling price?	NA = 1, always lower = 2, often lower = 3, equal = 4, often higher = 5, always higher = 6? (1-5)
X24	Time to complete sale (own sales) days	How many days does it take to sell your meat? (days)	NA = 1, 0 = 2, 1-2 = 3, 3-4 = 4
X25	Slaughtering cost (own sales)	Do you have people you pay to slaughter for you?	NA = 1, No = 2, Yes = 3
X26	Support cost (own sales)	Do you have people that help you sell meat?	NA = 1, No = 2, Yes = 3
X27	Refrigeration cost of direct sale (own sales)	Are refrigeration facilities available on or close to the market? And if it is available do you use it.	NA = 1, No = 2, Yes = 3
X28	Credit for customers (own sales) (1-5)	Do you sell meat to small traders and customers on credit?	NA = 1, Never = 2, Almost never = 3, Sometimes = 4, Often = 5, Always = 6
X29	Time for credit payment (own sales)	If you supply meat on credit, how many days on average does it take to be paid?	NA = 1, < 30 = 2, 30-60 = 3, 60-90 = 4
X30	Discount for customers (own sales)	Do you provide a discount to small traders or customers for large sales?(1-5)	NA = 1, Never = 2, Almost never = 3, Sometimes = 4, Often = 5, Always = 6

## **CHAPTER 2**

### **INTERPRETATION OF RESULTS AND EXPLANATION OF THE MODEL**

#### **1. INTRODUCTION**

Transaction costs take place in an interactive system. Therefore the data was analysed using the technique of non-linear dynamic model (NLDM). This is a cause effect model (input-output) that introduces dynamics into the system, and is related to the theory of deterministic chaos (non-linear dynamics).

#### **2. INTERPRETATION OF RESULTS**

The model produces various cause effect matrixes, which is summarised in the following matrixes: the NLDM matrix (Table 2.1), Dynamic Interaction matrix (Table 2.2), Coefficient of total vector determination (Table 2.3) and the Coefficient of consistency matrix (Table 2.4). The NLDM matrix is the main matrix of interpretation. The rest of the matrixes are used to cross-reference the degree of interaction, determination and consistency of the variables. All matrixes have a cause and an effect axis. Interpretation of the matrix starts at the cause axis. If a variable increases over its possible values the effect on the remaining variables is read from the corresponding effect axis (i.e. if X1 increases the corresponding Y value is 21% and the corresponding X30 value is -36% - Table 2.1).

- **AREA (X1)**

Each of the research sites where questionnaires were completed was allocated a number between 1 and 7. These areas include Caprivi (1), Mukwe (2), Okahao (3), Okongo (4), Onesi (5), Ruacana (6), and Rundu (7).

A possible concern is the vastness of the research area, and therefore the representative value of the results. It must thus be discerned if it would not be advisable, firstly to have larger samples and secondly individual analysis per area. In the NLDM model cross-referencing is applied in testing if the data is representational. The first step is to rank the variables according to their influence on the dependent variable (Y). Referring to Figure 2.1 it can clearly be seen that X9 has by far the largest influence on Y, continuing to X1 with the smallest influence. The influence of an increase in X1 on it self must then be tested against its influence, along the ranking order, on X2 to X30. The higher a variable is ranked the more stable it should be over the possible values for X1, to be representative. The vector of X1 on X1 is 358% where as X1 on X9 is 2%. Therefore over area 1 to 7, variable X9 remains relatively stable, and thus is representative. Applying the same methodology, it is clear that the above argument is also true for the remaining variables (see Figure 2.2 for a graphical presentation).

It can thus be stated that variable X2 to X30 remains stable over areas 1 to 7 and therefore the results are representative.

If X1 increases between 1 and 7 there is a 21% increase in the proportion of animals sold to Meatco. Therefore moving from one area to another, there is an average difference of 21% in the proportion sold to Meatco. The difference of 21% can be explained as follows. Firstly this difference is quite natural considering the large distances between areas and expanse of the total research area. Secondly there is an average difference of -76% in the size of cattle herds between areas. Thirdly as one moves across areas there is an average difference of 22% in the size of goat flocks and an average difference of -24% in the size of sheep flocks. Further, as can be seen from Figure 14.1, X1 has a rather small influence on Y, relative to the other variables.

- **AGE OF FARMER (X2) AND YEARS OF FORMAL EDUCATION (X3)**

The age of the respondents varied from 24 years of age to 79 years of age, with an average age of 56. The average age according to area was: Caprivi 58, Mukwe 57, Okahao 64, Okongo 46, Onesi 37, Ruacana 60 and Rundu 55. Years of formal education varied between 0 and 15 years, with an average of 6 years.

With an increase in age, the data shows an increase of 75% in the propensity to sell cattle to Meatco. This corresponds very well with years of formal education X3. As age increases, years of formal education decreases by 70%. Furthermore, as years of formal education increases, the proportion of animals sold to Meatco decreases by 39%. Thus it can be postulated that younger farmers with more formal education have an information cost advantage that allows them to explore other options in the marketing of their cattle.

If however, one compares the influence of X2 and X3 on Y relative to the other variables (see Figure 2.1), it is debatable how large this cost advantage is. The possible information cost advantage can be put further in perspective by comparing what happens to cattle herd size when X2 and X3 increase. With an increase in age, cattle herd size increases by 73%, and with an increase in years of formal education there is a corresponding decrease in herd sizes of 54%. Thus older farmers sell proportionally more cattle to Meatco, simply because they have more cattle to sell.

- **AVERAGE SIZE OF CATTLE HERD (X4)**

The cattle herd size in the data varied between 6 and 150, with an average of herd size of 52 animals. An increase in herd size leads to a corresponding increase in the proportion of cattle sold to Meatco. A possible reason for this is that Meatco is a more suitable marketing channel for owners with large herds that want to sell large quantities of animals at once.

An interesting fact that comes to light is that with an increase in herd size, there is an increase in transportation cost to Meatco buying points (261%) and to informal markets (274%). Transport cost is measured in kilometres to the buying point for practical reasons. Thus, larger herd owners tend to be situated further from the main marketing points. This corresponds well with variable X18 (Risk of non-sale to Meatco). With an increase in herd size (and therefore distance to the buying point) the risk of non-sale, as rated by the respondents, increases by 123%. This is verified by X10 (transport cost to Meatco buying points) where when the distance increases (as measured over all respondents), the risk of non-sale to Meatco increases by 162%.

- **AVERAGE SIZE OF SHEEP FLOCK (X5) AND AVERAGE SIZE OF GOAT FLOCK (X6)**

Sheep flock sizes varied between 0 and 27, with an average size of only 2, while goat flock sizes varied between 0 and 58 with an average size of 22. With an increase in sheep herd sizes there is an increase in Y of 62%. This can be explained by the fact that with an increase in X5, there is a corresponding increase in cattle herd size of 100%. Further with an increase in goat herd size, there is a decrease in the proportion of cattle sold to Meatco of 78%.

With an increase in goat flock size, there is a decrease in the proportion of cattle sold to Meatco of 78%. It is highly probable that this result is caused by more factors than mere market share competition between cattle and goats. The rationale for this statement lies in the following: Firstly the corresponding X10 value for X4 and X6 is 261% and 97% respectively. Secondly the corresponding X11 value for X4 and X6 is 274% and 108% respectively. In both these cases the vector difference between the two values is roughly half. Thus farmers with larger goat flock live much closer to the Meatco buying points and informal markets. Further with an increase in goat herd size there is no significant change in cattle herd sizes and an increase in sheep herd size. These farmers are thus more diversified and able to spread their risk. Having other livestock to generate income,

and easier access to markets, gives these farmers the choice of only selling to Meatco if they perceive it as the best option.

- **PERCENTAGE OF TIME SPENT TENDING LIVESTOCK (X7)**

The percentage of time spent tending livestock varies greatly from 1 to 100%, with an average of 61%. An increase in X7 causes an increase in Y of 86 %. Further, with an increase in X7 there is no significant increase (or decrease) in the size of cattle herds. Thus percentage time spent tending livestock does not necessarily indicate the size of a farmer's enterprise.

- **PRICE UNCERTAINTY MEATCO (X8) AND MEATCO PRICE INFORMATION COST (X9)**

Price uncertainty was measured by asking respondents if they knew what prices Meatco was offering, before taking their cattle to the buying point. When X8 increased from 2 (negative) to 3 (positive), the resultant increase in Y was an astonishing 2123%. Thus the cost of acquiring price information has a very large effect on the proportion of cattle sold to Meatco.

An increase in X8 is also associated with an increase in the distance from the buying point (X10) of 221%, the risk of non-sale (X18) of 99%, grade uncertainty (X21) of 90% and herd size (X4) of 140%. Thus farmers further away from the buying point have a higher risk of non-sale and grade uncertainty, have larger herds, and will invest in time and effort to find price information.

The variable X9 denotes if farmers have spent time finding likely Meatco prices, therefore if they incurred information costs. A movement from no to yes in this regard has an influence on Y of an even more astonishing 8298%. An increase in X9 also has the same effect on X4, X10, X18, and X21 as an increase in X8.

Thus, the cost of obtaining price information has the greatest impact in explaining the proportion of cattle sold to Meatco and thus the producers' choice of marketing channel. This can be clearly seen from Figure 2.1.

- **TRANSPORT COST (MEATCO) (X10)**

Transport cost was measured in distance to the buying point, because this is practical information that was known to most respondents. The information was verified by measuring the distance from stated point of origin to the buying point. The distances measured on maps were also used where respondents did not know the distance to the buying point. In the data gathered, distances varied from less than 1 km to 75 km. While these distances are short in comparison with those recorded by the fieldworkers in their daily reports, the longer distances are mostly travelled by traders, and not producers, who were the target of this survey.

An increase in the distance to the buying point resulted in an increase of the order of 917% in sales to Meatco. From a logical point of view this does not make sense, because larger distances normally mean greater transport cost and therefore a disincentive to sell to Meatco. The increase in distance with a resultant increase in sales to Meatco, however corresponds well with variable X4 (cattle herd size). As was discussed above, an increase in cattle herd size resulted in an increase in Y of 206%. Further, with an increase in herd size there was a corresponding increase in the distance that had to be travelled to the Meatco buying point.

It is therefore probable that herd size in combination with transport cost plays a distinctive role in the choice of marketing channel. A probable paradigm could be constructed as follows; larger herd owners will want to sell larger lots of cattle at once, relative to the smaller producers. It is also known that the owners of smaller herds tend to sell only in times when they need the cash, while owners of large herds are more likely to sell for commercial reasons, and therefore to sell the younger and leaner animals preferred by Meatco. There is also a greater chance of variability in quality in larger lots. It is known that Meatco buys cattle per weight and is less conscious of quality than butchers would be. A butcher would be more quality conscious, because buying a single animal is a large capital outlay for him

or her. Finally, informal butchers seldom buy more than one animal at a time. A farmer who quickly wants to improve his cash flow by selling a relatively large number of cattle will, therefore, rather sell to Meatco where he knows all his cattle will be bought at once.

An increase in the distance to the buying point also has a significant influence on variables X17, X18 and X21. Unequal bargaining power, (X17) as rated by farmers in respect to Meatco, increases by 123%. The risk of non-sale to Meatco (X18) increases with 162% and grade uncertainty (X21) increases by 123%. These effects suggest that there is an information cost associated with the distance that producers are located from the main marketing points.

- **TRANSPORT COST (OWN SALES) (X11)**

The same assumption, i.e. that distance travelled is equal to transport cost, was again made in estimating this variable. The range of values was between 1km and 50km, with an average distance of 4km. This average is much lower than the average for Meatco sales of 10km. It can, therefore, be assumed that over all the respondents the distance that they have to travel to the informal market is less than to the Meatco buying points.

When X11 increases there is a small increase in Meatco sales of 177%. The reason for this is that, with an increase in X11, there is again a resultant increase in herd size. Further, it is also now known that farmers with larger herds have a preference to sell to Meatco.

A further explanation for the above result can be found in the alternate cost of a marketing channel. An increasing X11 results in an increase in X24, X28 and X30. The time it takes to finish selling meat (X24) increases by 68%, the occurrence of selling meat on credit (X28) increases by 111% and the frequency of providing a discount to customers (X30) increases by 126%. All these variables make the cost of using a particular marketing channel higher, and therefore alternative channels become more attractive.

- **AUCTION TRANSPORT EFFORT (X12)**

Auction transport effort is an additional variable to measure the transport cost involved in selling to Meatco. This is necessary to firstly capture those added costs that were not taken in account in variable X10 (the transport cost to Meatco), and secondly to test the assumption that distance is equal to transport cost.

The assumption of distance equalling cost is roughly verified by the fact that an increase in transport effort causes an increase in X10 of 356%. An increase in transport effort is also associated with an increase in herd size (174%).

In addition, time spent at the buying point (X15) increases by 88%, unequal bargaining power (X17) with 107%, risk of non-sale (X18) by 162% and grade uncertainty (X21) by 97%. Thus the fact that information costs and transport costs are positively associated is again confirmed.

- **DIRECT SALE TRANSPORT EFFORT (X13)**

Variable X13 is a measure of the effort in transport associated with the farmer slaughtering his cattle and selling the meat at the local market. An increase in X13 causes a 340% increase in sales to Meatco. Again, transport effort is related to transport cost (X11), with an associated increase of 573%. The increase in variable X4 (herd size) also indicates a relationship between herd size and transport effort.

It is interesting to note that with an increase in transport effort, there is an increase in the frequency of credit (X28) and discounts extended to customers buying meat from farmer's (X30).

- **FREQUENCY OF MEATCO SALES PER YEAR (X14)**

The frequency of Meatco sales was sourced from the farmers and not from official Meatco data, because the farmer's opinions capture a certain amount of

information cost. An increase in variable X14 caused an increase of 1460% in the proportion of cattle sold to Meatco.

That an amount of information cost is captured in variable X14 can be seen in the fact that X12 (transport effort), X17 (unequal bargaining power) and X18 (risk of non-sale) only increase with 32%, 54% and 53% respectively.

The variable X14 further has the 5<sup>th</sup> highest influence on the proportion of cattle sold to Meatco of all the variables in the data sample (see Figure 2.1).

- **TIME SPENT AT THE BUYING POINT (X15)**

With an increase in X15 there is a corresponding increase in the proportion of cattle sold to Meatco of 623%. This can be attributed to farmers first waiting to see at what price cattle are sold before they actually decide to sell. The purpose of waiting can thus be seen as an information cost. This assumption is strengthened by the fact that unequal bargaining power (X17) and risk of non-sale (X18) increases by 102% and 103% respectively. Cattle herd size (X4), transport cost (X10) and auction transport effort (X12) correspondingly increase by 91%, 586% and 73%.

- **DIRECT COST OF OWN SALE (X16)**

The direct cost of own sales is the cost of selling at a particular market. This cost manifests in the fee that is payable to the person that owns or controls the market. An increase in X16 caused a small increase of 63 % in the number of cattle sold to Meatco. The direct cost of own sales therefore has an insignificant influence on the choice of marketing channel.

- **UNEQUAL BARGAINING POWER (X17)**

An increase of 879% occurs in Y if X17 increases. The corresponding X4 (herd size) and X10 (transport cost) variable also increased with 150% and 993%

respectively. Therefore large livestock owners that are situated far from the buying point still sell to Meatco even if they feel that they have unequal bargaining power. A possible reason for this has already been discussed above (see variable X10).

- **RISK OF NON-SALE (X18)**

If the risk of non-sale increases the proportion of sales to Meatco increases by 1839%. The corresponding X4 (herd size) and X10 (transport cost) increases by 285% and 6765% respectively.

Thus large livestock owners tend to sell to Meatco even if there is a high risk of non-sale. This is strengthened by the fact that the corresponding grade uncertainty variable (X21) increases by 121%.

- **AUCTION SHRINKAGE LOSS (X19)**

When auction shrinkage loss increases, there is an increase in sales to Meatco of 1091% and transport cost of 873%. Even though an increase in Meatco sales does not sound logical, it is supported by the large increase in transport cost (distance) of 873% (see discussion under variable X10 for a possible scenario).

- **DIRECT SALES SHRINKAGE LOSS (X20)**

An increase in direct sale shrinkage loss results in an increase in Y (proportion sold to Meatco) of 366%. This result is supported by an increase in X4 (herd size) of 174% and in X11 (transport cost of own sales) of 416%. Thus higher cost in the own sales marketing channel causes producers to sell proportionally more to Meatco.

- **GRADE UNCERTAINTY MEATCO (X21)**

As with Variables X17 to X19, there is a large increase (1079%) in the proportion of sales to Meatco with an increase in X21. This is accompanied by an increase in X4, X10, X17, X18 and X21 of 167%, 760%, 129% 151% and 168% respectively.

Taking the above in account, the only conclusion that can be reached (as elsewhere), is that large livestock owners still sell large numbers to Meatco even if they perceive the risk to be high.

- **GRADE UNCERTAINTY (TRADERS) (X22)**

Proportionally 118% more cattle are sold to Meatco with an increase in the grade uncertainty associated with livestock traders. The corresponding values for the other variable is relatively small, and it can thus be stated that X22 has a low interaction with the other variables.

With an increase in X23, there is a small increase in the proportion of cattle sold to Meatco. As with X22 there is very little interaction between X23 and the rest of the variables. Because of the low interaction it can be stated that the risk associated with grade uncertainty is independent of the other variables.

It is also interesting to note that the vector values for X2 (Age of farmer) and X3 (Years of formal education), corresponding with all the grade uncertainty variables (X20 to X23), remain relatively stable. Thus the respondents in the study understand the concept of grade and therefore grade uncertainty is a product of risk.

- **GRADE UNCERTAINTY (BUTCHER) (X23)**

With an increase in X23, there is a small increase in the proportion of cattle sold to Meatco. As with X22 there is very little interaction between X23 and the rest of the variables.

- **TIME TO COMPLETE SALE (X24)**

If the time to complete the sale of own meat increases, there is a small increase in the number of cattle sold to Meatco of 63%. The only significant corresponding variable increase is X11 (transport costs for own sales) with 153%. Thus, farmers

who have travelled further seem to be more risk averse, especially if the sale is not concluded speedily.

- **SLAUGHTERING COST (X25)**

An increase in slaughtering cost of own sales results in a significant increase in the proportion of cattle sold to Meatco of 424%. This is accompanied by an increase in X4 (average size of cattle herd) of 213% and an increase in X11 (transport costs for own sales) of 457%. Therefore, farmers with large herds and high transport costs will rather sell to Meatco if there is slaughtering costs involved with own sales.

- **SUPPORT COST OF OWN SALES (X26)**

Support cost is the measure of the cost incurred in the process of selling fresh or cooked meat. In most cases these cost manifests in the employment of people to help sell meat, to cook meat and to gather firewood. With an increase in support cost there is an increase in sales to Meatco of 374%. Further there is an increase in X4 (herd size) and X11 (transport cost) of 220% and 605% respectively. Thus the same argument for variable X25 can be argued for X26.

- **REFRIGERATION COST OF OWN SALES (X27)**

An increase in X27 has a resultant increase in Y of 314%. There is also a corresponding increase in X11 (transport cost) of 234%. It is thus possible that farmers would be prepared to travel further to informal markets that have refrigeration facilities. The availability of refrigeration facilities directly influences the net receipts by meat sellers, as they often have to sell meat at lower prices (e.g. by selling on credit or giving discounts) when the meat starts to get old.

- **CREDIT TO CUSTOMER'S (X28)**

When there is an increase in the frequency of credit extended to customers, the proportion of Meatco sales increases by 274%. This increase is accompanied by a corresponding increase in the frequency of discounts for regular customer's (X30). Further with an increase in the frequency of credit, the waiting period for credit repayment increase by 68%, and hence the risk of extending credit becomes higher.

- **TIME FOR CREDIT PAYMENT (X29)**

If the time that customer takes to repay credit increases, there is a relatively large increase in the sales to Meatco of 731%. The corresponding X4 (herd size) and X11 (transport cost) are of a magnitude of 195% and 259% respectively. Thus farmers with large herds, which are situated further from the informal markets, have a longer waiting period for credit repayment, if the frequency of credit is increased. They therefore have an incentive rather to sell to Meatco. Thus X29 has a significant influence on the choice of marketing channel.

- **DISCOUNT FOR CUSTOMERS (X30)**

An increase in the frequency of discount to customers results in an increase in sales to Meatco of 344%. There is also a corresponding increase in X4, X11 and X28 of 235%, 678% and 153% respectively. Therefore farmers that have larger herds and are situated further from markets are adverse to credit and discounts and would rather sell to Meatco.

Table 2.1: The NDLM matrix

		X increasing –cause 																														
		Y	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29	X30
Effect 	Y	10000	21	75	-39	206	62	-78	86	2123	8298	917	177	1916	340	1460	623	63	879	1839	1091	366	1079	118	66	63	424	374	314	274	731	344
	X1	-40	358	-41	41	-76	-24	22	-2	-52	-55	-61	-44	-53	-62	11	-5	16	-52	-72	17	-56	-74	-38	107	16	-62	-62	-48	-76	-64	-74
	X2	4	-5	58	-30	10	2	-3	13	2	4	-1	-13	0	-7	-1	-3	-13	-12	1	-14	-8	-5	10	0	-13	-3	-4	-5	-7	-2	-5
	X3	4	46	-70	1220	-11	-51	-18	-65	1	-1	41	5	-17	16	-5	-3	-12	-2	7	31	-7	9	-51	3	-12	22	17	6	19	20	10
	X4	112	-68	73	-54	563	100	3	-5	140	190	232	122	174	195	9	91	-11	150	258	45	174	167	83	-42	-11	213	220	93	183	195	235
	X5	-33	-7	-1	-15	-46	1080	700	-41	-30	-33	1	-48	-56	-71	-47	1	-48	50	-65	117	-48	1	109	-63	-48	-73	-71	-52	-71	-73	-71
	X6	-78	32	-30	-57	-44	138	8430	-34	-82	-84	28	-42	6	-73	-14	103	-44	2	-59	139	-71	-62	8	-41	-44	-73	-73	-48	-69	-86	-73
	X7	59	-7	30	-54	50	-28	-34	258	58	58	40	-5	35	28	54	32	25	17	51	6	35	43	-48	49	25	39	39	16	33	54	37
	X8	10	2	-3	-2	11	4	-5	5	31	31	15	11	4	11	4	2	0	8	10	10	16	15	0	7	0	17	17	10	16	17	17
	X9	10	2	-3	-2	12	3	-7	5	31	32	14	10	3	12	3	-1	0	7	10	7	17	15	0	8	0	18	18	11	17	18	18
	X10	130	-58	-26	46	261	237	97	-4	221	188	1527	101	356	137	78	586	-33	993	676	873	89	760	29	-51	-33	122	122	29	68	110	144
	X11	-25	-55	-44	-11	274	32	108	-55	135	135	289	795	269	573	56	220	153	410	270	224	416	188	147	-48	153	457	605	234	399	259	678
	X12	20	-28	11	-17	54	23	14	14	34	30	78	26	125	47	32	73	-4	88	94	57	30	61	6	-20	-4	40	40	1	22	38	48
	X13	-6	-24	-5	12	56	0	-15	-11	10	10	36	84	75	137	1	10	21	52	46	10	79	51	18	-16	21	102	105	47	105	93	126
	X14	12	22	-2	-8	-6	5	8	13	2	2	0	-1	13	-4	63	25	12	13	2	23	7	2	-8	10	12	0	0	4	-6	-3	-5
	X15	31	18	-3	-12	20	43	45	36	29	26	66	2	88	2	78	188	2	83	52	90	11	43	-11	8	2	5	6	6	-11	7	3
	X16	-16	1	-14	14	-14	-15	2	1	-15	-15	-18	21	-15	9	3	-12	58	-9	-15	-12	19	-15	-13	5	58	9	11	32	16	8	5
	X17	43	-14	5	-9	44	51	19	4	55	47	123	50	107	50	54	102	13	183	111	107	47	129	4	-16	13	48	51	17	32	52	58
	X18	73	-43	35	-27	123	37	1	12	99	97	162	75	162	96	53	103	-5	165	214	93	76	151	17	-32	-5	88	92	41	75	85	108
	X19	9	16	-7	4	18	47	61	-9	9	4	50	22	58	15	31	80	5	78	47	115	11	29	7	-6	5	10	14	10	-8	7	14
	X20	-5	-1	-3	-3	-1	1	5	-4	-3	-3	-3	20	-2	5	3	1	10	3	-2	1	21	-2	-3	-3	10	3	5	20	5	1	5
	X21	69	-22	-2	-8	72	30	-2	15	90	83	123	49	97	70	32	68	10	145	121	86	54	168	6	-7	10	67	69	32	64	81	80
	X22	-24	-7	31	-15	-8	63	32	-29	-17	-17	-21	-14	-21	-11	-26	-11	-14	-4	-21	-13	-25	-13	168	-15	-14	-23	-22	-24	-33	-31	-22
	X23	-32	58	-17	15	-36	-29	-14	19	-27	-24	-35	-26	-29	-26	5	-11	25	-28	-34	-21	-26	-33	-26	116	25	-35	-34	-24	-34	-22	-34
	X24	-27	-7	-17	16	-1	-20	1	-1	-14	-14	-12	68	-9	58	5	-18	111	2	-8	-18	61	-8	-14	3	111	58	63	61	68	48	58
	X25	-17	-10	-7	11	13	-16	-5	-2	-3	-3	2	47	4	55	-3	-15	52	7	5	-15	42	5	-6	-3	52	58	58	36	58	44	58
	X26	-17	-10	-7	11	14	-9	-1	-4	-3	-3	4	58	4	55	-3	-9	42	11	5	-10	53	5	-3	-13	42	55	58	46	58	37	58
	X27	-7	-5	-5	2	-4	-2	4	-4	-5	-5	-6	15	-5	4	0	-2	9	0	-5	-2	15	-4	-7	-5	9	3	4	32	10	5	4
	X28	-24	-28	-16	16	60	-19	-9	3	9	9	22	111	31	132	-2	-8	89	43	39	-9	101	39	-9	-11	89	125	132	66	163	133	153
	X29	-9	-20	2	12	34	-12	-14	0	7	7	27	46	20	73	-8	-6	36	27	25	-5	57	20	-1	-1	36	68	68	43	68	84	74
X30	-21	-36	-14	24	64	-16	-17	-7	30	30	34	126	44	166	1	-4	74	48	44	-6	135	52	-6	-13	74	155	163	102	184	146	184	

**Table 2.2: Dynamic Interaction Matrix**

		X increasing → cause →																														
		Y	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29	X30
Effect ↓	Y	0	61	71	-43	94	95	0	27	2113	8288	787	202	1896	346	1448	592	79	836	1766	1082	371	1010	142	98	90	441	391	321	298	740	365
	X1	-61	0	-36	-5	-8	-17	-10	5	-54	-57	-3	11	-25	-38	-11	-23	15	-38	-29	1	-55	-52	-31	49	23	-52	-52	-43	-48	-44	-38
	X2	-71	36	0	40	-63	3	27	-17	5	7	25	31	-11	-2	1	0	1	-17	-34	-7	-5	-3	-21	17	4	4	3	0	9	-4	9
	X3	43	5	-40	0	43	-36	39	-11	3	1	-5	16	0	4	3	9	-26	7	34	27	-4	17	-36	-12	-28	11	6	4	3	8	-14
	X4	-94	8	63	-43	0	146	47	-55	129	178	-29	-152	120	139	15	71	3	106	135	27	175	95	91	-6	-10	200	206	97	123	161	171
	X5	-95	17	-3	36	-146	562	-13	-34	-36	-236	-80	-79	-71	-52	-42	-33	-1	-102	70	-49	-29	46	-34	-28	-57	-62	-50	-52	-61	-55	
	X6	0	10	-27	-39	-47	-562	0	0	-77	-77	-69	-150	-8	-58	-22	58	-46	-17	-60	78	-76	-60	-24	-27	-45	-68	-72	-52	-60	-72	-56
	X7	-27	-5	17	11	55	13	0	0	53	53	44	50	21	39	41	-4	24	13	39	15	39	28	-19	30	26	41	43	20	30	54	44
	X8	-2113	54	-5	-3	-129	34	77	-53	0	0	-206	-124	-30	1	2	-27	15	-47	-89	1	19	-75	17	34	14	20	20	15	7	10	-13
	X9	-8288	57	-7	-1	-178	36	77	-53	0	0	-174	-125	-27	2	1	-27	15	-40	-87	3	20	-68	17	32	14	21	21	16	8	11	-12
	X10	-787	3	-25	5	29	236	69	-44	206	174	0	-188	278	101	78	520	-15	870	514	823	92	637	50	-16	-21	120	118	35	46	83	110
	X11	-202	-11	-31	-16	152	80	150	-50	124	125	188	0	243	489	57	218	132	360	195	202	396	139	161	-22	85	410	547	219	288	213	552
	X12	-1896	25	11	0	-120	79	8	-21	30	27	-278	-243	0	-28	19	-15	11	-19	-68	-1	32	-36	27	9	5	36	36	6	-9	18	4
	X13	-346	38	2	-4	-139	71	58	-39	-1	-2	-101	-489	28	0	5	8	12	2	-50	-5	74	-19	29	10	-37	47	50	43	-27	20	-40
	X14	-1448	11	-1	-3	-15	52	22	-41	-2	-1	-78	-57	-19	-5	0	-53	9	-41	-51	-8	4	-30	18	5	7	3	3	4	-4	5	-6
	X15	-592	23	0	-9	-71	42	-58	4	27	27	-520	-218	15	-8	53	0	14	-19	-51	10	10	-25	0	19	20	20	15	8	-3	13	7
	X16	-79	-15	-1	26	-3	33	46	-24	-15	-15	15	-132	-11	-12	-9	-14	0	-22	-10	-17	9	-25	1	-20	-53	-43	-31	23	-73	-28	-69
	X17	-836	38	17	-7	-106	1	17	-13	47	40	-870	-360	19	-2	41	19	22	0	-54	29	44	-16	8	12	11	41	40	17	-11	25	10
	X18	-1766	29	34	-34	-135	102	60	-39	89	87	-514	-195	68	50	51	51	10	54	0	46	78	30	38	2	3	83	87	46	36	60	64
	X19	-1082	-1	7	-27	-27	-70	-78	-15	-1	-3	-823	-202	1	5	8	-10	17	-29	-46	0	10	-57	20	15	23	25	24	12	1	12	20
	X20	-371	55	5	4	-175	49	76	-39	-19	-20	-92	-396	-32	-74	-4	-10	-9	-44	-78	-10	0	-56	22	23	-51	-39	-48	5	-96	-56	-130
	X21	-1010	52	3	-17	-95	29	60	-28	75	68	-637	-139	36	19	30	25	25	16	-30	57	56	0	19	26	18	62	64	36	25	61	28
	X22	-142	31	21	36	-91	-46	24	19	-17	-17	-50	-161	-27	-29	-18	0	-1	-8	-38	-20	-22	-19	0	11	0	-17	-19	-17	-24	-30	-16
	X23	-98	-49	-17	12	6	34	27	-30	-34	-32	16	22	-9	-10	-5	-19	20	-12	-2	-15	-23	-26	-11	0	22	-32	-21	-19	-23	-21	-21
	X24	-90	-23	-4	28	10	28	45	-26	-14	-14	21	-85	-5	37	-7	-20	53	-11	-3	-23	51	-18	0	-22	0	6	21	52	-21	12	-16
	X25	-441	52	-4	-11	-200	57	68	-41	-20	-21	-120	-410	-36	-47	-3	-20	43	-41	-83	-25	39	-62	17	32	-6	0	3	33	-67	-24	-97
	X26	-391	52	-3	-6	-206	62	72	-43	-20	-21	-118	-547	-36	-50	-3	-15	31	-40	-87	-24	48	-64	19	21	-21	-3	0	42	-74	-31	-105
	X27	-321	43	0	-4	-97	50	52	-20	-15	-16	-35	-219	-6	-43	-4	-8	-23	-17	-46	-12	-5	-36	17	19	-52	-33	-42	0	-56	-38	-98
	X28	-298	48	-9	-3	-123	52	60	-30	-7	-8	-46	-288	9	27	4	3	73	11	-36	-1	96	-25	24	23	21	67	74	56	0	65	-31
	X29	-740	44	4	-8	-161	61	72	-54	-10	-11	-83	-213	-18	-20	-5	-13	28	-25	-60	-12	56	-61	30	21	-12	24	31	38	-65	0	-72
X30	-365	38	-9	14	-171	55	56	-44	13	12	-110	-552	-4	40	6	-7	69	-10	-64	-20	130	-28	16	21	16	97	105	98	31	72	0	

**Table 2.3: Dynamic vector Matrix-Coefficient of total Vector Determination**

		X increasing → cause →																														
		Y	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29	X30
Effect ↓	Y	#	34	106	91	219	65	#	319	101	100	117	88	101	98	101	105	80	105	104	101	99	107	83	67	70	96	96	98	92	99	94
	X1	66	#	114	820	950	141	220	40	96	97	2033	400	212	163	100	22	107	137	248	1700	102	142	123	218	70	119	119	112	158	146	195
	X2	6	14	#	75	16	67	11	77	40	57	4	42	0	350	100	#	1300	71	3	200	160	167	48	0	325	75	133	#	78	50	56
	X3	9	920	175	#	26	142	46	591	33	100	820	31	#	400	167	33	46	29	21	115	175	53	142	25	43	200	283	150	633	250	71
	X4	119	850	116	126	#	69	6	9	109	107	800	80	145	140	60	128	367	142	191	167	99	176	91	700	110	107	107	96	149	121	137
	X5	35	41	33	42	32	#	125	315	88	92	0	60	71	100	90	2	146	5000	64	167	98	3	237	185	171	128	115	104	137	120	129
	X6	#	320	111	146	94	25	#	#	107	109	41	28	75	126	64	178	96	12	98	178	93	103	33	152	98	107	101	92	115	119	130
	X7	219	140	177	491	91	215	#	#	109	109	91	10	167	72	132	800	104	131	131	40	90	154	253	163	96	95	91	80	110	100	84
	X8	1	4	60	67	9	12	7	9	#	#	7	9	13	1100	200	7	0	17	11	1000	84	20	0	21	0	85	85	67	229	170	131
	X9	0	4	43	200	7	8	9	9	#	#	8	8	11	600	300	4	0	18	12	233	85	22	0	25	0	86	86	69	213	164	150
	X10	17	1933	104	920	900	100	141	9	107	108	#	54	128	136	100	113	220	114	132	106	97	119	58	319	157	102	103	83	148	133	131
	X11	12	500	142	69	180	40	72	110	109	108	154	#	111	117	98	101	116	114	139	111	105	135	91	218	180	112	111	107	139	122	123
	X12	1	112	100	#	45	29	175	67	113	111	28	11	#	168	168	487	36	463	138	5700	94	169	22	222	80	111	111	17	244	211	1200
	X13	2	63	250	300	40	0	26	28	1000	500	36	17	268	#	20	125	175	2600	92	200	107	268	62	160	57	217	210	109	389	465	315
	X14	1	200	200	267	40	10	36	32	100	200	0	2	68	80	#	47	133	32	4	288	175	7	44	200	171	0	0	100	150	60	83
	X15	5	78	#	133	28	102	78	900	107	96	13	1	587	25	147	#	14	437	102	900	110	172	#	42	10	25	40	75	367	54	43
	X16	20	7	1400	54	467	46	4	4	100	100	120	16	136	75	33	86	#	41	150	71	211	60	1300	25	109	21	36	139	22	29	7
	X17	5	37	29	129	42	5100	112	31	117	118	14	14	563	2500	132	537	59	#	206	369	107	806	50	133	118	117	128	100	291	208	580
	X18	4	148	103	79	91	36	2	31	111	112	32	39	238	192	104	202	50	306	#	202	97	503	45	1600	167	106	106	89	208	142	169
	X19	1	1600	100	15	67	67	78	60	900	133	6	11	5800	300	388	800	29	269	102	#	110	51	35	40	22	40	58	83	800	58	70
	X20	1	2	60	75	1	2	7	10	16	15	3	5	6	7	75	10	111	7	3	10	#	4	14	13	20	8	10	400	5	2	4
	X21	7	42	67	47	76	103	3	54	120	122	19	35	269	368	107	272	40	906	403	151	96	#	32	27	56	108	108	89	256	133	286
	X22	17	23	148	42	9	137	133	153	100	100	42	9	78	38	144	#	1400	50	55	65	114	68	#	136	#	135	116	141	138	103	138
	X23	33	118	100	125	600	85	52	63	79	75	219	118	322	260	100	58	125	233	1700	140	113	127	236	#	114	109	162	126	148	105	162
	X24	30	30	425	57	10	71	2	4	100	100	57	80	180	157	71	90	209	18	267	78	120	44	#	14	#	967	300	117	324	400	363
	X25	4	19	175	100	7	28	7	5	15	14	2	12	11	117	100	75	121	17	6	60	108	8	35	9	867	#	1933	109	87	183	60
	X26	4	19	233	183	7	15	1	9	15	14	3	11	11	110	100	60	136	28	6	42	110	8	16	62	200	1833	#	110	78	119	55
	X27	2	12	#	50	4	4	8	20	33	31	17	7	83	9	0	25	39	0	11	17	300	11	41	26	17	9	10	#	18	13	4
	X28	8	58	178	533	49	37	15	10	129	113	48	39	344	489	50	267	122	391	108	900	105	156	38	48	424	187	178	118	#	205	494
	X29	1	46	50	150	21	20	19	0	70	64	33	22	111	365	160	46	129	108	42	42	102	33	3	5	300	283	219	113	105	#	103
X30	6	95	156	171	37	29	30	16	231	250	31	23	1100	415	17	57	107	480	69	30	104	186	38	62	463	160	155	104	594	203	#	

**Table 2.4: Dynamic vector Matrix-Coefficient of Consistency**

		X increasing - cause →																														
		Y	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29	X30
Effect ↓	Y	100	89	91	85	89	84	90	88	83	93	87	91	86	88	94	91	84	88	76	70	89	78	83	88	90	85	80	78	93	84	77
	X1	41	100	35	60	16	54	41	48	34	46	33	46	35	35	50	52	52	38	23	52	44	-9	49	60	52	44	47	42	43	45	34
	X2	28	11	100	-10	15	11	12	15	22	31	10	13	18	20	11	8	9	12	15	5	9	23	16	26	10	11	12	11	7	6	18
	X3	69	75	64	100	69	66	68	63	69	62	68	64	71	69	61	74	62	74	74	70	67	70	63	73	69	72	74	30	73	29	73
	X4	59	24	53	38	100	51	32	44	59	59	63	55	48	59	41	60	47	48	52	51	53	50	55	38	56	54	55	50	58	57	64
	X5	64	48	60	70	69	100	68	66	64	49	56	75	52	81	47	66	76	50	54	71	78	52	72	48	78	81	74	28	74	18	75
	X6	75	82	61	89	86	93	100	81	78	80	91	86	94	88	92	96	88	95	91	95	81	84	88	83	84	71	73	83	80	88	70
	X7	55	60	41	63	74	53	75	100	64	53	58	74	57	76	63	65	75	55	32	25	77	66	51	54	75	75	70	52	77	84	74
	X8	19	12	4	13	18	20	-3	18	100	89	27	21	20	22	19	12	16	21	18	20	30	24	10	14	15	30	30	24	27	41	29
	X9	16	14	4	14	20	17	-11	19	67	100	20	21	18	21	17	7	15	16	16	17	29	20	9	15	15	28	30	21	28	30	26
	X10	52	57	61	73	77	67	74	53	58	60	100	70	58	70	41	53	41	65	60	70	53	65	57	59	53	70	67	47	46	47	54
	X11	63	44	25	69	62	65	48	62	66	82	70	100	70	65	63	58	66	64	65	60	68	83	63	59	61	65	69	62	70	68	67
	X12	26	9	20	15	28	26	25	19	29	29	36	31	100	31	27	31	17	40	40	32	28	31	25	16	20	30	28	19	26	27	28
	X13	25	-11	4	35	39	34	-11	26	23	38	38	48	39	100	41	37	27	35	46	20	43	37	31	23	35	47	51	37	65	81	55
	X14	18	26	22	9	7	14	16	19	17	17	14	9	21	12	100	22	32	18	16	20	15	14	10	16	31	15	23	10	20	12	20
	X15	35	40	19	22	33	33	35	26	32	32	36	21	40	26	36	100	24	36	31	34	23	31	23	30	24	21	16	21	15	22	21
	X16	5	18	14	20	1	0	15	12	2	5	1	30	13	19	10	6	100	12	6	11	28	5	7	16	58	18	19	26	20	16	24
	X17	29	25	27	20	34	31	28	20	28	33	38	34	39	34	34	37	23	100	40	34	34	39	22	22	27	28	31	22	27	26	34
	X18	36	14	33	26	40	37	28	28	35	41	42	42	45	43	36	36	24	53	100	38	39	42	34	23	29	41	40	31	35	35	42
	X19	33	26	11	23	23	26	32	13	26	34	26	23	31	37	25	30	31	33	32	100	24	30	20	20	21	20	20	16	17	33	27
	X20	11	8	28	-7	-1	5	10	-9	5	12	7	64	5	23	9	5	33	9	5	5	100	15	4	4	29	16	21	55	15	8	16
	X21	32	18	28	19	34	30	21	28	36	35	36	35	37	35	27	32	22	43	36	38	32	100	26	24	30	35	31	28	32	32	37
	X22	21	26	32	17	36	37	31	8	22	25	24	16	25	39	18	31	30	22	20	23	18	27	100	24	23	34	17	11	16	26	28
	X23	14	36	17	28	12	14	23	26	9	17	13	18	13	17	25	18	29	12	13	23	8	18	11	100	29	14	13	15	22	16	16
	X24	14	27	20	24	16	13	21	19	13	16	17	45	25	46	19	17	100	25	19	22	50	21	15	25	100	44	42	32	39	37	52
	X25	12	16	12	19	16	9	12	15	13	15	12	44	19	48	15	11	75	18	17	12	59	19	12	15	86	100	56	29	84	52	62
	X26	8	12	12	18	16	12	13	14	10	15	16	42	18	64	15	11	68	18	16	10	56	18	13	13	68	49	100	30	48	40	35
	X27	9	-3	12	12	-1	-2	16	2	2	11	3	22	2	20	2	-2	23	2	1	-1	26	14	0	2	18	12	15	100	16	15	12
	X28	24	14	16	35	34	28	18	31	23	33	33	48	36	42	33	30	43	29	32	24	39	33	27	29	49	43	42	33	100	67	55
	X29	20	6	15	21	26	9	9	17	21	20	23	30	22	42	15	16	31	23	29	21	42	29	26	20	37	47	41	33	40	100	46
X30	29	9	14	39	32	30	14	35	27	36	38	49	39	51	40	32	46	31	37	26	44	36	30	31	47	45	47	39	50	59	100	

# Vector changes of Xi on Y

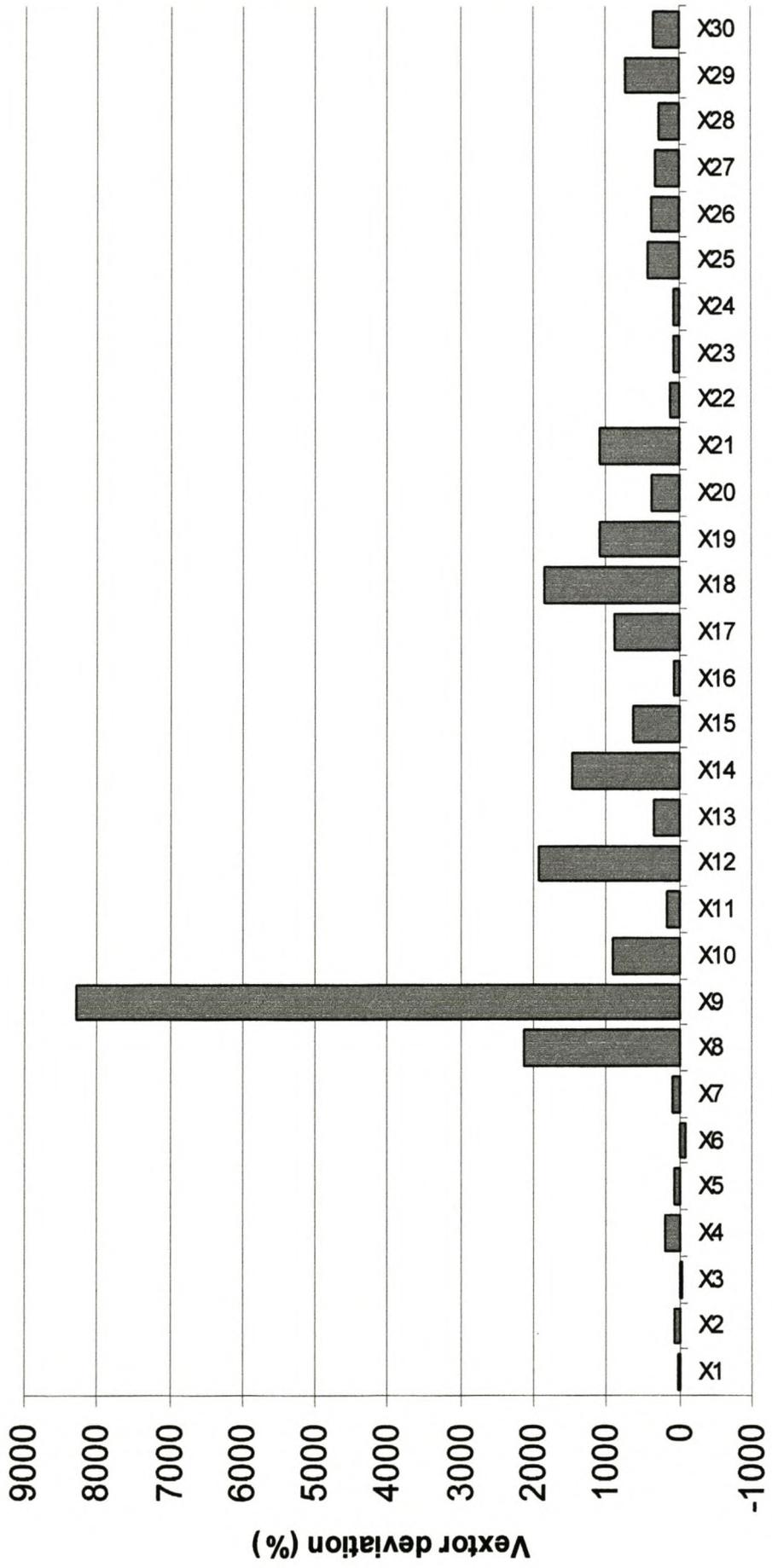


Figure 2.1 Vector changes of Xi on Y

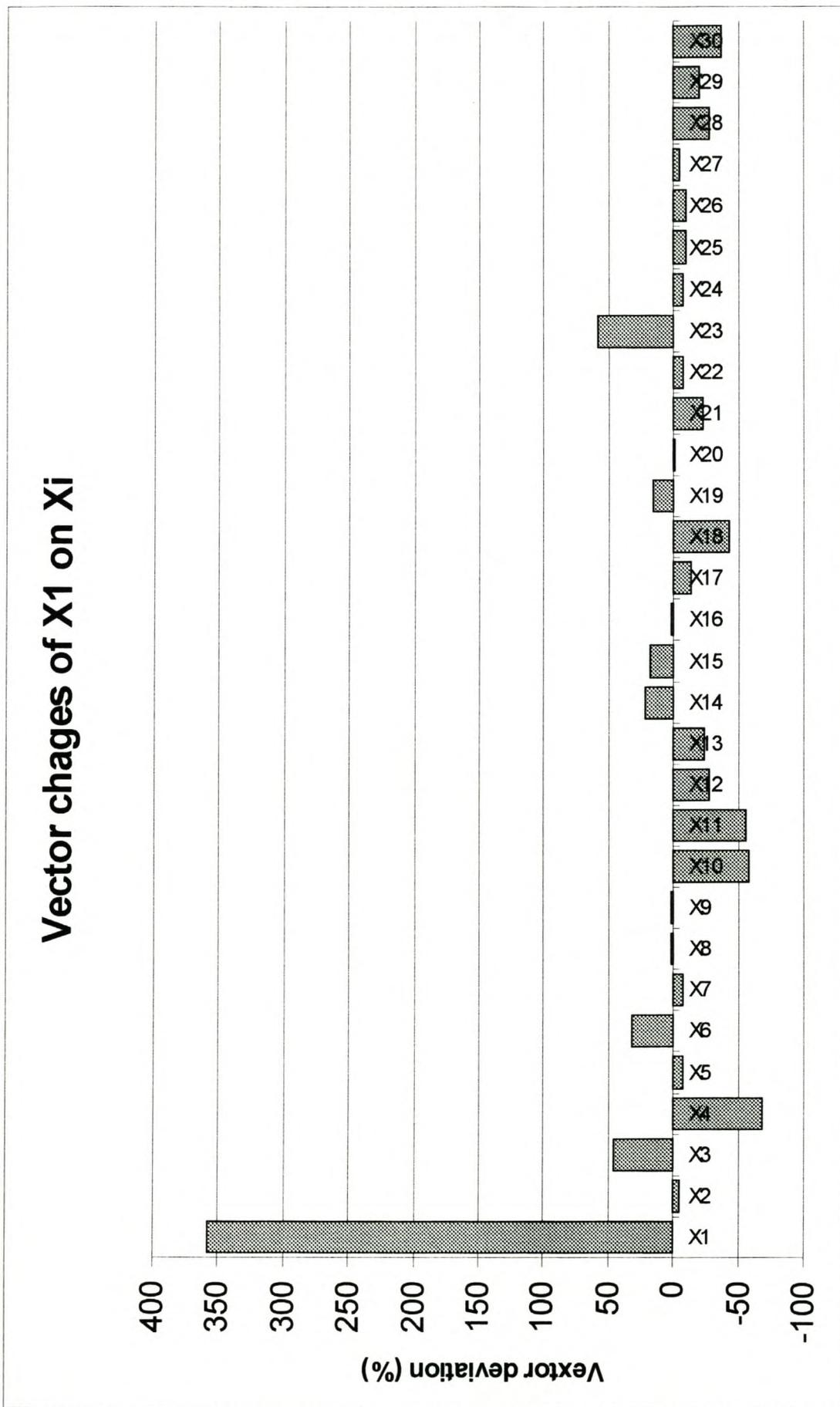


Figure 2.2: The vector values of X1 on X1 to X

## **CHAPTER 3**

### **SUMMARY AND CONCLUSION**

#### **3.1 TRANSACTION COST AS A BASIS FOR DECIDING ON MARKETING CHANNELS**

One of the basic assumptions of transaction cost economics is that if a transaction cost is too high a particular exchange will not take place. Exchanges take place within the context of a marketing channel. It is consequently plausible that a transaction cost associated with a particular marketing channel can have a major influence on the choice of marketing channel.

One way to test this assumption is to analyse the various transaction costs and industry specific vectors in relation to their weighted influence on the outcome. Transaction cost analyses (TCA) creates the paradigm within which transaction costs are analysed in relation to their influence on economic decisions. These decisions can be found anywhere, from simple marketing channel decisions in rural industries to vertical integration problems in mature complex industries.

#### **3.2 METHODOLOGICAL ISSUES IN MEASURING TRANSACTION COST**

One criticism of transaction cost economics is that its theoretical development has not been accompanied by successful measurement of transaction cost. Unlike physical production costs, transaction costs are not easy to separate from other managerial costs. Furthermore, the complex nature of institutions means that the costs of their operation are difficult to quantify.

The above mentioned has further implications in terms of data availability. For credible empirical analysis, transaction costs must be collected on a routine basis.

Transaction costs data are however not part of accounting or management practices. Thus primary data needs to be collected by researchers themselves.

Before data can be collected, two related questions need to be answered. Firstly what type of information should be collected and secondly how should the data be analysed.

Monetary valuations of some transaction costs are possible but in most cases it will prove difficult, if not impossible. The method used in this study to overcome the valuation problem is to use a ranking order. If we are therefore able to say, *ceteris paribus*, that a particular type of transaction cost is higher in situation A than in B, and that different individuals consistently specify the same ranking whenever the two situations are observed, then transaction costs are measurable.

### **3.3 METHOD OF DATA ANALYSIS**

The question of how the data will be analysed, is now of importance. It is argued in this study that transaction costs take place within a framework of dynamics. In such a framework a transaction cost variable is considered a vector. Vectors as per definition have both magnitude and direction. Analysis techniques that are linear in nature only measure the direction of these vectors and not their magnitude. The dynamic interaction of the system is thus ignored.

The analysis technique used in this study is the Non Linear Dynamic Model (NLDM). It is an incremental state model that was developed in Visual Basic 5, based on goal sorting and grouping orientation, to simulate the dynamic vector changes in the deterministic chaotic area.

This method puts the analyst in a position:

- To get more inference out of the data by increasing the degrees of freedom,
- To draw inferences based on the interactions between the data,
- To add complexity without sacrificing the original simplistic approach.

### 3.4 CONCLUSION

The first point of concern in the analysis was the vastness of the research area. This raised the question of how representative the data were even though the research sites were very carefully chosen. However through the technique of cross-referencing it was determined that the variables were stable across the research area. It was therefore possible to consider the data as representative.

It has been shown that transaction cost variables have a significant effect on the proportion of cattle sold to Meatco, and thus indirectly on the choice of marketing channels. To identify single variables that have the most significant influence is, however, difficult because of the interaction between variables.

Firstly the result that emerges with regular frequency is that farmers with larger herds are situated far from the Meatco buying points. They also prefer selling to Meatco even though they associate this marketing channel with high risk. It is also clear that where farmers have taken steps to mitigate these risks, sales to Meatco have increased.

The implication is that Meatco buying points are incorrectly located. As these locations are not fixed (i.e. they do not have high establishment costs) it is easy enough for Meatco to shift them. Possible recommendations that follow from the above conclusions are that: Meatco should move its operations closer to the larger farmers and focus on them as a group.

Secondly to identify a single variable that has the most significant influence on the choice of marketing channel is difficult because of the interaction between variables. The exception to this is variable X9 (price information cost), which has a four times greater influence on Y (proportion of cattle sold to Meatco) than the second most influential variable X8 (see Figure 2.1). Further, although X8 (price uncertainty Meatco), X12 (auction transport effort), X14 (frequency of Meatco sales) and X18 (risk of non sale) have high interactions with other variables, they all measure some type of information cost, and their highest interactions are

between themselves. It is therefore plausible to also include them as significantly influential. It can thus be stated that an important factor in the choice of marketing channel (especially the Meatco marketing channel) is price information cost. This supports the theory that transaction costs influences marketing channel choices.

Some type of information distribution can remedy information cost that has a significant influence on the amount of sales to Meatco. Examples of information circulation include radio broadcast, promotion through extension officers and poster advertisement. The information could include expected price data and the times and places of cattle sales.

Lastly the risk-associated cost of the alternate marketing channels has a notable effect on the percentage of sales to Meatco. The foremost of these is: the risk of extending credit, the availability of refrigeration at markets and the opportunity cost of giving discount to customers. It is therefore advisable in the interests of the farmers and consumers that, informal markets need to be reformed and upgraded (i.e. refrigeration facilities) to make it more accessible to small farmers.

### **3.5 FINAL REMARKS**

The title of this study focuses on the influence of transaction cost on marketing channel decisions. This may lead to some confusion, as the main body of the work seems to focus on the measurement of transaction cost.

However the question that is implied in the title can only be fully answered if the measurement of transaction cost is solved.

Furthermore a solution cannot only contain theoretical prose if there is no serious development of an empirical nature. Transaction cost economics may be considered as one of the most important and influential paradigms in economics of the twentieth century. Yet, without critical empirical development, transaction cost will largely remain in the theoretical realm of new institutional economics.

This study is not without fault and areas remain that need further study. In a general equilibrium modelling framework it is assumed that all individuals have the same information (i.e. that transaction costs are zero). It is further assumed that markets for all goods exist, including markets for future goods and all risks. Institutions are therefore ignored, except for markets and property rights. When these assumptions are relaxed dynamics are introduced in the system. The dynamics in the system can however not be successfully defined with linear techniques. It is in these areas that the application of non-linear techniques in economics shows promise.

The study has shown that it is possible to measure transaction costs on a case study basis in small industries. It will however also be of use in complex problems in larger industries. The use of primary data is however prohibitive, therefore as a tool in everyday economics it has its limits.

Transaction costs economics have often been criticised for the slow pace of empirical work relative to the theoretical development. This is largely due to the difficulty of applying linear techniques on dynamic systems. Non-linear techniques can be applied with great effect on such systems.

Finally, in an increasingly global economy the dynamic nature of trade and institutions will most probably create problems where non-linear techniques become a necessity.

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