The Impact of Alternative Vertical Coordination Mechanisms for the Development of Small Scale Farmers. A Case Study of Bindura District.

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Abstract:
The study sought to assess the impact of the alternative vertical coordination mechanisms for the development of small scale farmers. Zimbabwean government has put small scale farmers as an important key to fight against poverty, create more wealth through increasing productivity in the agricultural sector. The study used descriptive design, questionnaires were distributed to a sample of 50 small scale farmers. Data was analyzed using the multiple linear regression. The research found that the production of tomatoes under contract was associated with significantly higher incomes compared to those who sold on the spot markets or open marketing. Spot markets, while providing occasional high returns to farmers have in turn high price risks and risk of non-sale of products or loss of quality. Contract price were significantly higher than open market prices, but trading on the later involved extra transaction costs such as transport and accommodation. The main conclusion was that contract production and marketing was more profitable and effective than open marketing. The research recommended that government should facilitate the development of small scale horticulture sector through improving the road networks that link rural and urban areas. Access to capital should be improved, government should provide relevant information so that farmers can use timely information to make production and marketing decisions. Government to rehabilitate the national research institutions and link them with extension service, provide efficient markets and intellectual property rights protection through regulation and enforcement of contracts in the horticultural market to ensure sustainable development of small scale farmers.

Keywords*: Vertical coordination, Small scale farmers, Open marketing, Contract markets, Zimbabwe.*

Introduction

Vertical coordination is an important part of a competitive strategy and is defined broadly as various methods used to manage vertical stage in a marketing channel (Boland, 2002). We have three basic types of vertical coordination, open marketing, contract production, marketing and integration through cooperatives or public companies. Open marketing is the traditional method used by many producers to sell their commodities as price takers, especially in developing countries such as Zimbabwe.

The research is to focus on the impact of the alternative vertical coordination mechanisms for the development of small scale farmers. A case study of Bindura District for the period 2014 to 2015. The structure of horticulture marketing systems around the world is becoming more and more vertically integrated. The small scale farmers in Zimbabwe are now faced with options between producing fruits and vegetables under contract or for the traditional open market, because of inherent characteristics of agricultural products, high rate of perishability, high variability of quality and seasonality in production, coordination of production consumption is essential for improving economic performance of Zimbabwe's horticultural markets. Given these inherent characteristics, basic market conditions, change the structure of horticultural markets participants within the marketing system (farmers and consumers) are seeking information on the economic impacts of alternative marketing arrangements especially vertical coordination. Given the objectives of stable incomes, stable supply, profit maximization, small scale farmers are the most vulnerable participants in the marketing system.

Statement of the problem

The contract marketing and production refers to a firm committing to purchase a commodity from a producer at a price agreed in advance of the purchase. A contract between producers and processors is a form of vertical coordination. Contracts involve different levels of producer and processor responsibility. Contract farming has produced additional marketing alternatives for the small scale farmers, therefore, they can choose to sell on open or spot markets or to engage in contractual agreements with agricultural-business firms. It is therefore necessary to assess the impact of the alternative vertical coordination mechanisms for the development of small scale farmers.

Research objectives

The main purpose of this study was to assess the impact of the alternative vertical coordination mechanisms on the development of small scale farmers in Zimbabwe.

- To determine the feature of the small scale farmers in marketing system for horticultural crops, marketing channels and price discovery mechanisms.
- To analyze the relationship between the type of marketing arrangement and farmer's gross margin for tomato enterprise.
- To determine the nature of transaction costs associated with alternative vertical coordination mechanism.
- To make appropriate recommendations for the development of small scale farmers.

Literature review

The increased risk exposure of producers to price variation from supply and demand conditions and increased exposure to risk has likely led producers to further increase the use of contracts marketing. Producers also realize cash flow and tax advantages, as well as the ability to expand their operation. In principle, contacts are beneficial to both producers and buyers (e.g. risk reduction). In most cases, processors are the contractors; they formulate terms and offer those terms to producers an opportunity to reduce revenue risk by guaranteeing price. Processors exchange risk exposure or crop premiums for control over their inputs. Contracts add stability to market transactions through commitment and serve to minimize risks associated with unfavorable changes in market conditions. However, contracts also limit profit potential from favorable changes. (Boland, 2002). There are at least five parties that may be affected by a farm production contract agreement. These include the producer, processor, landlord, suppliers and lenders. Contracts may affect associated parties through changes in crop ownership, eligibility for crop insurance and farm programs, if contracts fail, liabilities and constraints of some parties (e.g. banking regulations), assumptions of risks, security interests and change in existing agreement (e.g. share cropping) contracts vary considerably by contractor and crop, and should be evaluated on an individual basis. There are two basic types of contracts, marketing contract and production contracts. Differences in the two type are: management responsibility, crop ownership, and provision of crop inputs. The possible changes within the contract are pricing, storage, transportation, and quality determination (Malik 2006). The appropriate contract for a given situation depends on the market structure. The more complex, differentiated product markets will benefit from higher levels coordination, examples of such markets are those that require extensive technology or capital investment for production, perishable products require special management skills and specific quality attributes, or emphasize product uniformity. On the order hand, non-differentiated commodity markets often function in nearly perfect competitive conditions. Firms in these markets are impacted by supply and demand conditions and will benefit little from higher levels of vertical coordination.

Marketing Contracts

Marketing contracts identify a buyer, seller, and product, it have two main provisions, quantity and price. Marketing contracts are used to set a price and market for a crop to be sold at a future date. Producers have a guaranteed of buyer and price for their production, but supply most or all crop inputs, retain ownership until the time of sale, and have sole management responsibility. Price is determined by current supply and demand conditions (Rukuni 2001).

Quality is also becoming more important in marketing contracts. Quality may be a specified provision of the contract or part of a pricing mechanism. There are a number of pricing mechanisms used in marketing contracts, some use a flat price, which is a single, specific price set at the time of contract. This is the only type of marketing contract that alleviates price risk. Many marketing contracts use a base price, determined from a cash market or futures exchange, plus or minus economic incentives for quality attributes, basis for storage and transportation, or a specific price spread. (Martinez and Reed 1996). A flat-price contract may set a price at planting period for a product to be sold at harvest time, because producer maintains ownership of the crop, therefore, the producer is responsible for transportation and storage costs. Examples of marketing contracts are delayed or advance-pricing mechanisms, futures market strategies and contracts to deliver to a processor or cooperative condition.

Production Contracts

Production contracts are divided into three parts, production inputs supplied by the contractor, quality and quantity, and compensation to producer for services provided. In addition to price risk, production contracts address crop loss and management efficiency. (Forster, 1996). Relative to marketing contracts, production contracts increased processor or buyer control. Processor also address crop loss and management risk in addition to price risk. Boland, Lusk, and Barton

(1998). To compensate for risk sharing, the producer portion of crop valve is often lower than in marketing contracts. Two types of production contracts can be identified, production- management contracts, and resource-providing contracts.

Production Management Contracts

In production-management contracts, processor participates in crop management, producers provide most of the inputs and retain title, but contracts may also provide some inputs such as seed and management assistance. In exchange, a processor or buyer agrees to purchase the entire crop and provide economic incentives for quality and quantity. These contracts are popular in field crops such as fruits and vegetables. Bailment contracts are an example of production-management contracting. Forster, (1996).

Resource providing contracts

Resource providing contracts are the highest vertical coordination level contracts. It involves the processor supplying most inputs for production and involvement in management practices. Producers often provide only land and labour. Personal service contracts are an example of resource – providing contracts, where processors supply chicks, feed, and management. Martinez, and Reed (1996).

Integration

Integration is a method of vertical coordination representing the greatest degree of control that a firm can gain over the output from another stage of production Boland, (2002). Coordination of two or more stages take place under common ownership and management. For example, farmers who produce maize and hay as feed for their daily operations are vertically integrated across the crop and livestock production stages.

Role of Agriculture in Economic Development

Agriculture plays an important role in rural development, is the progressive improvement in rural levels of living achieved primarily through increases in small-scale farmer's incomes, output and productivities (Todaro, 2003). The principal sources of agriculture progress and the basic conditions essential to its achievement are divided into the sources of smallholder agricultural progress and the conditions for general rural advancement (Thomas, 1992). Sources of smallholder or small scale agricultural progress includes: technological changes and innovation, appropriate government policies and supportive social institutions . Conditions for general rural advancement incudes; modernizing farm structures to meet raising food demands, creating effective support system and changing the rural environment to improve levels of living (Todaro, 2003). This means an agricultural development strategy requires at minimum, three basic elements; (1)accelerated output growth through technological, institutional and price incentives changes designed to raise the productivity of small-scale farmers, (2) raising domestic demand for agricultural output derived from an employment-oriented urban development strategy and (3) diversified, non- agricultural, labour-incentive rural development activities that directly and indirectly support and are supported by the farming community. The crucial role played by small scale farmers in agricultural production aims to achieve these sources and conditions necessary for rural and agricultural development (Malik, 2006).

Neo-classical development economists influenced most of the thinking about the contribution of agriculture to development; agriculture was seen largely as a declining sector that contributed labor, food and capital for the modernization of the industrial sector. The unit investment in the agricultural sector compared to the industrial sector yields much less linkages or multiplier effects implying less contribution to employment and general development of other upstream or downstream industries (Forster, 1996). Thus modeming the agricultural sector had no rationale basis. However, scholars like Mellor and Johnson listed five roles of agriculture in economic development, thus [a] supply of food for domestic consumption, [b]release of labor for industrial employment [c]enlargement of markets industrial goods [d]supply of savings and earnings of foreign exchange currency. Mellor and Johnson argue that the five roles of agriculture are equally important and pointed out the interdependence on the agricultural sector and the industrial sector. Because of movement of labor from the agricultural to the urban sector is an inevitable outcome of economic development, the agricultural sector not only has to produce enough food with less human capital but also efficient marketing institutions have to evolve to ensure distribution of goods and services.

The structural Adjustment Programs of 1990s recommended to developing countries such as Zimbabwe by the International Monetary Fund and World Bank were meant to reduce some of the structural rigidities that limited the development of agricultural sectors. Agricultural policies in developing countries tend to be biased towards increasing productivity of farmers without much emphasis on improving the distribution systems of produced food. Almost three quarters of the population in many developing countries derive their incomes from agriculture, thus for any development strategy to make the most impact. It has to start with addressing the problems that curtail the development of agriculture.

Role of Marketing in Economic Development

The concept of a market like most economic processes is still in evolution with on single agreed upon definition. Traditional neo-classical economists defines markets as Institutions within which Adam Smiths "invisible hand" efficiently directs rational individual behavior leading to Pareto optimal allocation of resources. Economists view market as an area where raw agricultural products from the farm are transformed into food purchased by consumer. Physical exchange of the raw materials and transformed products and services occur due to the interaction of buyers and sellers and prices are discovered. Underlying these arenas of exchange is the law of one Price [LOOP] that states that under conditions of competition the price of a homogenous product maintains equilibrium given time, place and form utilities. LOOP applies even where markets exhibit a high degree of concentration as long as entry and exit is costless and frictionless. If a firm practices price discrimination, spatial arbitrage will take place until that market attains an equilibrium. The process of coordination goods and services within the system from production and consumption is called marketing (Boland, 2002).

The business community views a market as a group of potential customers who share a particular want and are willing to engage in exchange to satisfy that want. Underlying this paradigm is the concept of marketing management where the firm plans and executes the choice of product, price, place and promotion to create exchanges that satisfy consumer wants and the firm maximizes its profits. Other goals of the firm may be increasing market share and increasing good will or reputation, Kotler [1991]

Using the economic definition of a market, we understand that the market helps us answer questions relating to what to produce, how much to produce, how to produce and how to distribute what has been produced (Todaro, 2003). Other processes involved in marketing include storage, transportation and processing of raw commodities. Therefore, marketing is a series of sequential actions and require some coordination to ensure orderly movement of products from one stage to the next one.

Marketing plays four important roles in promoting development of the food systems, equitable income distribution, economic growth, improved nutrition and food security. Marketing contributes directly to economic growth, income distribution and improved nutrition because it is the source of many productive activities that incorporate many jobs.

Conceptualising Vertical Relationships In Horticultural Markets

The justification of the frameworks used in this study could be supported by (Boland, 2002) which clearly outlined the distinguishing characteristics of horticultural crops that influence the structure of their marketing system, perishability, large price variations, storage limitations, seasonably of production, high variability in quality, bulkiness and geographic specialization. Perishability of horticultural crops limit their marketing time as fresh products such that some form of coordination is needed to ensure timely transfer from producers to consumers. Also closer coordination of production and consumption helps to reduce past harvest losses.

Moreover prices of horticultural crops tend to be volatile compared to other crops. Most horticultural crops are bulky and need careful post harvest handling to preserve quality. Seasonality in production combined with limited storage results in shortages and gluts that cause prices to respond accordingly. Because the final consumer demands different quality, the marketing system should be responsive to these varied needs through coordination of production.

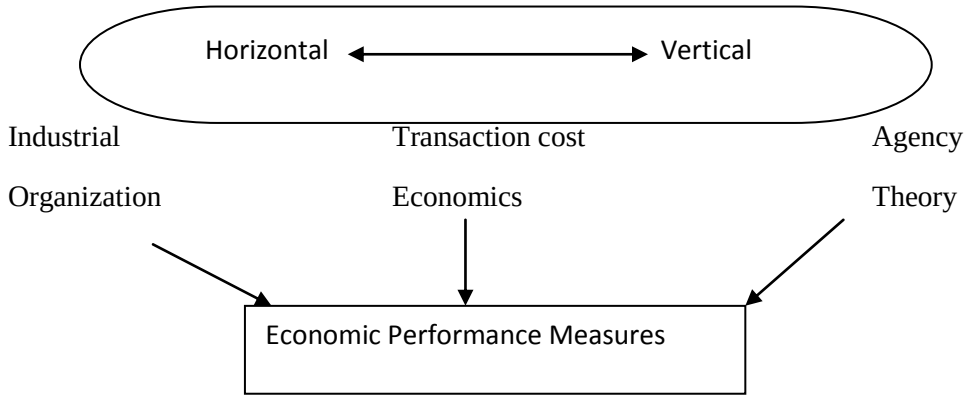
Thus with the characteristics above it is appropriate to discuss the meaning of vertical coordination and the various forms it takes in the agricultural sector. Vertical coordination is thus defined by (Martinez, 1996) as activities employed to harmonize stages of production and marketing. A market that is coordinated well results in economic efficiency while a poorly coordinated one represents a market failure.

Marketing chain participants utilize many ways to get final products to consumers. One or a combination of the following coordination mechanisms maybe used, direct marketing, cooperative bargaining, contracting and franchising and joint venture arrangements, strategic alliances and vertical integration.

Direct (spot) marketing occurs when buyer and sellers exchange goods on markets without any prior arrangements between them. Interaction of buyers and sellers is impersonal and chances that they may do business together again are limited. Contracting is an institutional arrangement where a buyer makes an arrangement with a supplier on timing of production or delivery, price, production practices and so forth. Thus the purpose of this study is to dwell into the depth of the two (contract and contracting).

Economic theory for analyzing vertical coordination of markets stressed the importance of understanding the market-specific causes of non competitive behavior, it noted the relationship between "market power and the price policy" and hints at how the degree of industry concentration is correlated with non competitive behavior. The theory of vertical coordination has two distinct branches of economics, transaction cost economics (TCE) and agency theory.

Fig 1 Conceptual Frameworks



Source: Primary Data 2015

The interaction of these factors affects the conduct of agents resulting in some measurable economic performance. Proxies that are often used to measure performance are quantity produced, price levels, profits, efficiency, employment equity, economic welfare and progressiveness. Aspects of conduct that are studied include collision, pricing and product strategies, innovation, advertising and legal tactics adopted by firms to influence the structure of the market and also their performance.

Table 1: Traditional Industrial Organization Framework

Structure →	Conduct →	Economic Performance
• Number of buyers and sellers in the industry • Their size distribution • Degree of product differentiation • Ease of Entry	• Behavior of economic agents • Collusion pricing and product strategy Innovation Advertising Legal tactics	Proxies often used to measure economic performance are; • Market prices • Quantities sold • Economic welfare • Employment • Efficiency

Source: Primary data (2015)

Empirical applications of the industrial organization (IO) framework in analyzing the conduct of manufacturing industries

resulted in the evolution of anti trust laws in US and popularized a branch of economics now known as law and economics.

Despite the widespread use of IO framework, it has several shortcomings. Critics often site that the model primarily measures performance of the horizontal levels of the market ignoring the effects of interrelationships between firms of different levels of the market chain. Secondly, the IO model does not address how firms deal with uncertainty (Kotler, 1991). Another paramount theoretical contribution that countered the industrial organization, model was the theory of contestable markets that was introduced by (Baumol,1982). He argues that firms would not employ non-competitive strategies when barriers to entry are low because of threats of new entrants.

The industrial organization framework is used to study the structure of smallholder horticulture markets and the conduct of market participants. According to (Kimenye,1993) a multiple linear regression model is estimated to evaluate the effect of choice of vertical coordination mechanisms on economic performance agents. The model evaluates the effect on gross margins of variables such as age of the farmer, their level of expertise in crop enterprise, the firm size, choice of vertical coordination mechanisms, etc.

$GM/HA = \alpha + \beta 1\ Area + \beta 2\ Age + \beta 3 Exp + \beta 4 Educ + \beta 5\ Acc\ Trans + \beta 6\ Weather + \beta 7\ Season$

Description of Model Variables

GM/HA	=	gross margin per hectare
Area	=	area planted
Age	=	age of farmer
Exp	=	experience growing tomatoes
Educ	=	level of education
Acc trans	=	access to transport
Weather	=	weather
Season	=	season

Transaction Cost Economics in the study of Vertical Relationships

The concept of transaction costs into economic literature was first introduced by(Coase, 1937) through "The Nature of the firm" article. He sought to understand the validity of the neo-classical approach that conceptualized the firm as a production function with prices coordinating the economic system. He argued that firms exist because of costs associated with using the price mechanism, specifically the challenge of discovering prices. Transaction Cost Economics (TCE) has emerged as a branch of economic theory that relates the costs associated with organization alternatives thus the approach when studying economic organization typically regards a business firm as a governance structure rather than production function.

The production function approach assumes that most importantly those products are homogenous and economic agents have equal access to information regarding all aspect of exchange. Contrarily TCE analyses the hierarchy of organizational structures of firms in the light of transactional costs because, if these were absent it would be useless to organize the economic activities. One mode of organization would have no advantage over the other. Kenneth Arrow (1969) defines transaction costs as costs associated with running an economic system, that is, costs of carrying out an exchange of goods and services. Three types of costs corresponding to the phases of exchange exist; search and information costs, bargaining and decision costs, policing and decision costs (Dahmlman, 1992). In order to carry out an exchange, it is necessary to find information about potential exchange partners, prices and quality of products, negotiate terms of exchange and monitor compliance.

Most of the criticism can be summarized in (Fisher,1998) observed that, "transaction costs have a well deserved bad

name as a theoretical device because solutions to problems involving transaction costs are often sensitive to be assumed from the costs, and because there is a suspicion that almost anything can be rationalized by invoking suitably specified transaction costs. This ambiguity in the use of term is reflected by the way most proponents think about it, for instance Williamson, fail or deliberately avoid defining the term Hodgson (1998).

Agency Theory in the Study of Vertical Relationships

The last theoretical framework used to analyze vertical relationships in markets for horticultural crops is Agency theory. Agency theory has been applied to empirical research on contracting because it gives a framework for analyzing the dynamics of contract designing under conditions of limited and or asymmetrical held information. The essence of the Agents theory is about the trade off between the cost of measuring behavior and the cost of measuring the outcomes and transferring risk from principal and agent. The framework, therefore, studies the nature of vertical relationships and evaluates outcomes.

Two branches of Agents theory are recognized, the positivists theory and the principal agents theory. The unit of analysis for both branches as a contract between the principal and an agent. However, the two differ in their formal treatment of this unit of analysis. The positivist branch is more descriptive and more concerned with governance mechanisms of contracts. The principal agent approach develops models under a variety of quantitative models under a variety of quantitative variables and defines the contracting optimum solutions. The current study uses the positive instrument that is depicted in Table 1

Table 2 Agency Theory and TCE: Analytical Framework

Focus	First Step Production (Assets)	Second Step Exchange (transactions)
Objectives	Understand the layout stages of the industry chain. Understand the emergence of Authority of relations Determine the strategic objectives of the coordination process	Analyze the control exchange mechanisms Describes agent's problems Adverse selection Moral hazard Analyze the incentive The incentive problems
Variables	Technological variables Asset specifically of agents of the coalition versus the competitive environment	Transaction Characteristics Uncertainity Tasks programmability and separatability

Source: Primary data (2015)

The agency theory analytical framework is in two steps. First, one has to understand the layout stages as well as emergence of authority relations. In addition, strategic objectives of coordination process should be determined. Secondly, is the analysis of control and exchange mechanisms by critically assessing agency problems such as adverse selection, moral hazard, asset specificity, and incomplete contracts.

Moral hazard refers to situations where economic agents maximize their own utility to the detriments of others knowing that they do not bear the full cost of their actions due to uncertainity and incomplete contracts. For instance, a principal or agent may choose not to apply with the contract rules where no legal structure is present to resolve associated conflicts in a timely manner. In most cases, legal costs may be too high to warrant recourse to the law such that parties may get away with opportunistic behavior.

Adverse selection is a state of information asymmetry resulting in equilibrium where the quality is dominated by low quality goods. Placing good quality products on top of containers concealing the bad ones is one example which often happens when it is too costly to check the individual product quality. Of great concern to most development economists is the effect of asset specificity and idiosyncratic investments. Investment in capital assets that cannot be converted easily to other uses often locks up parties in contract together for long periods, limiting flexibility in resource allocation, a case in point is relational contracting.

Designing contracts that are inclusive of all relevant matters is almost impossible, and expensive. Most, contacts, therefore, are typically incomplete leaving room for parties to interpret the ambiguities to their own advantage. Understanding the consequences of incomplete contacts is one of the challenges facing scholars of the new institutional economics.

RESEARCH METHODOLOGY

The descriptive survey method was used on a population of 100 small scale framers. A sample of 50 small scale farmers was randomly selected. The data collection was through questionnaires, and personal interviews. Data was analyzed using the multiple linear regression.

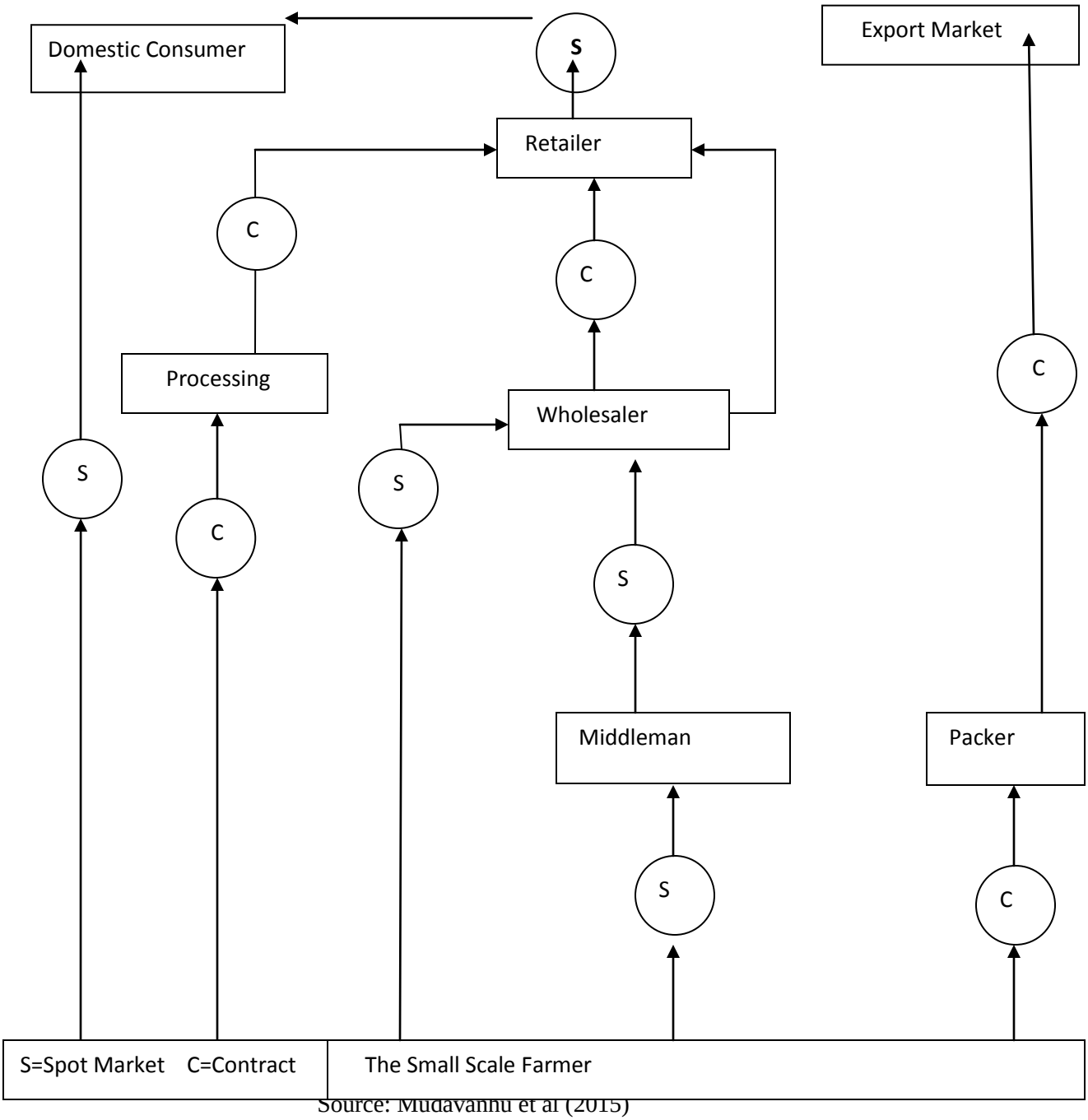
Economic Perfomance Of Farmers Using Alternative Vertical Coordination Mechanisms

Marketing Channels and Price Discovery Institutions Used by Smallholder Farmers in Zimbabwe

Mabaya(1998) divided horticultural markets in Zimbabwe into formal and informal market. The formal market is comprised of large, privately owned wholesale firms, processing firms, packers, restaurants, grocery shops, boarding schools and government institutions while the informal market consists of rural assembly markets and urban street markets. Of significance to the smallholder farmer is the informal market and the domestic formal market since large scale commercial farmers almost exclusively use the export market. Typically, export crops tend to be capital intensive limiting the extent to which individual smallholder farmers could participate. The intricate channels and associated institutional arrangements through which horticulture products flow from the rural farm gate to the consumer are shown in Figure 2 Most smallholder farmers sell directly to the consumer, to middlemen, to urban retailers or to wholesalers on spot markets.

The opportunity that is becoming increasingly available to smallholder farmers is to produce horticultural crops whose type, quality and quantity are predetermined according to consumer demand. In this type of trade, the smallholder farmer is contracted to produce products for processing plants. The current study compares the economic performance of farmers producing a traditional crop (tomato) for the domestic spot market or open marketing and those producing under contract to supply a local processing firm.

Fig 2 Marketing Channels and Associated Institutional Arrangements Faced by small-scale farmers in Zimbabwe.



Source: Mudavanhu et al (2015)

Contract farming in Zimbabwe is associated with irrigation schemes. As a result, irrigation schemes formed the main sampling frame, a list of irrigation schemes that have a history of contract farming was collected from the national agricultural extension head office in Harare. Chakona -Munganirwa irrigation scheme was randomly selected from the tailored list. The scheme is the oldest irrigation scheme where farmers have the most experience with contract farming. Secondly, farmers at this scheme make individual decision to select type of marketing arrangements for their horticultural crops. In fact, every season, they have a choice between growing tomatoes under contract for Cairns Foods Inc. or selling on spot markets in surrounding areas.

Irrigation schemes are state sponsored facilities meant to benefit communal farmers. Zimbabwe has a total of 82 developed schemes, 70 of which are operational, (Rukuni, 1994). Operational irrigation scheme occupy an estimated

4775hectares sustaining about 7900families throughout the country.

Chakona -Munganirwa irrigation scheme

Chakona -Munganirwa irrigation scheme is located in Ward 14 Muchapondwa, Bindura District. The village is under chief Musana and the local village head (Sabhuku) is Ishmile Muunganirwa. The village has a population of 463 people in 105 households. Muunganirwa Fish and Horticulure cooparative has 70 members, 28 from Chakona village and 42 members from Muunganirwa, 40 male and 30 female. The cooperator has a total area of about 26 hectares where they practice fishery projects and horticulture, growing cucumbers, peanuts, potatoes, tomatoes, beans and other vegetables. The abundant spring water in the area is used for irrigation of crops and the fish project. In 2006 the cooperative entered the Zimbabwe Plough Conservation competition coordinated by the Environmental Management Agency (EMA). They became district winners, provincial winners and 5th in the national competition.

The history of irrigation in communal areas dates to 1912 when missionaries helped farmers construct and operate their own projects. Government intervention began in 1928 and government helped farmers to develop small-irrigated plots (about one hectare) and supplied extension and other support services. Most of the effort went into developing schemes that had been established by missionaries. Schemes were believed to reduce famine during drought periods. The management had decision making remained in the individual farmers' domain. Established in 1935, Nyanyadzi was the first scheme in communal areas managed by the state. The state emphasized the production of cash crops such as wheat, beans and sun hemp. Proceeds from the sale of cash crops would be used to purchase the staple maize and sorghum. This strategy was unpopular with farmers because the cash crops had no guaranteed market and farmers were unfamiliar with buying staple crops.

Table 4 : Structure of Chakona -Munganirwa irrigation scheme

Factor	Numbers
Population of community	463
Number of members	70
Male	40
Female	30
Size	26 hectares

Source: Primary data (2015)

Major enterprises are tomatoes and beans. Market outlets for tomatoes are; the Mutare based processing firm, Cairns Foods Inc, and Bindura and vegetable wholesale markets. Cairns Foods Inc. subcontracts farmers to produce tomatoes throughout the year. Unlike other farmers Muunganirwa farmers have access to water for irrigation that is imperative for horticultural crop production all year round. As a result Cairns has had a long history, more than twenty years of contracting with farmers in Zimbabwe. Activities at Bindura and Muunganirwa vegetables wholesale markets are characterized by spot transactions between large groups of farmers and wholesalers and retailers. Relationships between buyers and sellers are often a one day affair or at most short term and there are no predefined obligations. The scheme, with its 26hectares of total irrigated land, has about 70 farmers. A random number was applied to select 50 farmers. However, during the interview some farmers turned out not to be involved in the particular enterprise that the study was directly addressing so these surveys were dropped from the final model estimation.

Data for two consecutive production seasons (October to December 2014 and January to March 2015) were collected to evaluate the performance of farmers using alternative marketing channels. Most of the data was transcribed from the farmers' personal records. In cases where records were absent farmers were asked to recall the respective figure that was then weighted by total sample averages. Observations for the two respective years are pooled together for the estimation of the model. The next section gives a summary description of the variables of the model.

Description of Model Variables

Recall that the theoretical model shown in equation 1 was as follows:

GM/HA=α+β1AREA+β2AGE+β3EXP+β4EDUC+β5AccTRANS+β6AccEXT+β7AccTI+

β8MCc +β9MCs + β10GoodTy +β11Weather + β12Season +ε

(Equation 1)

Equation 1 was modified to suite the environment from which the data came. First the variable describing the type of goods in question, was dropped because the empirical research focused on a single perishable good (tomato). Secondly, the variable for weather, "Weather", was omitted because all respondents came from the same agro-ecological zones and therefore experienced the same weather patterns. Further, the data were taken from an irrigation scheme where every farmer has access to water for agricultural purposes all year round. Also the dummy variables for access to transport (AccTRANS), information (AccTI), and extension (AccEXT) were omitted because these showed little variability across all respondents. As a result the empirical model estimated is shown in equation 2.

GM/HA = α+β1 AREA + β2AGE + β3 EXP + β4EDUC + β5MCc + β6MCs + β7Season + ε

(Equation 2)

The section gives an in-depth analysis of the model variables and gives the reasons why they were included. The dependent variable is described, followed by the independent variables.

The Dependent Variable

The dependent variable used in the multiple regression model is Gross Margin per Hectare (GM/HA). This variable is calculated as follows

GM/HA = {TR – TVC}

Where:

TR = {Q*P}

TVC + {∑ (Land, Seed, Chemicals, Fertilizer, Labour, Transport, Marketing Costs)}

First, only variable costs were calculated because costs of fixed assets and their depreciation rates were difficult to ascertain. In the smallholder sector, land is owned communally, therefore, it cannot be sold. As a result one cannot put a figure on the market value of land. Other fixed inputs such as irrigation facilities are purchased and maintained by the state. These costs were not included in the analysis but this does not affect the outcome of the analysis because none of the farmers incurred these costs.

The variable costs that were included in the analysis were, land preparation, seed, chemicals, fertilizer, labour, transport and marketing costs. Land preparation costs were the costs of ploughing the area that was under tomato. Generally, each season has a uniform prevailing rate for ploughing. Data on total amount of money spent on tomato seed, insecticides, herbicides, fertilizer were transcribed from farm records. In terms of labour only hired labour was accounted because generally family labour is not viewed as a cost in agricultural production systems. Also because of the nature of horticultural production systems, farmers tend not to work in the field for a full day or extended periods. Attempts to collect data on family labour hour were futile. It was concluded that family labour hours for horticultural crops are best recorded continuously during a production season rather use recall data. The costs of transportation were divided into two sources. The first was the individuals' round trip bus fare. The second was the cost of transporting products. Generally, buses and trucks charge the same amount per unit of produce for a standard distance. These costs were easily computed since were per unit costs times the number of boxes transported. Lastly, marketing costs were costs of renting a stall at the market place, the cost of accommodation and the costs of food during the marketing process. Total figures were obtained

using the following formula:

$$TR = \{Q*p\}$$

Were "Q" was the total harvested quantity and "P" price obtained. The price figure was easy for those farmers who produced under contract because the contracting firm paid a uniform price regardless of product quality. One would think that collecting price data would be more problematic for the spot market. On the contrary, farmers do know what income they get. Therefore, in some cases prices data was obtained by the following formula:

$$Y/Q$$

where: Y = Total income Q = Total quantity marketed

These prices were validated by comparing them with the average weekly prices that are published by the commercial farmers' union "The Farmer" magazine. In cases where a price observation was an outliner, the commercial farmers' union price was used to calculate total revenue value.

In this analysis, profit maximization behavior is assumed. The advantage of using this proxy is that it is fairly easy to measure and it can be compared across groups of people over time and space and the unit of measurement (us $) has no ambiguity across the country.

The Independent Variables

A total of eleven variables were explored to evaluate their effect on gross margins per hectare (GA/HA) of tomato enterprises; Area, Age, Experience, Level of Education, Marketing arrangement used, and Season. Each variable is defined and operationalized as follows:

Area: This variable was simply total amount of land per farm under tomato cultivation for each growing season. The unit of measurement was hectare. The aim was to measure if size enterprise was positively related to viability. There was no sign of expected priori. Economies of scale in horticulture farms in Zimbabwe are not known. Further, most farmers on the scheme are small scale and therefore scale economies are not likely to enter the analysis.

Age: This variable was simply the age of the farmers. The aim was to measure if age was positively related to viability. There was an expected priori especially with communal farmers as their ages influenced the total output as they have perfect knowledge and experience of necessary requirements and post that are in area.

Education: This variable was simply the level of qualifications of the farmers. The aim was to measure if agricultural qualifications had a positive relation to viability. Most farmers on the scheme had no any formal qualifications. Therefore there was a sign of expected priori. As those qualified were expected to produce tomatoes of high quality, with a higher output.

Season: This variable was simply the seasonality of the area understudy. The aim was to measure if there seasons when output was positively related to viability. There was no sign of expected priori as the seasons affected all farmers in the area .

Use of contract: This variable was simply a measure to note if producing for a contracted firm had any positive relation to output and quality than those selling their tomatoes on the spot market.

More Reflections on Transaction Costs Economics Theory

Instead of studying the firm as an economic entity, Williamson (1979, 1985), considers transactions as a basic unit of analysis. Under behavioral assumption of opportunity and bounded rationality of economic agents, transaction costs economic theory asserts that institutional of economic organizations have a transaction cost origin. That is, by knowing the significant dimensions of transactions, we can predict the likely governance structures that will emerge.

Empirical results from the current study as well as from Kimenye (1994) support the transaction cost economic theory.

Data from the current study were collected from an irrigation scheme where farmers have equal access to production inputs. Data analysis showed that farmers at Muunganirwa irrigation scheme have equal access to land, water, agricultural extension advice, transport facilities, seed, fertilizer, and agro-chemicals. Participation in contracts does not result in increased productivity levels among farmers. However, this conclusion may be different for farmers who are not at irrigation schemes. For these farmers, productivity levels may vary depending on the level of access to productive inputs such as land, water, extension advice, transport and seed.

In the case of Muunganirwa farmers, the determining factor for economic performance boils down to the levels of transaction costs that one incurs during the marketing process. Contracting was associated with far less transaction costs than marketing on spot markets. Mechanisms that reduce transaction costs will improve the general economic performance of this marketing system.

Econometric results show that contracting with Cairns foods inc. was positively associated with high incomes. Product prices and transaction costs were higher on spot markets than on contract. A great deal of planning is needed to capitalize on certain market windows on spot markets. The biological nature of tomatoes limits the extent to which farmers can time markets since the crop is highly susceptible to frost damage and insect infestation. Therefore, there should be a deliberate effort to coordinate production with consumer demand.

Conclusions

The study found out that vertical coordination is a mechanism for enhancing farm income. Contract marketing reduce average production costs and lead to greater returns and less risk relative to open marketing. The research also found out that most of the small-scale farmers lack information on the benefits of contract marketing. The small – scale farmers also face the problems of financial and transport facilities. The study also found out that the small-scale farmers in Muunganirwa village benefits from the irrigation scheme, this should be extended to all villagers for the sustainable development.

The study recommended that government should improve the road networks that link rural and urban areas, this will help to create a relatively level playing field for all farmers. Government should empower small scale farmers through training and provision of appropriate technologies, land ownership, financial support, relevant information for farmers to make production and marketing decisions. Research is an area that is lagging behind in the agricultural sector in Zimbabwe, government should rehabilitate the national research institutions and link them with the extension service. Processing firms should take advantage of small scale farmers, as they have an inherent capacity to produce better quality horticultural crops. In the contractual arrangements, it is important for farmers to consult their extension workers and understand their obligations before they limit their resources. Government should initiate small scale farmers social and economic welfare projects to facilitate their vital role in agricultural and rural development for the benefit of the nation as a whole. Irrigation schemes, should be provided to other villages for the sustainable development.

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