

Comparative analysis of corporate strategies in agriculture: The internationalisation of agribusinesses in Sub-Saharan Africa

By

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DECLARATION

I declare that the thesis, which I hereby submit for the degree PhD Agricultural Economics at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

SIGNATURE:

DATE:

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ABSTRACT

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Between 75% and 90% of the world market for agricultural commodities is controlled by four major agribusiness multinationals (MNCs), namely Archer Daniels Midland (ADM), Bunge, Cargill and Louis Dreyfus Company (the ‘ABCD’ firms). The activities of the ABCD firms typically involve extensive cross-border trade and investment, which define internationalisation at a grand scale. The similarities in strategy and approaches of ABCD firms from an internationalisation perspective can be interpreted as a “convergence in practice” in the global agro-food system. However, the virtual absence of the ABCD firms in sub-Saharan Africa means that the continent remains the last frontier of global agro-food system convergence. In this sense, emerging agribusiness MNCs in sub-Saharan Africa represent a harbinger of global convergence in the continent’s agro-food sector. Yet there is limited understanding of the activities, strategies and approaches of these agribusiness MNCs.

The objective of the study is to unpack agro-food system convergence within the context of agribusiness internationalization in sub-Saharan Africa. This task is achieved in four ways. First, the study shows evidence of convergence in sub-Saharan Africa through a trend analysis of four agribusiness MNCs within the continent. The analysis identifies similarities in strategy and approach between agribusiness MNCs in sub-Saharan Africa and ABCD firms. Second, the study assesses the cross-border market entry behavior of 67 agribusiness firms in the continent, including the four aforementioned firms that were used to illustrate evidence of convergence. Third, the study assesses the transboundary alliance behavior of 10 firms drawn from the same sample to show evidence of “corporate clustering” or cluster convergence.

Fourth, the study takes a closer look into firm-level behavior through a specific case study of an internationalising agribusiness MNC in Zambia to show evidence of supplier convergence.

Several research methods were used to analyse the various dimensions of convergence, all of which were examined within the framework agribusiness internationalisation. These methods include trend analyses to identify strategies and approaches, a multinomial logit model to assess cross-border entry strategies, game theory to assess the likelihood of transboundary strategic alliances and cluster convergence, and system dynamics modelling to analyse value chain integration and supplier convergence. The respective research methods were applied to a variable number of agribusiness firms which were drawn from the same sample.

The study found evidence of convergence – defined by a gravitation of the agro-food system towards fewer large-sized agribusiness MNCs – which is being driven by two growth phenomena, namely, growth through value chain integration and growth through strategic alliances. The study identified these two types of convergence as follows:

- a) Supplier (σ) convergence, which occurs when firms seek to gain competitive advantage in new markets by internalising critical but non-core value chain functions; and
- b) Cluster (β) convergence, which occurs when agribusiness MNCs leverage complementary assets of other competing firms and use collaborative advantage as a means to gain competitive advantage in new markets.

The analysis predicts that there will be “a collapse of the middle”, which is defined by a gradual disappearance of agribusiness firms with an annual turnover ranging between US\$160 million and US\$996 million per annum, most of whom will enter into strategic alliances. Such strategic alliances are leading to a formation of large clusters that will likely morph into multi-billion-dollar agribusiness firms. It is entirely possible that these mega-agribusiness MNCs can ultimately be acquired by the powerful quartet of ABCD firms once the sub-Saharan African market matures, a phenomenon that will complete the final phase of global agro-food convergence.

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LIST OF ACRONYMS

AIM	Alternative Investment Markets
BFAP	Bureau for Food and Agricultural Policy
BLM	Binary Logit Model
CLD	Causal Loop Diagram
DRTS	Diminishing Returns to Scale
ETC	Export Trading Company
ETG	Export Trading Group
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
IAD	Institutional Analysis and Development
IIA	Independence of Irrelevant Alternatives
IJV	International Joint Venture
IMF	International Monetary Fund
LDC	Louis Dreyfus Company
LSE	London Stock Exchange
MLM	Multinomial Logit Model
MNC	Multinational Corporations
M & A	Mergers and Acquisitions
NWK	Noord Wes Kooperasie
NYSE	New York Stock Exchange
PCA	Principal Component Analysis
Pty	Proprietary
SDM	System Dynamics Model
TCT	Transaction Cost Theory
JV	Joint Venture
UNIDO	United Nations Industrial Development Organization
WOS	Wholly Owned Subsidiary

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Over the past decade, scholars have observed changes occurring in the agricultural sector in sub-Saharan Africa. Felgenhauer and Labella (2008), for example observed that large “African” agro-food companies are moving beyond national geographic markets, and in the process, challenging leading global multinational corporations (MNCs) in some instances, or seeking cooperation with them in others. This phenomenon was initially identified in the early to mid-2000s through the “supermarket phenomenon”, which was described within the context of a rapid process of international expansion of supermarkets (Reardon & Gulati, 2008). In the latter part of the 2000s, particularly in the aftermath of the 2008 food price crisis, the internationalisation process was identified more so, through cross-border acquisitions of large-scale farms (Anseeuw, 2012). Ducastel and Anseeuw (2014) argued that the more recent changes in the agricultural sector had been underpinned by the emergence of “new players” (such as investment funds and engineering firms – and acting as new avenues of agricultural finance and applied technology) who have contributed to increasing levels of vertical integration in commodity value chains.

In sub-Saharan Africa, the internationalisation of agribusinesses has not been readily explained by extant theory. Part of the reason is that much of the internationalisation theory has been crafted for, and adapted to suit, developed market contexts. Sub-Saharan African agro-food markets are under-developed compared to other parts of the world – and they are domicile to inadequate commercial and physical infrastructure, policy and political instability, inadequate legal frameworks and weak institutions, centrally controlled currencies, and a generally pervasive role of governments in markets. Sunje and Çivi (2015) argued that such conditions challenge the validity of existing internationalisation theory, and call for a broader conceptual framework of internationalisation in emerging markets.

Yet in its embodiment of “developing market conditions”, sub-Saharan Africa is diverse. For example, the continent consists of a combination of low- and middle-income countries, the latter of whom are an exception. A case in point is South Africa, whose agricultural market conditions are distinct from those within the rest of sub-Saharan Africa. Two aspects of South Africa’s economic character are worth mentioning in this regard. First, South Africa is the only “Newly Industrialised Country” (NIC) in sub-Saharan Africa due to the country’s deeper and more advanced manufacturing and financial sectors, more developed infrastructure and greater levels of economic development (Kuepper, 2016). Secondly, South Africa is the only country in sub-Saharan Africa with a fully-fledged “futures market” for agricultural commodities. Against the backdrop of South Africa’s peculiar characteristics in sub-Saharan Africa, analysts have found evidence to suggest that South African-based agribusiness MNCs have, in recent times, begun to follow the global trend of intensified vertical integration and consolidation (African Centre for Biosafety (ACB), 2013; Ernst & Young, 2014; Hamman, 2014). As an under-current of these broader processes of internationalisation, Anseeuw and Ducastel (2012) argued that South Africa’s integration into global agro-food and financial markets has led to some degree of financial deepening in the agricultural sector.

From an internationalisation perspective, cross-border investments in agriculture can be interpreted within the sphere of convergence given the tendency of agribusiness firms to assume higher levels of vertical integration and greater levels of consolidation of value chains. However, one could argue that convergence is still in its infancy in sub-Saharan Africa given that the degree of vertical integration and consolidation of agribusiness MNCs remains debatable, within both South Africa and the rest of the sub-continent. This study by no means trivialises the heterogeneity of sub-Saharan Africa’s agribusiness MNCs. Rather, the study seeks to deconstruct convergence within the context of the internationalisation of agribusiness MNCs in sub-Saharan Africa through an integrated theoretical framework that is based on fundamental economic incentives that seem to shape it.

1.2 PROBLEM STATEMENT

Between 75% and 90% of the world market for agricultural commodities is controlled by four major agribusiness multinationals (MNCs), namely Archer Daniels Midland (ADM), Bunge, Cargill and Louis Dreyfus Company (the ‘ABCD’ firms) (Murphy, Burch & Clapp, 2012;

Pirrong, 2015a). The collective market share of the ABCD firms means that they have a significant influence over the agro-food system in terms of its structural shape and form. On the basis of anecdotal evidence, one can argue that the commonality in strategies and practices of ABCD firms (Murphy et al., 2012; Pirrong, 2015a) exhibit a tendency of convergence, despite the underlying diversity of the firms' management and corporate structures.

A key limitation to our broader understanding of market and industry convergence is the general paucity in literature in relation its application to the agro-food sector (Bornkessel, Bröringb & Omtac, 2016). Moreover, assessments of strategies and practices usually omit "less large" emerging agribusiness MNCs from sub-Saharan Africa because the sub-continent is deemed to be relatively small when viewed in the global context (Craven, 2016). However, the value of sub-Saharan Africa's agribusiness sector is projected to treble and reach US\$1 trillion by 2030 (Van Rooyen, 2014). The emerging question is: will the agribusiness sector in sub-Saharan Africa assume a growth path defined by strategies and practices that align to the global trend, and in that sense, extend the paradigm of convergence to the continent's agro-food system? This empirical question is yet to be sufficiently addressed in literature and the strategies and practices of mega-agribusiness firms remain a generally under-explored enquiry from the perspective of both ABCD firms (Murphy *et al.*, 2012; Pirrong, 2015a) and their sub-Saharan African equivalents (Felgenhauer & Labella, 2008).

Given the foregoing, the study makes three underlying arguments. Firstly, the study argues that the diversity of sub-Saharan Africa's agro-food systems should not necessarily lead to an "atheoretical" indeterminateness that is based on the notion that every case is different. Secondly, and based on the first assertion, if similar comparisons are drawn from a selected set of firms, the internationalisation of agribusiness MNCs in sub-Saharan Africa can be seen to be advancing in a fashion that is similar to what has been observed at a global level – that is, among ABCD firms. Thirdly, the study argues that aspects of consolidation and value chain integration – which are defining features of internationalisation – are leading to a convergence in at least one part of sub-Saharan Africa's agriculture, which is the corporate agro-food system. The study further argues that the consequence of convergence in one part of the corporate agro-food system will see the broadening and entrenchment of a dual agri-food system, consisting of a large homogenous corporate system and a relatively small heterogenous traditional system. This scenario will define a convergence-divergence complex of the continent's agricultural sector.

In order to unpack the various elements of convergence, the study systematically analyses agribusiness strategies and the internationalization of agro-food firms in sub-Saharan Africa through three approaches. First, through an in-depth analysis of market entry strategies applied to a sample of 67 agribusiness MNCs to show evidence of convergence. Second, through an analysis of 10 core agribusiness MNCs that form nuclei of strategic alliances, to show evidence of cluster convergence. Third, through a single-firm case study that shows evidence of supplier convergence. Figure 1.1 outlines the components of the thesis through a conceptual framework of the study's organisational strategy.

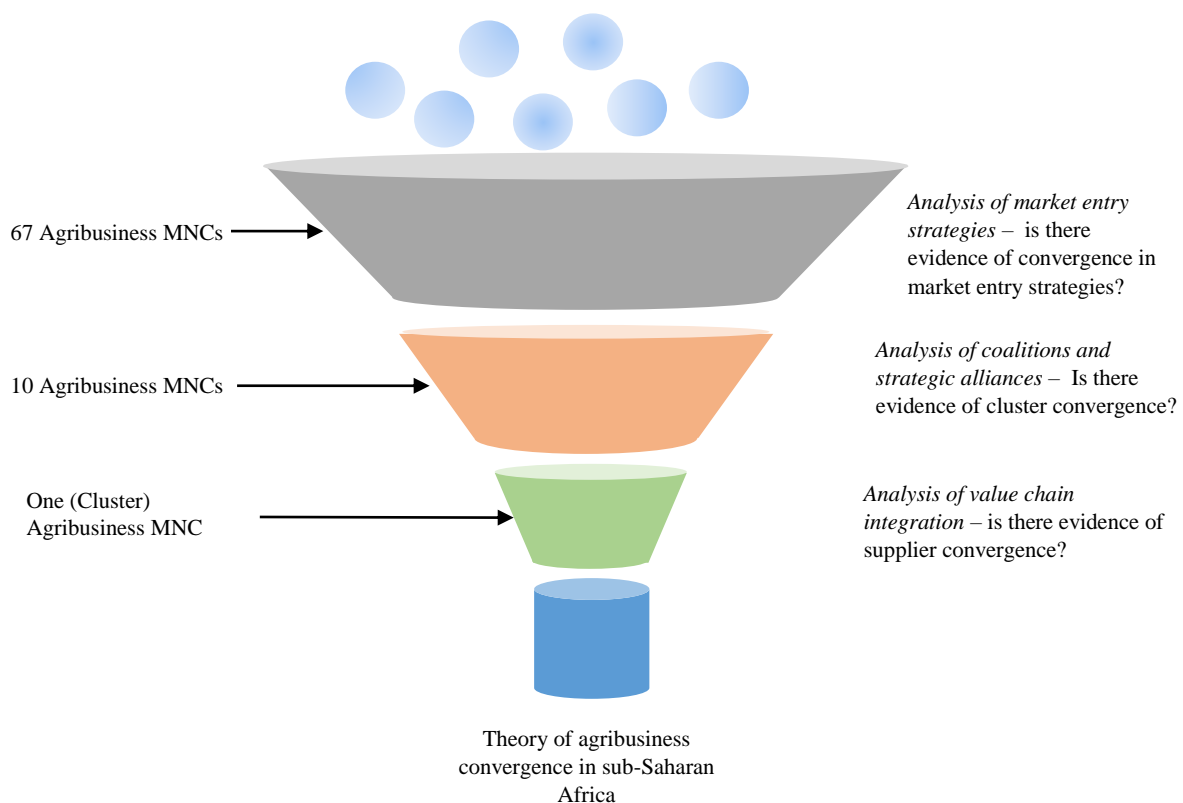


Figure 1.1: Unpacking convergence of agribusiness MNC's in sub-Saharan Africa
Source: Author's conception

The three aspects of convergence outlined in Figure 1.1 are analysed within an integrated theory framework which involves a sequential application of internationalisation theory, optimisation theory, observed entry modes, and game theory. These theories explain the underlying rationale for cross-border investments of agribusiness MNCs in sub-Saharan

Africa. A better understanding of the convergence in behaviour of agribusiness MNCs will assist policymakers with strategic intelligence that can offer guidance on how to craft progressive policy that promotes agribusiness investment, as well as reduces risks and uncertainties.

1.3 STATEMENT OF HYPOTHESES

Studies that explicitly analyse the concept of convergence and internationalisation patterns of the agro-food sector have generally been limited, with “emerging market” references being virtually non-existent. The rarity in “developing country” examples further justifies the need for this study’s analysis. Overall, two agro-food internationalisation case studies are worth noting. First, a study by Syvrud (1999) hypothesised that, for US-based food processing agribusiness firms, factors such as legal barriers, financial capability and international experience were critical determinants of the choice of entry in foreign markets. Second, is a case study by Calegario, Houston and Bruhn (2015) which hypothesised that US firms that produce and export Genetically Modified (GM) food products would rather establish their production in the European Union (EU) market, rather than produce at home and export, due to stringent technical restrictions imposed on GM exports in the EU market. For these studies, hypothesis testing was evidently done under “developed market” conditions that are entirely different from those of sub-Saharan Africa.

In sub-Saharan Africa, only a handful of studies have addressed internationalisation within the framework of more grounded theoretical foundations, albeit partially. For instance, Di Corato and Hess (2013), drawing from options theory, assessed large-scale foreign investments in Ethiopian farmland by modelling the incentives arising from price volatility and corporate tax. In another study, Maertens, Colen and Swinnen (2011) modelled the fresh fruit and vegetable sector in Senegal and found evidence of greater income growth effects arising from Foreign Direct Investments (FDI). In both case studies, internationalisation is not dealt with explicitly, but couched in broader micro- and macroeconomic theory.

A recognition of the dissimilar market conditions in sub-Saharan Africa, as previously discussed, means that a set of new assumptions are in order. However, despite sub-Saharan Africa's peculiar characteristics, this study argues that:

- a) Agribusiness MNCs adopt similar modes of market entry when expanding into new markets in sub-Saharan Africa.
- b) Agribusiness MNCs are forming strategic alliances that are morphing into corporate clusters.
- c) Agribusiness MNCs in sub-Saharan Africa are integrating and consolidating their value chains.

The second hypothesis presents several dimensions that were tested by answering three key questions: Is there a convergence in market entry strategies? If so, which strategies are defining the characteristics of convergence? Is there evidence of strategic alliances (cluster convergence) or value chain integration (supplier convergence), or a combination of both? To answer the foregoing, the study applied various methodologies to test these sub-hypotheses, which are outlined in Table 1.1 below.

1.4 RESEARCH OBJECTIVES

The overall objectives of the study can be partitioned into two sub-groups: Firstly, to understand agribusiness MNCs' internationalisation strategies in sub-Saharan Africa, and secondly, to determine if approaches to internationalisation are similar to those that are applied by the larger global agribusiness firms elsewhere in the world. The specific objectives are set out as follows:

- a) The study aims to contribute to the growing body of literature on agribusiness MNCs by providing a sub-Saharan African perspective of their evolution and character;
- b) The study seeks to provide an understanding of the process of how agribusiness MNCs make specific strategies for, and decisions on, acquisitions and vertical integration when they engage in cross-border investments;
- c) The study endeavours to generate a theory that can define the growth path of agribusiness MNCs in sub-Saharan Africa.

In order to gain a deeper understanding of the nature of internationalisation and possible convergence, the study unpacks further sub-objectives, which are: to determine the relationship between firm size in determining market entry; to determine the likelihood of alliances arising among agribusiness MNCs in sub-Saharan Africa; and to assess how decisions of vertical integration are made.

Figure 1.2 below provides an outline of the study's research process in unpacking the internationalisation of agribusiness firms in various parts of sub-Saharan Africa. As shown in Figure 1.2, the study involved four main processes:

- a) Defining the research questions, through a review of regional and international practice in cross-border investments of agribusiness firms;
- b) Defining strategies, by drawing from internationalisation theory and mapping pertinent agribusiness experiences in sub-Saharan Africa;
- c) Selecting entry market strategies, by using comparative case studies drawn from a survey of agribusiness firms in sub-Saharan Africa, with a view to developing a new theory which can be applied to strategic entry decisions in foreign markets within the continent, and
- d) Assessing the implications of market entry strategy on the structure of the value chains using logical scenario thinking to frame situations and run system dynamics simulations that can determine the various outcomes arising from different strategies.

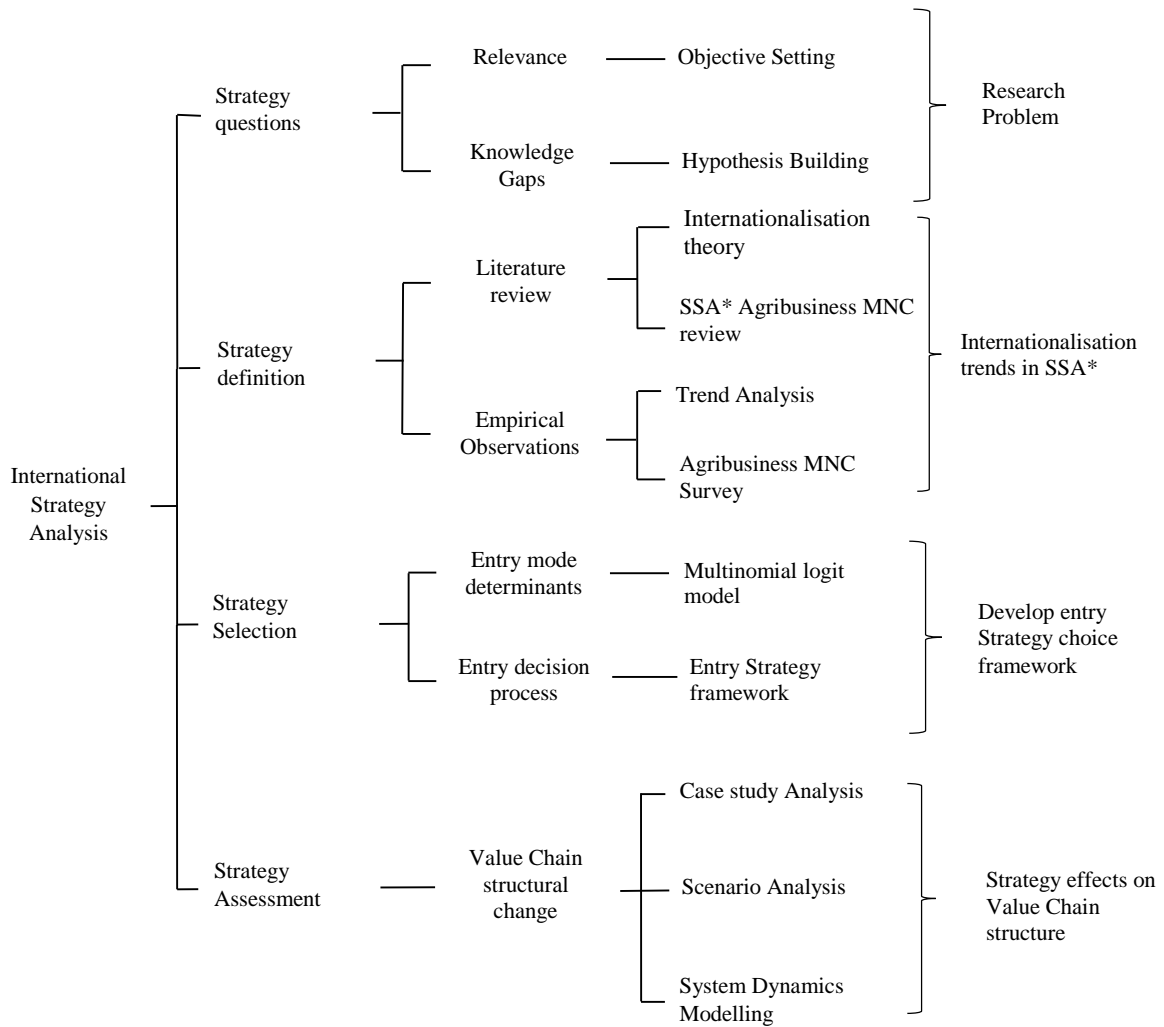


Figure 1.2: Schematic outline of the research process

Note: *SSA is short for sub-Saharan Africa

1.5 RESEARCH METHODS

An important dimension revealed in Figure 1.1 and Figure 1.2 relates to the four research methods that were employed in the study. These research methods are case study reviews of agribusinesses in sub-Saharan Africa, multinomial logit regression analysis, scenario analyses, and system dynamics analysis.

1.5.1 Multinomial logit model

A multinomial logit model (MLM) was used in the study to assess the association between firm size and the choice of entry strategy. The primary cross-sectional data collected on sixty-seven

agro-food actors was used to identify the relationship between the size of the agro-food actors, and their choice of entry into foreign markets. Unlike the binomial logit model (BLM) which limits the outcome to two choice alternatives, the MLM approach broadened the strategy choice set that appropriately depicts the multiple options that are adopted by agro-food actors in sub-Saharan Africa. In this sense, the MLM avoided the aggregation of dissimilar entry strategies, or even the deletion of strategy choice categories, which could potentially impair the analysis results (Martin, 2013). As such, the MLM explained the various entry strategy outcomes observed across sub-Saharan Africa.

Modelling multiple entry strategy alternatives using discrete models comes with a fair amount of challenges, three of which are worth noting. Firstly, unlike the commonly applied logit and probit toolkit, coefficient interpretation under multiple outcomes is subject to further analytical computations (Bowen & Wiersema, 2004). For instance, the direction and magnitude of a given set of variables can be appropriately captured by calculating marginal effects (Cameron & Trivedi, 2005). This is particularly important because marginal effects change across a range of observations, being positive for some observations and negative for others, within the same sample (Greene, 2003). Given this caveat, research that is overly reliant on summary measures of the marginal effect typically omits essential information about the true magnitude of the marginal effect (Wiersema & Bowen, 2009).

Secondly, is the common and related practice of interpreting interaction effects, which has been argued to be inconsequential on the basis that when non-linear models are linearised (by logarithmic transformation, for instance), no interpretation should be placed on the attendant signs. The reason for this is that the interaction term's magnitude and statistical significance varies at each observation in the sample (Karaca-Mandic, Norton & Dowd, 2012). Wulff (2015) emphasised this point and noted that a major part of entry strategy research has not sufficiently recognised these challenges, which inevitably leads to questions regarding some of the related conclusions regarding the direction of relationships.

Thirdly, literature on entry strategy choice has raised some strong reservations regarding the independence of irrelevant alternatives (IIA) assumption, which postulates that the odds of a firm preferring one entry choice over another does not depend on the presence (or absence) of other "irrelevant" options. For instance, according to the IIA assumption, the relative probability of entering into a strategic alliance over "direct exports" do not change if a WOS

option is added as an additional possibility. While the IIA hypothesis is a core premise in rational choice theory, a number of studies have, however, shown that economic agents often violate this assumption when making choices. Previous research that has applied MLMs has shown that, in some situations, the IIA assumption tends to be too restrictive on the relative preferences between the different alternatives.

1.5.2 Game theory

The study also applied game theory modelling to sketch the conditions and scenarios under which strategic alliances are likely to occur between a set of agro-food actors. In order to formalise strategic alliance formation in sub-Saharan Africa, the study drew from a typology of game literature called “cooperative games with transferable utility”. Cooperative games, which are otherwise known as coalitional games, are essentially situations in which strategies are determined collectively as a group of firms (coalition), instead of individual companies. In such scenarios, the individual companies ‘cooperate’ by way of binding agreements about the sharing of revenue, otherwise known as pay-offs in game theory literature (Harsanyi & Selten, 1988). Such cooperative game situations are characterised by transferable utility, which means that a company within the coalition can partially shift individual utility to another company without any loss to the coalition. It can therefore be assumed that, with all possible pay-off sharing options between coalition members, the total utility received by the coalition remains the same.

The study assumes that strategic alliances in sub-Saharan Africa are coalitions that are formed on the basis of three critical rules, which are as follows:

- a) Every firm gets at least a pay-off they could get on their own. Thus, the strategic alliance should be “individually rational”,
- b) The total value of the pay-off in the alliance is exactly divided among the companies within the coalition. This is otherwise known as the “efficiency principle”,
- c) A company within the coalition can receive either a minimum pay-off of what it has contributed, or more than its maximum contribution, without harming the coalition.

The three guiding properties outlined above are used to construct solution concepts that essentially define the stability of a coalition. In this study, stable coalitions were based on pay-off allocations which were deemed to be acceptable by agro-food actors that are part of the coalition. The study identifies a group of 10 agro-food actors, and simulates the likelihood of these actors being in stable coalitions. The case study sought to illustrate how strategic alliances are occurring in sub-Saharan Africa, and possibly provide insights into how they will likely evolve in the future.

1.5.3 Intuitive logic scenario thinking

The term “scenario” is often associated with the description of the future, particularly in relation to the modelling of projections in (agricultural) economics (Strauss, 2008). The underlying assumption of intuitive logic scenario thinking is that “the past is different from the present and the future” (Strauss, 2008). In their pedagogical description of intuitive logic scenario thinking, Strauss and Meyer (2010) argued that the approach is influential in making sound and informed strategic decisions under normal (risk) and abnormal (uncertainty) conditions.

The study uses intuitive logical scenario thinking as a powerful conceptual tool to craft situations which depict the decision-making environment of agribusinesses in sub-Saharan Africa. Intuitive logical scenario thinking is applied to a Mauritian-based agribusiness venture with investments in Zambia, by providing context, rules, uncertainty, options, decisions and outcomes that characterise the environment and the situations in which the agribusiness operates. An intuitive logic scenario-thinking framework was used in conjunction with the System Dynamics Modelling approach.

1.5.4 System Dynamics Modelling (SDM)

System Dynamics is an approach that has been used extensively to analyse and solve intricate problems, with an emphasis on the analysis of strategy and design. Originally called Industrial Dynamics, the field advanced from the seminal work by Jay W. Forrester within the discipline of control engineering and management (Forrester, 1961). Over time, Industrial Dynamics evolved into System Dynamics, as the conceptual foundations of “information feedback” and

“delays” became increasingly applicable in various other disciplines, including business management, to understand the dynamic behaviour of complex social, biological and physical systems. What made System Dynamics particularly useful was the fact that naturally non-linear relationships within social systems – whose model equations were difficult to analytically solve – could now be deciphered through experimental or simulation approaches developed by Forrester (Sterman, 2000).

With System Dynamics being applied extensively to a wide range of inter-disciplinary problems, the approach naturally found its niche in agricultural-related research. This includes work on poultry waste and by-products management (Shamsuddoha, Quaddus & Klass, 2015), small ruminant production systems (Tedeschi, Nicholson & Rich, 2011), sustainability of dairy systems (Molina, Atzori, Gaona & Guerrero, 2014), modelling grassland farming systems (Neuwirth & Peck, 2013), management strategies on the bio-economic efficiency of beef production systems (Pang, Makarechian, Basarab & Berg, 1999), grain supply chain cost modelling (Sachan, Sahay & Sharma, 2005), analysis of beef market liberalisation policies (Hamza, Rich, Baker, Bahta & Katjiuongua, 2015), and modelling of maize-based ethanol as a source of biofuel (Kibira, Guodong & Nowak, 2010).

The study applies System Dynamics Modelling (SDM) to capture the dynamic behaviour of agribusiness MNC value chains. In this spirit, the study applies the information feedback characteristics of an agribusiness enterprise in an attempt to demonstrate how organisational structure, amplification (of entry strategies), and time delays (of decisions and actions) interact to affect the structure of the agribusiness firm’s value chain. In this sense, the study’s approach treats a firm’s value chain as a system or a continuum of material assets (such as information, raw materials, products, and capital) that can be modelled as non-linear relationships that are defined by flow rates and stock accumulations that are linked by feedback loops. Simulations were used as a means of inferring the time-evolutionary dynamics of the agribusiness firm’s value chain system. The objective of the exercise is to learn about the firm’s strategic behaviour and how it affects the value chain over time.

The study’s proposed approach to internationalisation strategy extends the purview of business modelling by incorporating technical, structural and organisational complexities of agribusiness value chain strategies. The study combines entry mode strategies on the one hand, and extensive modelling on the other. As such, the analysis combines both qualitative and

quantitative techniques to facilitate the discerning of structural issues of value chain configuration, which provide insights into how the agro-food sector in sub-Saharan Africa is structured.

The proposed approach draws from several different methods, including SDM, operational research, social sciences and process consultation – all aimed at combining them to attain a much more holistic understanding of internationalisation. The study contains a conceptual model on corporate decision-making and structural change. Figure 1.3 below shows the four phases of entry strategy assessment, namely:

- a) Defining and mapping the structure of the value chain through cognition,
- b) Model conceptualisation through brainstorming, and diagrammatic illustrations of causal loops and stock flows,
- c) Model formalisation through simulation of discrete events, and
- d) Sensitivity and scenario analysis of situations.

As shown in Figure 1.3, the process of developing an SDM involves the construction of partial models that are combined to form a complete agribusiness supply chain.

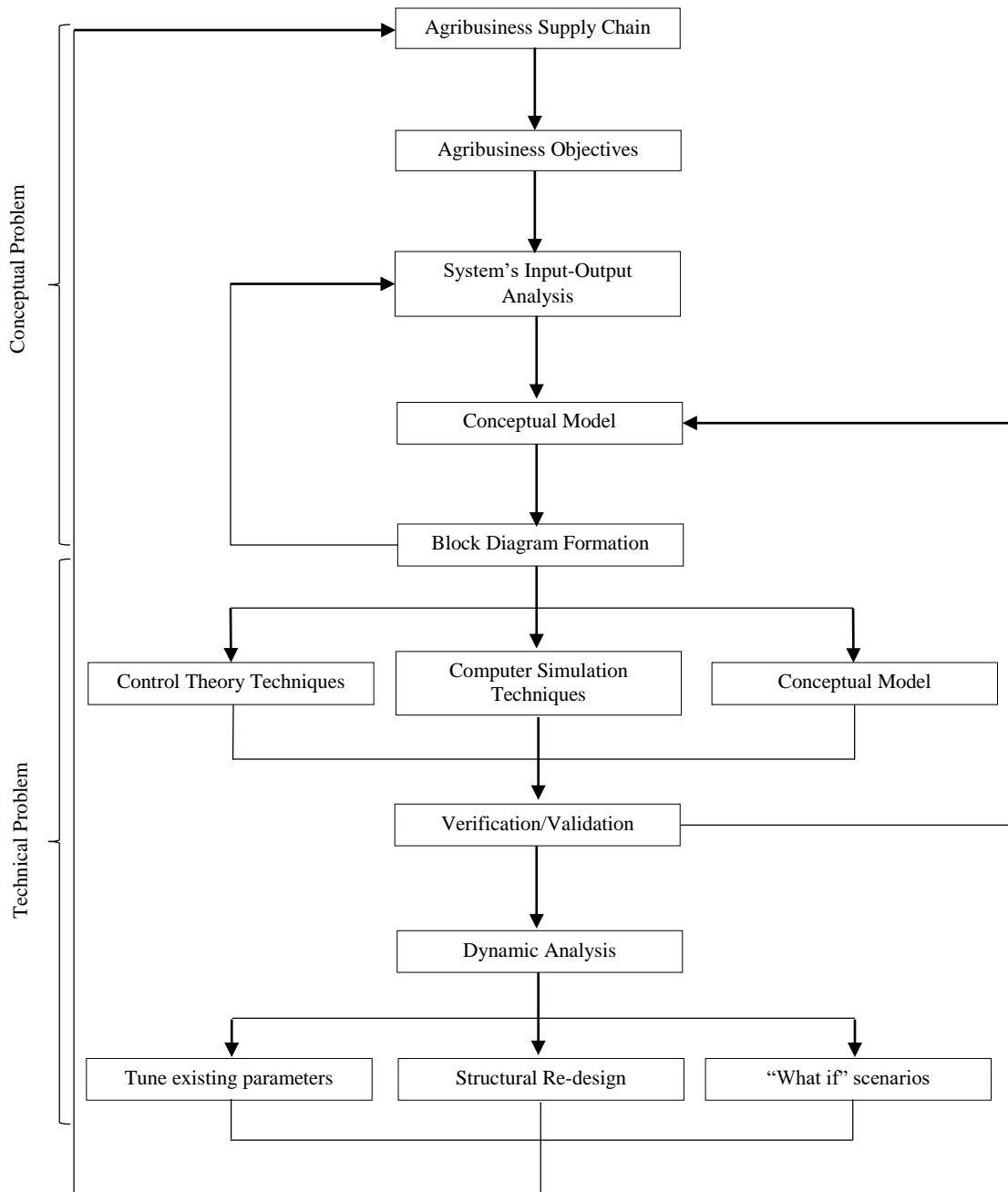


Figure 1.3: The Cardiff framework of supply chain design

Source: Adopted from Naim and Towill (1993)

The practicality of the model demonstrates how an agribusiness MNC integrates its value chain upon entering new markets in sub-Saharan Africa. Two types of constraints arise when constructing SDMs, namely technical complexities (such as requirements for time-critical procurement operations) and organisational complexities (which include autonomous structures of corporate management in geographically separate markets).

1.6 OUTLINE OF STUDY

Table 1.1 below provides a summary overview of the organisation of this study's chapters, with the schematic overview of the process outlined in Figure 1.2. Following on from this chapter, Chapter 2 provides an overview of agribusiness internationalisation in sub-Saharan Africa and the rest of the world by reviewing agricultural commodity trading firms as specific case examples. The purpose of this Chapter is to present evidence of convergence in strategies among agribusiness MNCs in sub-Saharan Africa. Chapters 3 through to 5 answer the research questions that were outlined in Chapter 1.

Table 1.1: Summary of Chapters

	Chapter Title	Key elements of analysis	Hypothesis	Number of firms in Case study	Methods Used
Chapter 2	Evidence of agribusiness convergence in sub-Saharan Africa	<ul style="list-style-type: none"> - Evolution of agribusiness MNCs in sub-Saharan Africa - Comparisons between ABCD firms and other agribusiness MNCs in sub-Saharan Africa 	Internationalisation of agribusiness MNCs in sub-Saharan Africa is similar to larger global firms in terms of strategy and character.	<p>Four agribusiness MNCs, based in Mauritius, Tanzania and South Africa and Singapore</p> <p>NB: All of them have extensive presence in sub-Saharan Africa</p>	<ul style="list-style-type: none"> - Literature review - Event analysis
Chapter 3	The coverage – divergence paradox: The notion of two extremes	<ul style="list-style-type: none"> - Identifying the relationship between the size of agribusiness MNCs and the market entry strategy: – Exports, JVs, and WOS 	There is a strong relationship between the size of agribusiness MNCs and their choice of strategy in cross-border investments	A sample of 67 agribusiness firms, based in sub-Saharan Africa and overseas, with extensive presence in sub-Saharan Africa	<p>Multinomial logit model</p> <ul style="list-style-type: none"> - Marginal Effects - Predicted Probabilities
Chapter 4	Cluster (β) convergence and strategic agribusiness alliances in sub-Saharan Africa	<ul style="list-style-type: none"> - Assessing strategic alliance formation - Identifying the formation of agro-food clusters 	If larger agribusiness MNCs enter agro-food markets through strategic alliances, such alliances will be more likely to occur among a few large players.	A sample of 10 agribusiness MNCs, which have been involved in internationalisation activities across sub-Saharan Africa.	<ul style="list-style-type: none"> - Cooperative Game Theory - Monte Carlo Simulation
Chapter 5	Supplier (σ) convergence: An agribusiness case study in Zambia	<ul style="list-style-type: none"> - Detailing the optimisation behaviour of agribusiness MNCs - Detailing the process of vertical integration and consolidation 	Agribusiness MNCs in sub-Saharan Africa are vertically integrating their value chains in a manner that is consistent with the “supplier convergence” paradigm.	One agribusiness MNC based in Mauritius, with investments in Zambia	<ul style="list-style-type: none"> - Logical Thinking and Scenario Analysis - System Dynamics Model

Whereas Chapter 2 presented initial evidence of convergence, Chapter 3 considered a sample of 67 agribusiness firms with a footprint across sub-Saharan Africa to further test the similarities in agribusiness entry strategies among a diverse set of firms. The influence of firm size as a key driver was considered against a number of other various country-specific, firm-specific and market-specific factors. The Chapter makes three important considerations: First, it departs from the traditional narrative of binomial logit modelling (BLM) and multinomial logit modelling (MLM) approaches by considering a greater number of market entry options, which reflect the diversity of market entry choices available to sub-Saharan African agribusiness firms. Second, the proposed model offers a more sophisticated meta-analytical quantitative procedure which is powerful and more suited for analysing entry and establishment strategy options that account for firm heterogeneity, even within contexts where data is limited. Third, unlike previous methodological approaches to past entry strategy research, empirical tenets such as asset specificity are considered within a case study approach. As such, the study overcame a number of limitations inherent in a BLM approach.

Chapter 4 makes a key observation that strategic alliances are becoming more frequent in sub-Saharan Africa, and therefore makes an attempt to review and understand alliance formation. Using a sample of 10 agribusinesses in sub-Saharan Africa, the Chapter assesses the potential of strategic alliances through an experimental approach that is based on cooperative game theory. A mathematical model is developed to describe the behaviour of these agribusinesses, underpinned by assumptions. A Monte Carlo simulation is used to determine which alliance combinations are feasible and stable.

Chapter 5 evaluates the content and character of internationalisation through an illustrative case study of a Mauritian-based agribusiness firm which has investments in Zambia. The Chapter explores the optimisation behaviour of firms when considering investments in farmland and agro-processing within a wheat value chain. This is done by combining various scenarios and a system dynamics model (SDM) to evaluate value chain optimisation under each given situation. A micro-firm level perspective of cross-border investment behaviour was useful in understanding the strategic drivers of agribusiness investments when they are put into foreign agro-food markets in sub-Saharan Africa.

Chapter 6 concludes the study with a summary of major findings, the theoretical contribution of the research, policy recommendations, and the identification of topics for future research. The study builds on the findings of all the preceding Chapters and makes key propositions, based on the hypotheses stated in Table 1.1. The appendix at the end of this thesis outlines the survey instrument that was used to collect primary data.

CHAPTER 2

EVIDENCE OF AGRIBUSINESS CONVERGENCE IN SUB-SAHARAN AFRICA

2.1 INTRODUCTION

Global agriculture has undergone a wide-scale restructuring process, which has led the transformation of the agro-food system into a relatively sophisticated, globalised and financialised sector (Murphy *et al.*, 2012). The four largest grain trading firms in the world (the ABCD) account for a collective market share of between 75 % and 90 % of the global agricultural commodity trade, and generate a combined revenue in excess of US\$350 billion (Meyer, 2013; Gaudreau, 2015). The sheer size of this quartet means that it exerts a great deal of influence – determining how much money is invested in agriculture, where agricultural production is located, and where the produce is shipped within the global agro-food system (Murphy *et al.*, 2012).

In sub-Saharan Africa, there is anecdotal evidence to suggest that the corporate agro-food system is converging towards common transboundary strategies, mainly seen in the form of mergers and acquisitions (see Figure 2.1). This phenomenon is leading to the consolidation and transformation of the sector into fairly complex and modernised agro-food systems under the influence of agribusiness MNCs such as Olam International, AFGRI, Export Trading Group (ETG) and Zambeef. The critical question is: how do agribusiness MNCs in sub-Saharan Africa compare with the ABCD firms?

Previously noted in Chapter 1 was the observation that sub-Saharan African agro-food markets have unique characteristics and conditions that set them apart from the rest of the world – such as inadequate physical and commercial infrastructure, political instability, inadequate legal frameworks, weak institutions, and a pervasive influence of government in currency and commodity markets. These conditions challenge some of the assumptions of theories otherwise developed for markets that are relatively more developed, stable and efficient (Beugelsdijk, Mudambi & McCann, 2010; Xu & Meyer, 2013).

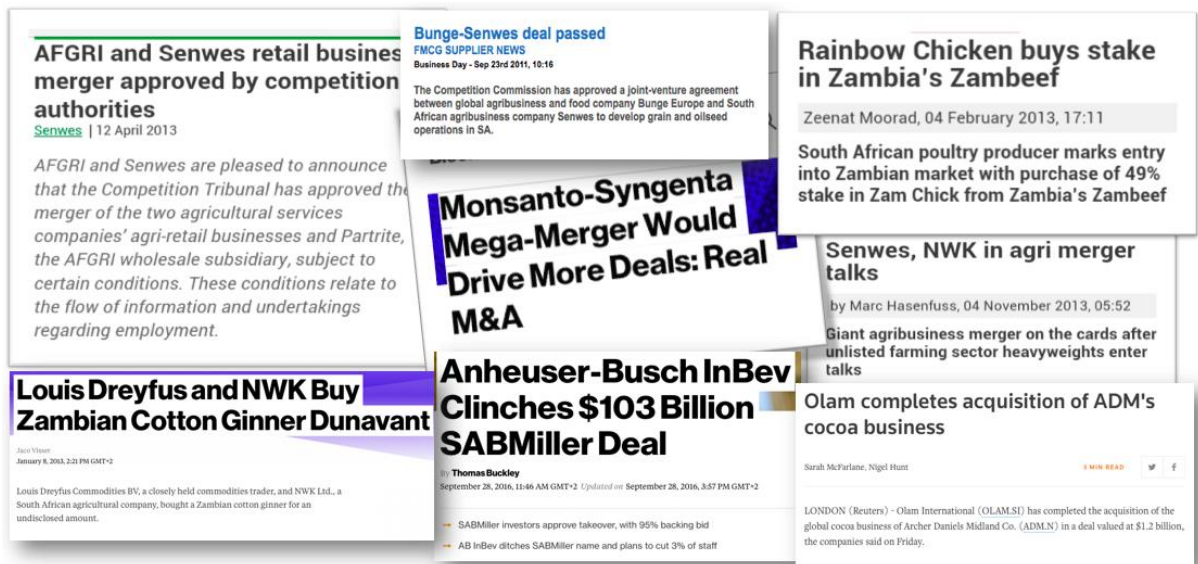


Figure 2.1: Anecdotal evidence of agribusiness convergence in sub-Saharan Africa
 Sources: Business Day (2011), Bloomberg (2013; 2016), Senwes (2013), Moorad (2013), Hasenfuss (2013).

Against the backdrop of institutional constraints besetting emerging markets, Ledwith (2012) argued that decision makers operating in sub-Saharan Africa adopt non-conventional approaches – departing from the rigorous and religious use of budgets and business proposals, to a decision process that draws heavily on ad hoc decisions that are based on recently inferred perceptions of the future (“hunches”). Ledwith (2012) further argued that governance systems in sub-Saharan Africa are exceptionally risky and uncertain, to the extent that strategic decision processes almost entirely depend on intuitive deductions based on infrequent cycles of experiential knowledge.

Given these caveats, the purpose of this Chapter is to review strategies adopted by agribusiness MNCs in sub-Saharan Africa, and compare and contrast them with those of larger global agribusiness MNCs. To that end, the Chapter makes reference to some internationalisation experiences among ABCD firms and those of comparable agribusiness MNCs in sub-Saharan Africa. The Chapter is structured as follows: the second section discusses, broadly, agribusiness entry modes, both at global and regional levels. A distinction is made between South Africa and sub-Saharan Africa, taking into account nuances in market conditions. The third section discusses the internationalisation of four selected agribusiness MNCs in sub-Saharan Africa over the past two decades, highlighting their evolution in terms of their cross-border

investments. The Chapter concludes by summarising the main points and drawing out key questions.

2.2 BACKGROUND AND CONTEXT

This section outlines the strategies of agribusiness MNCs at global and regional level, the latter of which is split further between South Africa and the rest of sub-Saharan Africa. Global level references will largely focus on the activities of the ABCD firms, while regional level descriptions will attempt to draw from the region-specific differences in economic conditions which are an important factor affecting market entry decisions.

2.2.1 Agribusiness strategies at global level

From a global perspective, agribusiness strategies are epitomised by the strategic behaviour of ABCD firms. After all, Murphy *et al.* (2012) argued that the ABCD firms are at the centre of the changes that are occurring in the agro-food system, and have been playing a pivotal role in shaping global agricultural commodity markets. Moreover, Murphy *et al.* (2012) noted that ABCD firms are also being shaped by global forces such as increased commodity price volatility, further arguing that the ABCDs are responding and adapting to such global forces, and playing a role in influencing the direction of these global forces.

Despite the important and instrumental role of ABCD firms in global agricultural markets, their operations are often not well understood (Murphy *et al.*, 2012; Pirrong, 2015a). The likely reason for why ABCD firms are poorly understood is that, while they have evolved into very complex agribusiness firms over time (Clapp, 2015), there has, however, been very limited public information made available regarding their intricate operations (Murphy *et al.*, 2012). Despite ADM and Bunge being public companies, with Cargill and Dreyfus remaining largely family-owned businesses, the ABCD quartet hardly shares information regarding its activities, making any effort to track its activities an extremely daunting task (Murphy *et al.*, 2012; Clapp, 2015). The dearth in information on the ABCD firms means that an analysis of their activities naturally places a heavy reliance on grey literature.

The key features of ABCD firms are reflected by the terms that are used by experts to describe their activities and functions. Clapp (2015) referred to them as “cross-sectoral value chain managers”, Pirrong (2015a) called them “commodity trading firms” and McFarlane (2016) found it sufficient to name them “commodity trade houses”. In spite of the various terminologies used to describe them, they are fundamentally multinational entities that are essentially in the business of transforming agricultural commodities in space (logistics), in time (storage), and in form (processing) (Pirrong, 2015a; 2015b). Through such transformations, agribusiness MNCs perform physical “arbitrages” which unlock and increase the value of commodities. Arbitrage is the practice of purchasing commodities or securities in one market for immediate resale in another market in order to profit from a price discrepancy (Meyer, 2006). The manner in which commodity-trading firms engage in the transformation and physical arbitrage of agricultural commodities essentially defines their integration strategies.

The summary of characteristics of the ABCD quartet shown in Table 2.1 below reveals five key features. First, the ABCD firms have had an exceptionally long period of historical evolution, which stretches between 114 years and 198 years. Second, the global commodity trading firms are tremendously diverse, as they engage in different transformation activities such as input (fertiliser) manufacture, procurement and origination of commodities, transportation and port operations, processing, insurance and investment services. Third, the ABCD firms are multi-product, multi-country operations, mostly (but not only) focused on the food-feed-fuel complex. Fourth, commodity-trading firms outlined above comprise both family-owned private firms (Cargill and Dreyfus) and publicly traded corporations (ADM and Bunge).

Table 2.1: Overview of selected ABCD firms

	Archer Daniels Midland (ADM)	Bunge Limited	Cargill	Louis Dreyfus Company
Founded	1902	1818	1865	1851
No. of years in existence	114	198	151	165
Employment (No.)	32 300	35 000	153 000	22 000
Revenue (2015)	US\$67.7 billion	US\$57.8 billion	US\$120.4 billion	US\$55.7 billion
Location				
- <i>Origin</i>	Minneapolis, Minnesota, USA	Amsterdam, Netherlands	Conover, Iowa, USA	Alsace, France
- <i>Headquarters</i>	Chicago, Illinois, USA	White Plains, New York, USA	Minnetonka, Minnesota, USA	Amsterdam, Netherlands
- <i>Incorporated</i>	Chicago, Illinois, USA	Bermuda	Minnetonka, Minnesota, USA	Geneva, Switzerland
Ownership Type	Publicly listed	Publicly listed	Private, Family Owned	Private, Family Owned
Ownership Structure	74.80 % Institutional Holdings	80.46 % Institutional Holdings	90 % Cargill Family 10 % Management	90 % Dreyfus Family 10 % Management
Public Listing	On 24 December 1924, New York Stock Exchange (NYSE: ADM)	On 2 August, 2001, New York Stock Exchange (NYSE: BG)	-	-
No. of countries present	75	40	66	100+
Products ¹	Oilseeds Grains Intermediate products	Oilseeds Grains Intermediate products	Oilseeds Grains Intermediate products	Oilseeds Grains Intermediate products

Source(s): Corporate documents, newspaper articles, and competition commission notifications.

Lastly, the firms in the quartet are significantly large in their own right, with annual revenues that span between US\$56 billion and US\$120 billion per year, while employing between 22 000 and 153 000 people, worldwide (See Table 2.1 above). The ABCD's considerable size and enormity imply that they are "too big to fail" (Pirrong, 2015b). The "too big to fail" theory states that particular corporations are exceptionally large and interconnected to the extent that their failure would devastate the broader agro-food system. Due to their systematic importance, such big corporations would thus be supported by government when they are at risk of potential failure.

1 (i) Oilseeds – oils and meal from soybeans, cottonseed, sunflower seeds, canola, peanuts, flaxseed, palm kernel and Diacylglycerol (DAG) oil
(ii) Grains – rice, wheat, soybean, maize/corn.
(iii) Intermediate/processed – corn germ, corn gluten feed pellets, syrup, starch, glucose, dextrose, crystalline dextrose, high fructose corn syrup sweeteners, cocoa liquor, cocoa powder, cocoa butter, chocolate, ethanol, and wheat flour.

Another interesting feature of ABCD firms relates to the strategic location of their headquarters, and the places in which the firms are incorporated. Cargill and Bunge have been strategically incorporated in “tax havens” – Bermuda and Minnesota, respectively. Equally important for these large corporations is their strategic decision to incorporate their operations in regions where they can easily move capital and repatriate profits internationally.

The features outlined above are pertinent to the manner in which the agribusiness MNCs have evolved in the recent past, particularly their business models and related strategies. According to Clapp (2015), agribusiness MNCs have intensified their vertical integration and consolidated their business activities. The former has constituted commodity-trading firms as managers of entire value chains, and the latter has led to a diversification beyond food and agriculture into other sectors (Clapp, 2015). In this sense, commodity-trading companies have tended to generally follow a “farm-to-fork” model – which includes performing all value chain activities – from grain origination, to farmland ownership, input suppliers, insurance providers, purchasing, storage, transportation, processing, retail, and the financing of all these activities along the chain (Murphy *et al.*, 2012). Figures 2.2 through to 2.5 below show the evolutions of the ABCD firms that capture these trends over the past two decades.

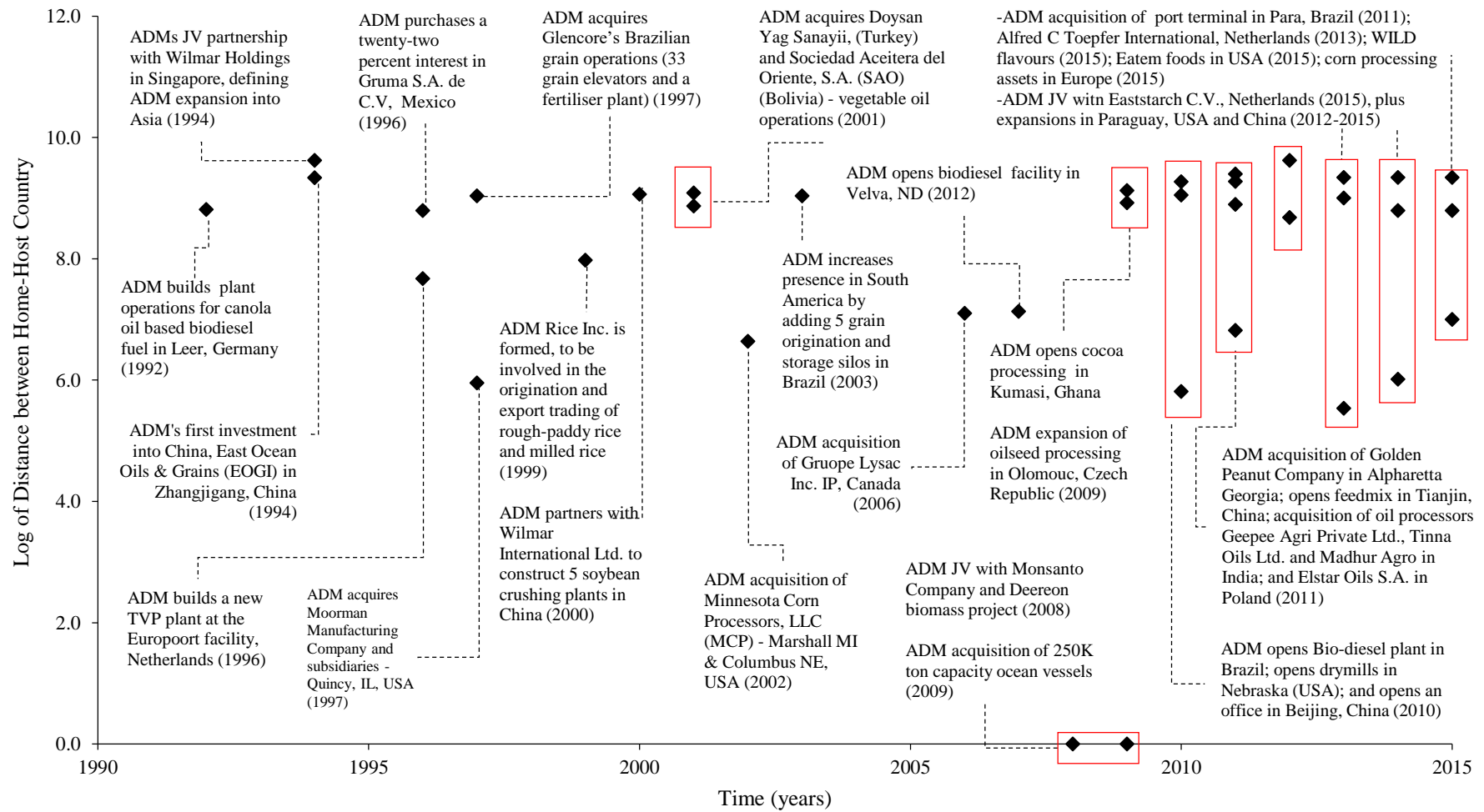


Figure 2.2: The evolution of Archer Daniels Midland (ADM) (1990–2016)
 Source: Adapted from Archer Daniels Midland (2017).

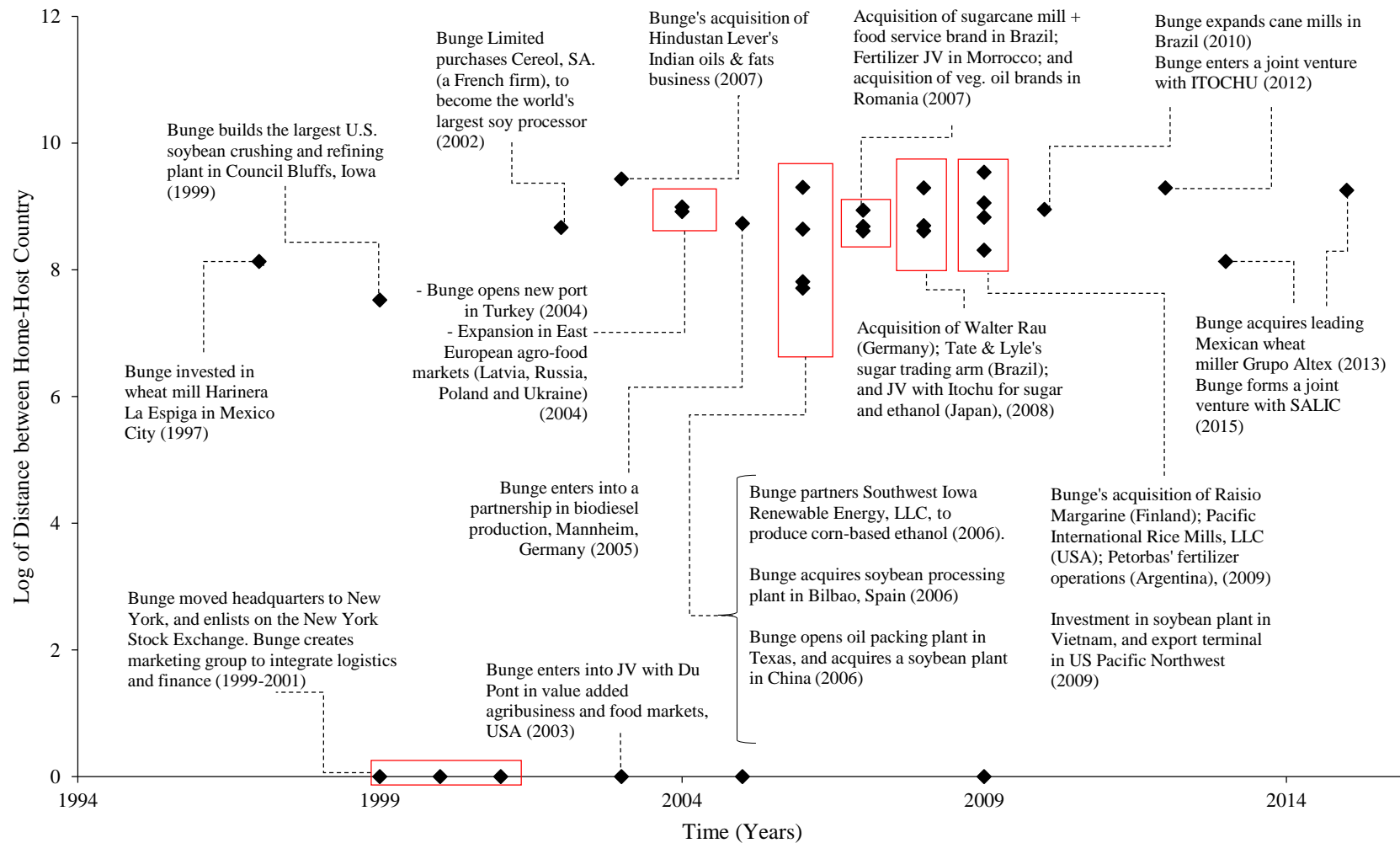


Figure 2.3: The evolution of Bunge (1990–2016)

Source: Adapted from Bunge (2017); de Lap rouse (2012).

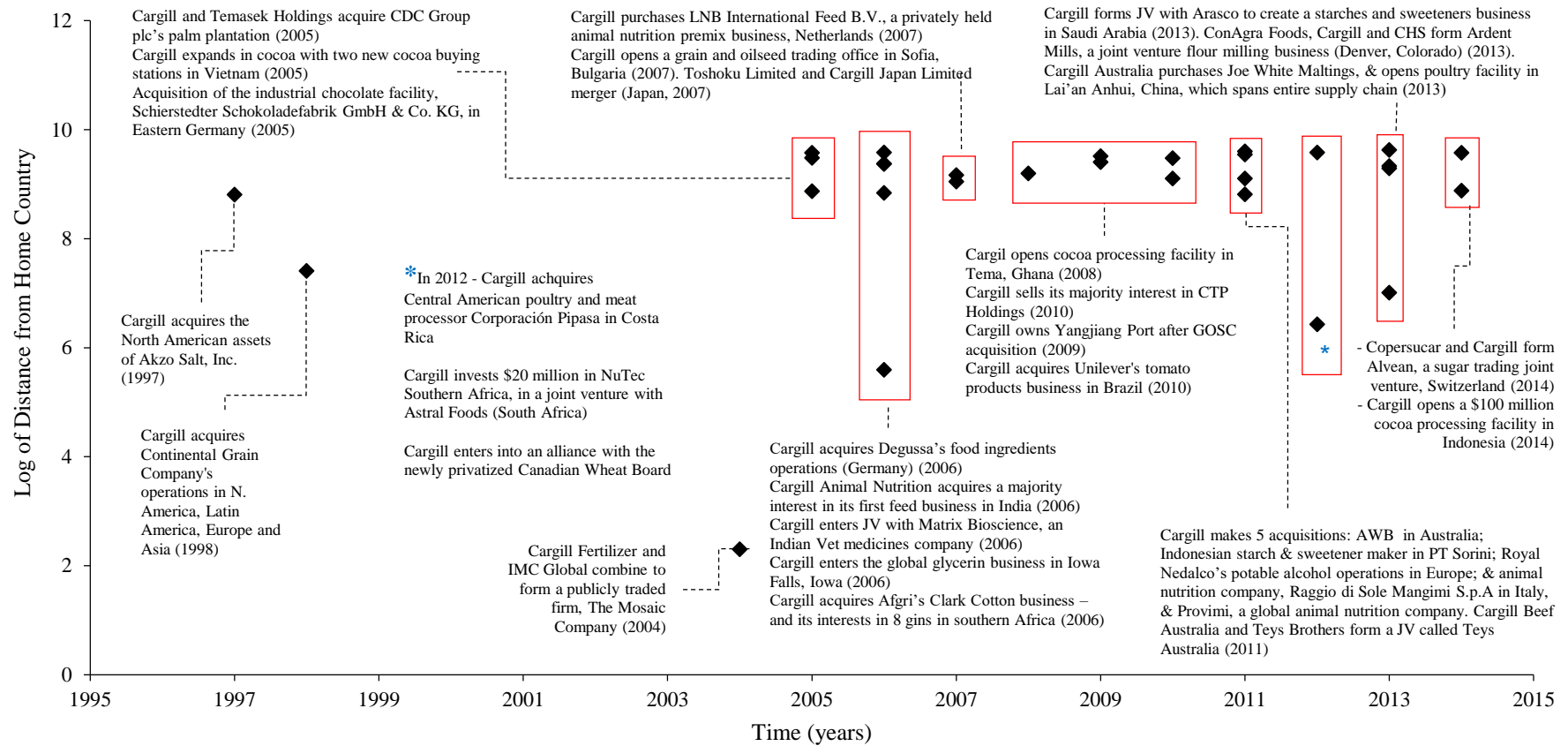


Figure 2.4: The evolution of Cargill (1995–2016)

Source: Adapted from Cargill (2017).

*Strategies implemented in 2012

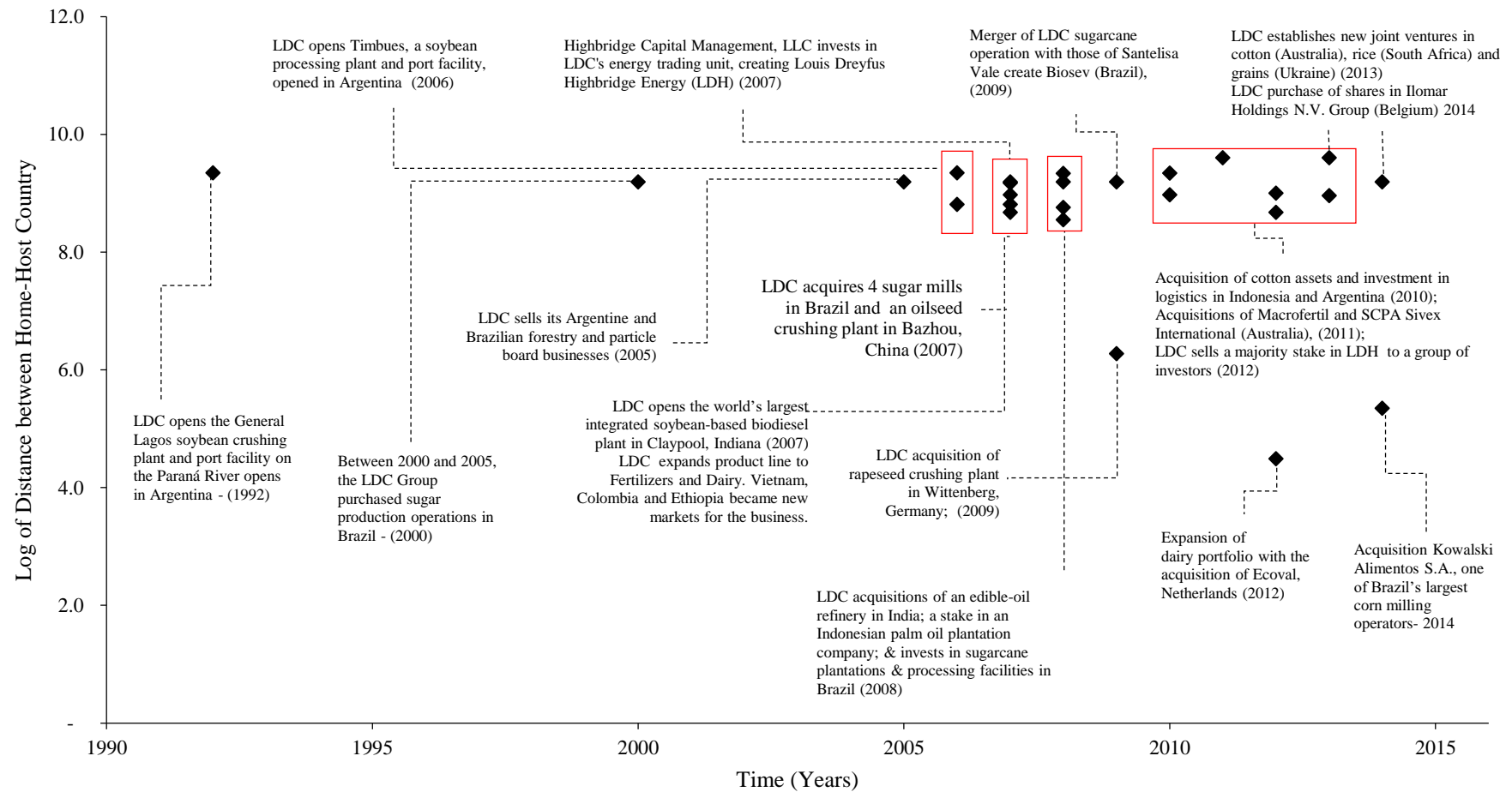


Figure 2.5: The evolution of Louis Dreyfus Company (1990–2016)

Source: Adapted from Grain (2010); LDC (2017).

According to Murphy *et al.* (2012), the activities underpinning the evolutions outlined in Figures 2.2 through to 2.5 have led to a restructuring of the global agro-food system in three fundamental ways. First, the increased vertical and financial integration of ABCD firms has seen an increased participation in derivatives trading, often bundled with other non-food commodities, which has led to intricate linkages between the agro-food and financial sectors. This, together with access to new financial avenues (through hedge funds and asset management companies), has led to the financial deepening of the agro-food sector.

Secondly, the acquisition of farmland, (through either asset management subsidiaries or private equity funds) and the subsequent establishment of highly mechanised corporate mega-farms have led to the corporatisation of agriculture. For example, Louis Dreyfus Commodities owns 60 000 ha of farmland in Brazil, while Calyx Agro – a Louis Dreyfus Commodities subsidiary established in 2007 – was quoted by de Lapérouse (2012) as having 103 000 ha of land in Latin America (Brazil, Argentina, Paraguay and Uruguay). Cargill owns farmland through its Black River Asset Management’s investment in Ceres, the third largest farmland fund operating in Bulgaria, controlling 22 000 ha of land (*ibid*). Farmland acquisitions are worth noting, even though their collective significance in global corporate farming remains debatable.

Thirdly, the consolidation of various diverse activities which span across the integrated food, feed and fuel segments of the production system (otherwise called the “food-feed-fuel” complex) have led to the emergence of highly intricate and diversified supply chains. The internationalisation activities outlined in Figures 2.2 through to 2.5 show that much of the global firm’s cross-border investments are occurring in North and Latin America, Europe and Asia – and much less so, in sub-Saharan Africa.

2.2.2 Agribusiness strategies in South Africa

South Africa is regarded as a “Newly Industrialised Country” (NIC), a term used to describe economies that have not yet reached “developed country status”, but have, in a macroeconomic sense, outpaced other developing economies (Kuepper, 2016). A related definition by the United Nations Industrial Development Organization (UNIDO) classifies South Africa as an “Emerging Industrial Economy” (EIE) (Upadhyaya, 2013). According to these definitions,

South Africa is the only NIC in sub-Saharan Africa, and one of two EIEs (the other one being Mauritius) from sub-Saharan Africa.

The defining characteristics of NICs (and EIEs) include the presence of large MNCs, high FDI stocks, liberal trade regimes and open market economies that are transitioning from agriculture to manufacturing (Bożyk, 2006). Such characteristics not only set South Africa apart from the rest of sub-Saharan Africa, but also present the country as a strategic “gateway” to the rest of the continent for those large global agribusiness MNCs that are looking to invest in the rest of the continent (Scholvin & Draper, 2012; Hall, 2013). The “gateway” narrative was also supported by Anseeuw *et al.* (2012) who referred to South Africa as “a laboratory for the rest of Africa”. Such perceptions are evidently reflected by strategic investments by agribusiness MNCs in South Africa – such as the ABCD firms – who have used South Africa as an “entry point” to the rest of sub-Saharan Africa, or as a headquarters for their regional operations.

An example is the 50–50 JV of Dreyfus and NWK Limited in Epko Limited, a sunflower crushing subsidiary based in South Africa. The partnership between NWK Limited and Dreyfus has subsequently gone beyond South Africa which, through Opti-feeds, invested in a poultry enterprise through Mont-Trade (Pty) Ltd in Botswana in 2012. In the same year, NWK and Dreyfus entered into a 60–40 JV to acquire the Zambian-based Dunavant Cotton Company, which was to be later incorporated as a diversified grain-trading firm called NWK Agri-Services (Zambia).

In another example, Bunge Limited entered into an equal JV with Senwes in April 2011 through Bunge EMEA (Bunge Europe, Middle East and Africa), to form Bunge Senwes Africa (Pty) Ltd. The purpose of the JV was to develop grain and oilseed operations in South Africa, with a view to supplying maize, wheat and soybean to both South Africa and the rest of sub-Saharan Africa (African Centre for Biosafety (ACB), 2013). The Bunge-Senwes partnership eventually ended in 2016, but the regional footprint of Bunge Senwes Africa (Pty) Ltd within sub-Saharan Africa expanded to Zambia, Kenya, Mozambique and Malawi between 2012 and 2015.

South Africa has also received significant investments from large global agribusiness MNCs such as Cargill, Noble, China National Cereals, Oils and Foodstuffs Corporation (COFCO), and Wilmar Continental – which are using South Africa not only as a “launch-pad” to invest

in other countries within sub-Saharan Africa, but also as a base for commodity exports into the rest of the region. As foreign agribusiness MNCs entered into strategic alliances through acquisitions or JVs with South African-based agribusiness MNCs, this phenomenon led analysts to believe that South Africa was aligning to the global trend of intensified vertical integration and consolidation (Ernst & Young, 2014; Hamman, 2014; Ducastel & Anseeuw, 2014).

2.2.3 Agribusiness strategies in the rest of sub-Saharan Africa

According to UNIDO's classification, sub-Saharan Africa – excluding South Africa and Mauritius – consists of a mix of developing and least-developed markets (Upadhyaya, 2013), which are typically characterised by weak regulation, fragmented markets and a general lack of infrastructure. These conditions present expanded opportunities for arbitrage, which make sub-Saharan Africa an attractive growth space for agribusiness MNCs (Blas, 2013; Craven, 2016). However, Craven (2016) cautions that the very conditions that present opportunities for growth also create a fair amount of risks which discourage risk-averse agribusiness MNCs from investing in sub-Saharan Africa.

To overcome these risks, agribusiness MNCs within sub-Saharan Africa engage in strategic alliances with other foreign MNCs (Felgenhauer & Labella, 2008; Van Rooyen, 2014; Ducastel & Anseeuw, 2014). Strategic alliances involve a number of new actors – such as sovereign wealth funds, engineering firms, agro-processors – who are contributing to the vertical integration of agricultural value chains. Ducastel and Anseeuw (2014) and Clapp (2014) argued that such new actors are bringing greater levels of investment and finance, although the extent of financial deepening has been subject to debate.

It is worth noting that the lack of financial depth and innovation across the rest of sub-Saharan Africa has discouraged some agribusinesses from embarking on cross-border investments. A case in point is the lack of dynamic, structured agricultural commodity trading systems²

² Of note, several *ex post* and *ex ante* attempts to establish agricultural commodities (futures) exchange include: (a) The Zimbabwe Agricultural Commodity Exchange (ZIMACE) – which was operational between 1994 and 2001. Efforts to resuscitate a new platform have occurred through the Commodity Exchange for Zimbabwe (COMEZ), established in 2011, (b) The Agricultural Commodity Exchange for Africa (ACE) in Malawi – established in 2006, (c) The Zambia Agricultural Commodity Exchange (ZAMACE) – in Zambia, which was

(Nyamutowa, Masunda & Mupaso, 2014). Craven (2016) argued that sub-Saharan Africa's lack of well-developed structured agricultural commodity trading platforms precludes agribusiness MNCs from futures trading – consequently limiting their ability to hedge against risks. Moreover, Craven (2016) pointed out that poorly developed port and commercial physical infrastructure in sub-Saharan Africa precludes the movement of grain and oilseeds at a significantly larger scale – and this compels agribusiness MNCs to internationalise through comparatively “low-volume-throughput” business models.

From an internationalisation perspective, Ledwith (2012) ascribes strategic alliances of foreign agribusiness MNCs to two key reasons. Firstly, the new actors, previously noted above, are contributing to a partial or complete internalisation of value chain activities, either as a way of capturing and extracting value or as a way of managing risks associated with poor infrastructure, among others (Maertens *et al.*, 2011; Ledwith, 2012). Secondly, the weak enforcement of contracts, and the need to secure adequate raw material supplies of appropriate quality, encourage agribusiness MNCs to internalise more non-core functions in order to exert more expansive control and coordination over their agro-food value chains (Maertens *et al.*, 2011; Ledwith, 2012). The presence of new actors and the internalisation of value chain activities – including primary agricultural production – have been argued to be the cause of agro-food system restructuring and transformation in parts of sub-Saharan Africa (Herre, 2013; Sitko & Chisanga, 2015).

2.3 A CASE OF AGRICULTURAL COMMODITY TRADING FIRMS

To illustrate the internationalisation of agribusiness firms in sub-Saharan Africa, the study considers four specific case examples, namely, AFGRI Limited, Zambeef PLC, Export Trading Group (ETG) and Olam International Limited (see Table 2.2 below). These agribusiness MNCs are ideal illustrations of internationalisation within the sub-region because they have extensive cross-border agro-food supply chains within the continent. These agribusinesses align to Pirrong's (2015a) definition of agricultural commodity trading firms, which describes them as “agribusiness [corporations] engaged in transforming commodities in space (logistics), time (storage), and form (processing)”. The case studies were selected on the basis of their multi-

operational between 2007 and 2012, and then re-established in 2015, (d) The Ethiopian Commodity Exchange (ECX) – in Ethiopia, established in 2008, (e) The East Africa Exchange (EAX) – in Rwanda, established in 2012. .

country, multi-product diversity and size. They employ labour forces of at least 4 500 and generate annual revenues greater than US\$200 million per year. The trans-boundary nature of these agribusiness firms makes it difficult to justify their selection on the basis of location because they have strategically re-located their corporate and operational offices to regions beyond their countries of origin. As shown in Table 2.2 below, a firm may incorporate in one country and be headquartered in another, partly to take advantage of favourable tax regulations in foreign jurisdictions, and to enable easier financial flows and repatriation of profits.³

The geographic footprint of the selected firms is extensive. Olam International, ETG and AFGRI have presences of between 19 and 25 countries in sub-Saharan Africa (see Table 2.2 below). The most experienced firm is ETG, which has been involved in cross-border trade and investments for 40 years. Zambeef and AFGRI internationalised much later, with 8 and 11 years of cross-border experience in sub-Saharan Africa, respectively. Generally, the selected agribusiness firms are engaged in both perishable and non-perishable products such as grains, oilseeds, livestock and livestock products.

³ For instance, Olam International Limited and ETG have relocated their operational offices to Singapore, which is widely regarded as a commodities and financial services hub for traders. Olam received an “Approved International Trader status” (now called the Global Trader Programme) from the Singapore Government, giving Olam International Limited a concessionary tax rate of 10 %, which was subsequently reduced to 5 % in 2004. ETC Holdings (under ETG) and AFGRI Limited’s major shareholder – Agrigroupe Holdings (Proprietary) Limited – have strategically located in Mauritius, generally regarded as a financial services hub due to reforms that allow for easier movement of capital. This is not surprising, given that Singapore has the best global ranking in the “ease of doing business”, “protecting minority investors” and “enforcing contracts”, while Mauritius is regarded as the best in Sub-Saharan Africa on the same indicators, according to the World Economic Forum (WEF).

Table 2.2: Overview of selected agribusiness case studies

	AFGRI Operations Limited	Zambeef Public Limited Company	Export Trading Group (ETG)	Olam International Limited
Established	1923	1991	1967	1989
Incorporated	1995	1994	1983	1989
Employment (No.)	4 800	5 800	7 000	23 000
Revenue (2015)	US\$733 million	US\$275 million	US\$2.5 billion	US\$15.6 billion
Location				
- Origin	South Africa	Zambia	Kenya	Nigeria
- Headquarters	Pretoria, South Africa	Lusaka, Zambia	Dar es Salaam, Tanzania	Singapore, Singapore
- Incorporated	South Africa	Zambia	Singapore	Singapore
No. of SSA countries present	19	3	25	24
No. of years ⁴	8	11	40	22
Countries	Angola, Benin, Botswana, Burkina Faso, Burundi, Congo, Cote d'Ivoire, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, South Africa, Tanzania, Togo, Uganda, Zambia, Zimbabwe	Zambia, Ghana and Nigeria	Kenya, Uganda, Tanzania, Ethiopia, Sudan, Malawi, Mozambique, Zambia, Zimbabwe, South Africa, Benin, Botswana, Burkina Faso, Burundi, Ghana, Guinea Bissau, Ivory Coast, Mali, Namibia, Nigeria, Niger, Rwanda, Senegal, Sierra Leone, Togo, and the Democratic Republic of Congo (DRC).	Angola, Kenya, Uganda, Tanzania, Ethiopia, Egypt, Sudan, Malawi, Mozambique, Zambia, Zimbabwe, South Africa, Benin, Botswana, Burkina Faso, Ghana, Guinea Bissau, Ivory Coast, Mali, Namibia, Nigeria, Senegal, Sierra Leone, Togo.
Commodities	Maize, sunflower, sorghum, soybeans, wheat, barley, livestock feed, poultry, grain milling (cotton, fruits, nuts raisins, vegetable oil, molasses, rice, fertilisers, retail goods)	Maize, sorghum, soybeans, wheat, grain milling, leather, palm oil, livestock feed, poultry, eggs, beef, pork, diary and dairy products, edible oils, and flour.	Maize, wheat, soybeans, rice, sorghum, millet, beans, pigeon peas, cow peas, chick peas, green gram, groundnuts, raw cashew nuts, sesame seed, Niger seed, coriander seeds, cumin seed, linseed, ginger, cloves, sugar, coffee, fertiliser and tea.	Grains (maize, soybean, wheat, barley etc.), edible nuts, sugar, cocoa, coffee, spices and vegetable ingredients, dairy, rice, packaged foods

Sources:Zambeef PLC (2017a; 2017b); Sutton and Langmead (2013), Olam (2017a; 2017b); Olam Annual Report (2014); Olam Investor Presentation (2015); Olam Press Release (2015); ETG Agro Brochure (2015); Patel (2014); AFGRI Annual Reports (2004-2013); Competition Commission of South Africa (2012); AFGRI (2017).

⁴ This is defined as the number of years since the agribusiness first cross-border investment in a market in SSA.

2.3.1 Case Study One: AFGRI Limited

The trajectory of AFGRI's rich 93-year history can be summarised in three distinct phases, namely: The first phase between 1923 and 1995, in which the Oos Transvaal Kooperasie (OTK) operated as a farmer-owned cooperative within the context of a government-controlled, single-channel marketing system for grains and oilseeds.

The second phase was between 1996 and 2014, in which OTK was renamed and rebranded as AFGRI Operations Limited, with the intent of transforming the firm into a corporate structure reflective of a modern, world-class agribusiness company. Market deregulation in 1996 allowed for the firm's public listing on the Johannesburg Securities Exchange (JSE), which saw a diverse AFGRI shareholding structure that consisted of professional asset managers holding public shares on behalf of institutional and individual investors (AFGRI 2013; Ducastel & Anseeuw, 2014). During this period, AFGRI expanded its sub-Saharan African footprint through the John Deere equipment dealership branches in Zimbabwe, Zambia and Ghana, and a 51 % majority acquisition in Nigeria's poultry venture, BNOT Harel. To add, AFGRI entered into a partnership with the United States Agency for International Development (USAID) in 2012 through its Southern African Trade Hub's (SATH) Strategic Partnership Grant (SPG) to invest in Zambia, constructing grain storage infrastructure with a capacity of 20 000 tons, servicing 3 000 smallholder farmers (Hayat, Chikura, Kapoor & Gajarsa, 2016).

The third phase between 2014 and the present saw AFGRI being delisted from the Johannesburg Securities Exchange (JSE), to become a private company after its takeover by AgriGroupe – a South African registered holding company controlled by a consortium based in Mauritius called Joseph Investments (Wessels, Mazwai & Valodia, 2014). The consortium is led by a pool of North American investors that hold 60 % of AgriGroupe. The main investor in this pool is Fairfax Financial Holdings, a financial holding company listed on the Toronto Stock Exchange (Canada). Figure 2.6 below shows a chronology of AFGRI's various major entry modes with respect to internalisation events over the 20-year period from 1995 to 2015.

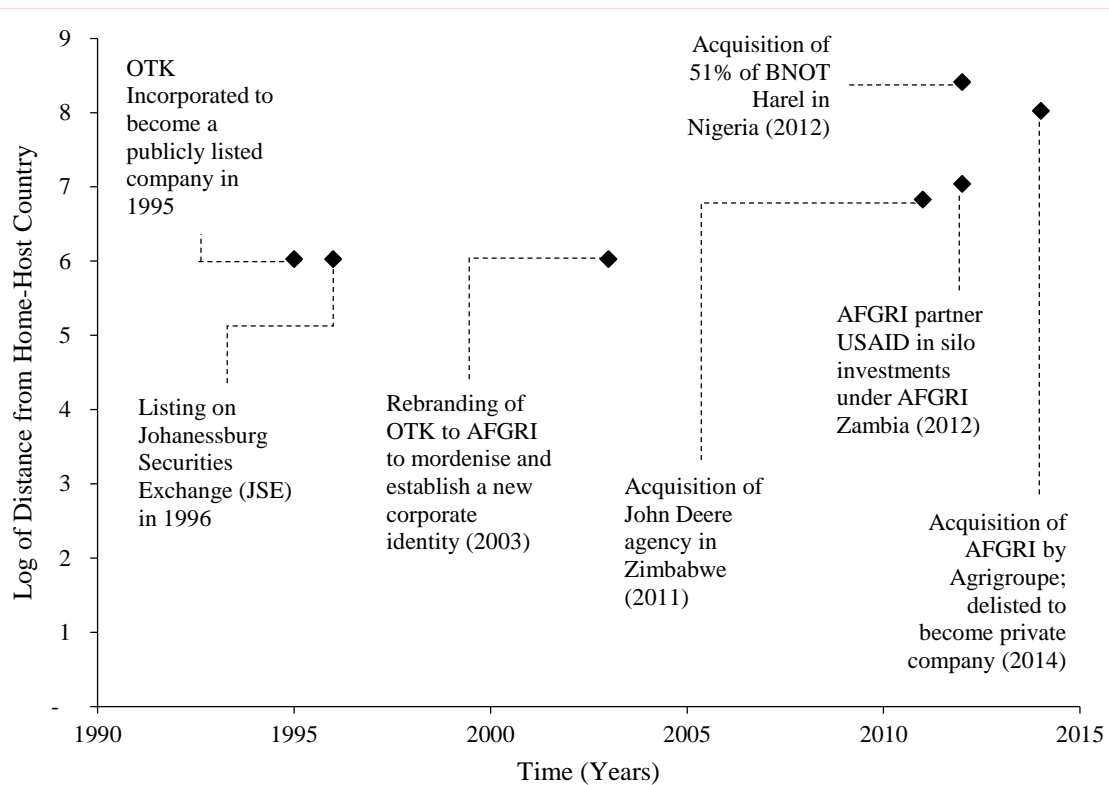


Figure 2.6: The internationalisation of AFGRI Limited (1995-2015)
 Source: Hayat *et al.* (2016); Wessels *et al.* (2014), AFGRI (2013; 2017).

In 2008, AFGRI established the Collateral Management International (CMI) (Pty) Limited, a subsidiary firm providing storage and warehouse services in 19 countries in sub-Saharan Africa. Though not shown in Figure 2.6, the establishment of CMI has been one of AFGRI's important subsidiaries in terms of footprint expansion in the continent.

2.3.2 Case Study Two: Zambeef Private Limited Company (PLC)

The trajectory of Zambeef's growth path from 1995 to 2015, and the description of the firm's expansion can be summarised by two key phases (Figure 2.7 below): First, is an organic growth phase between 1994 and 2002 – in which the firm's expansion was limited by access to capital, high interest rates, and a struggling Zambian economy. During this period, growth was attained by renegotiating the firm's debt, and buying cattle on credit and selling for cash, while keeping overheads low (Sutton & Langmead, 2013). The period between 1995 and 1999 saw Zambeef entering into a 5-year contract with South African retail chain, Shoprite, to supply meat to its seven outlets; expanding its own butchery outlets; and entering into an equal partnership with Zambezi Ranching and Cropping, which led to a shift in its operations to Huntley Farm. In

1997, the company began growing wheat, and added poultry to its line of products in 1999 through its subsidiary called Zamchicks, and then stock feed through its Novatek subsidiary.

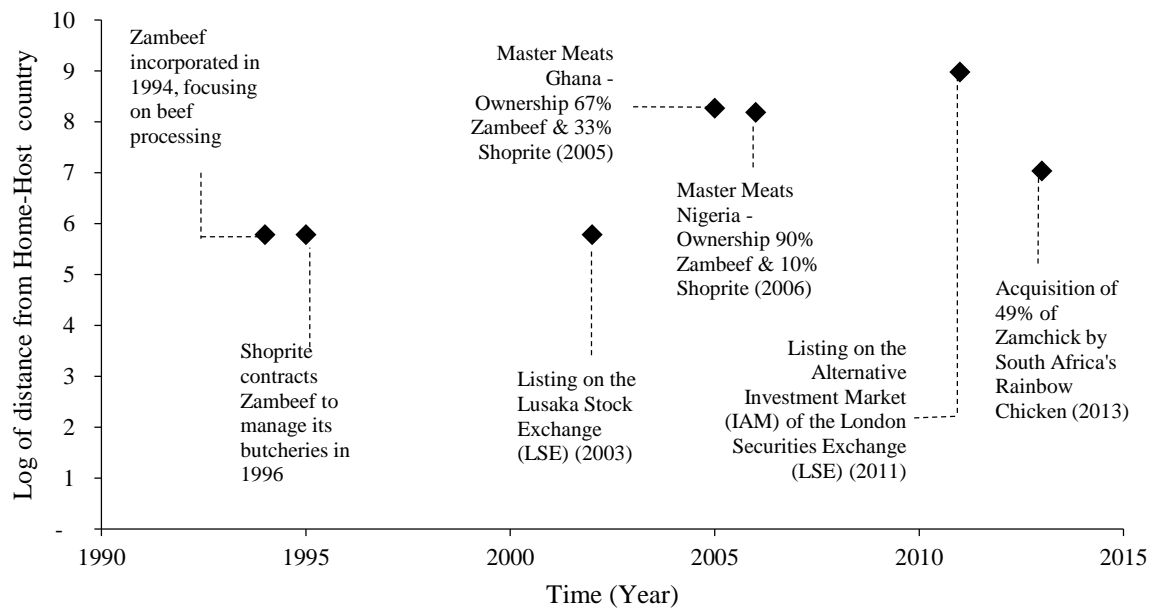


Figure 2.7: The internationalisation of Zambeef Products PLC (1995-2015)

Source: Sutton and Langmead (2013), Almas and Obembe (2014), Zambeef (2017a; 2017b)

Second, is a non-organic growth phase between 2003 and present – in which Zambeef tapped into local and foreign equity markets, firstly through a listing on the Lusaka Stock Exchange in 2003, and listing on the Alternative Investment Markets (AIM) of the London Stock Exchange (LSE) in 2011.⁵ The former was followed by Zambeef’s expansion into Ghana in 2005 and Nigeria in 2007, through a majority partnership with Shoprite. Despite listing on the Lusaka Stock Exchange in 2003, Zambeef only undertook raising its first equity capital in 2008, which paved the way for acquisitions of Master Pork Limited, Zamanita Limited, Chiawa Farm Asset and Nanga Farms, all in the same year (Almas & Obembe, 2014).

2.3.3 Case Study Three: Export Trading Group (ETG)

Established in Kenya in 1967, ETG, then known as the Export Finance Company Limited, was initially focused on distributing and marketing products manufactured by MNCs such as

⁵ During the period 2007 to 2011, the firm’s total assets increased threefold, from more than US\$69 million to US\$245 million. Over the period, Zambeef’s growth was heavily influenced by the company’s increased access to finance through equity markets, which offered new avenues to access non-bank finance.

Colgate-Palmolive and Del Monte in neighbouring Eastern and Central African countries (Patel, 2014). In 1981, Mahesh Patel, the company's CEO, bought 100 % of the shares in the Export Finance Company to establish the Export Trading Company (ETC), which became known for agricultural commodities. Between 1990 and 1995, the company's corporate head office was moved from Kenya to Tanzania, while establishing storage and logistical capacity throughout Eastern and Central Africa to support its trading activities. In the 2000s decade, ETG became more diversified by focusing more on integrating its supply chains. In 2002, the firm set up its agricultural manufacturing, milling and processing, dal mills, corn-soya blend factories, and cleaning and packaging plants. Between 2005 and 2008, ETG expanded into primary agriculture through the acquisition of farms:

- a) Acquired, in 2005, the Kapunga rice project in Mbeya, Southern Tanzania, which is the largest rice estate in Tanzania, with a total size of 7 023 ha. The estate also produces wheat (3 000 ha) and barley (300 ha).
- b) Acquired, in 2007, through ETC Bio-energy Limited, Mpongwe Farm, consisting of a total area of 45 421 ha, making it the largest grain estate in Africa, and the largest wheat farm in Zambia. The farmland includes irrigated and dryland production. Of the land utilised, 3 000 ha was irrigated and 5 000 ha dryland production, out of an available un-cleared area of 29 000 ha.
- c) Acquisition, in 2008, of tea estates, through Sociedade de Desenvolvimento da Zambezia (SDZ), of Cha Sarl in Gurue, Mozambique, which produce black CTC tea. The estate has a total of 1 655 ha under tea, with a further 3 000 ha being developed. The tea is exported mostly to Mombasa (see Figure 2.8 below).

Apart from the existing farms, ETG held 136 140 ha of greenfield investments in Tanzania, 156 000 ha in Mozambique, and 13 000 ha in the DRC (ETG, 2011). However, ETG divested all its farming assets as part of a corporate governance restructuring process in which a parent holding company (Export Trading Group PTE Limited) was established in Singapore, with the Export Trading Company (ETC) Holdings being based in Mauritius. The latter manages the procurement or warehousing, processing and specialisation divisions.

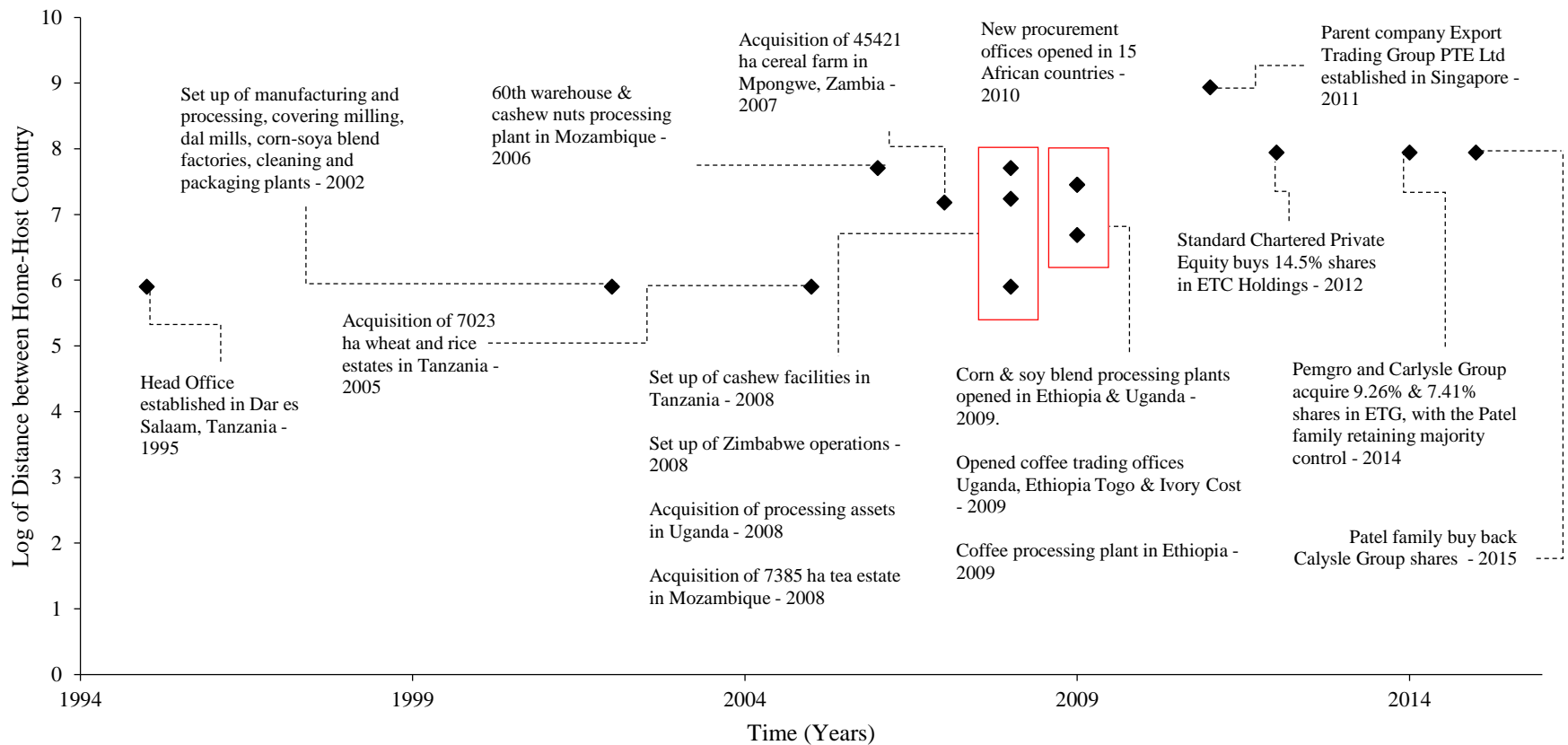


Figure 2.8: The internationalisation of the Export Trading Group (ETG) (1995-2015)

Source: Patel (2014); ETG Agro Brochure (2015); <http://agriqueafrica.com/speaker/mahesh-patel/>

Currently, ETG has 21 processing centres and over 500 multi-sized warehouses across 23 different African counties in which they operate, with a combined storage capacity of 1.8 million tons. From a logistics perspective, ETG operates an in-house fleet of more than 600 commercial trucks through its partnership with Pwani International Hauliers Limited. In enhancing its logistical capacity at the port of Dar es Salaam, ETG entered into a joint venture with the Sharaf Group from the United Arab Emirates (UAE), as well as the National Development Corporation (NDC) of Tanzania, to develop two inland container depots to handle containerised cargo. In addition, ETG has long-standing partnerships and agreements with all major shipping lines that dock at major ports. The emphasis on partnerships along its supply chain makes ETG largely a firm influenced by the need to take advantage of collaborative advantage.

2.3.4 Case Study Four: Olam International Limited

Olam International limited was established in 1989 by the Kewalram Chanrai Group (KCG)⁶ in Nigeria. The firm started off as Olam Nigeria PLC, and almost immediately moved its headquarters to London, before eventually setting up base in Singapore. Olam was initially set up as a non-oil based export operation, while also initially exporting cashews out of Nigeria to India. Over time, the firm evolved from a single-product, single-country geography, to a multi-product MNC, and this growth phenomenon can be traced back to 1994 when Olam started its cross-border expansion into West Africa (including Benin, Togo, Ghana, Côte d'Ivoire, Burkina Faso, Senegal, Guinea Bissau, Cameroon and Gabon) and East Africa (Tanzania, Kenya, Uganda, Mozambique and Madagascar) – exporting cotton, cocoa and shea nuts. The regional expansion between 1994 and 1999 coincided with widespread deregulation of food markets across many parts of the African continent, which essentially created more space for private-sector market entry. This expansion occurred as described below.

Firstly, Olam International Limited went through a period, between 1994 and 2000, in which the company grew organically, establishing supply chains for cashew nuts, cocoa, Arabic coffee, cotton, wheat, sesame, among other products – from warehousing, primary and value-

⁶ The KCG itself has a rich history which pre-dates 1860, in the province of Sindh, India (now part of Pakistan). The Group was founded by two brothers – Jhamatmal and Thakurdas Chanrai – who started off by setting up a small textile-trading operation, which later grew and diversified into handicrafts and agricultural commodities. It is reported that the KCG already had a presence in West Africa (Sierra Leone, Ghana and Nigeria) as far back as 1900.

added processing, inland logistics and shipping – in Côte d’Ivoire, Ghana, Tanzania, Togo, Uganda, Gabon, Cameroon, Mozambique and South Africa.

Secondly, the firm went through a period of rapid financial expansion between 2001 and 2005, in which Olam International Limited deepened and expanded its financial avenues to raise more capital for growth. In 2002, Olam received external investment to acquire equity from certain agribusiness, the first being Russell Alternative Investment Fund (AIF) Singapore Investment Limited, which was managed by the AIF Capital Limited. In 2003, further equity was acquired by the International Finance Corporation (IFC) and Temasek Holdings, through its wholly owned subsidiary, Seletar Investments. It is also during this period that Olam International Limited transitioned from a privately owned public limited agribusiness entity into a publicly traded company by listing on the Main Board of the Singapore Exchange in 2005.

Thirdly, Olam has gone through a post-Initial Public Offering (post-IPO) era from 2005 to the present, which was punctuated by a period in which Temasek Holdings made strategic investments within the company itself, particularly between 2009 and 2014, by progressively increasing its shareholding to a majority controlling stake of 51.4%. In 2010, Olam International discussed a possible merger with the Geneva-based Louis Dreyfus Company, the world’s largest cotton and rice trading company. However, the merger talks broke down as the two firms failed to agree on terms.

With access to global equity markets, the post-IPO era saw Olam expanding its strategic reach in sub-Saharan Africa by making major investments in Zimbabwe, Zambia, Sudan, Senegal, Ethiopian, Nigeria and Cote d’Ivoire through key acquisitions and joint ventures (see Figure 2.9 below). These included:

- a) Entering the Zambia cotton market in 2007, and opting to extend the firm’s capacity by entering into a JV with Continental Ginnery in 2009. Olam expanded its product portfolio in Zambia by entering the grain market, trading wheat, soybeans and maize.
- b) A greenfield cocoa processing plant was located in Abidjan, Cote d’Ivoire, and a primary processing and warehousing plant was constructed in San Pedro in 2010.
- c) Acquisition of Crown Flour Mills in 2010, one of the top three wheat millers in Nigeria, for US\$107.6 million. In the same year, Olam entered into an 80/20 joint venture with

the Lababidi Group (LG) to set up a port-based sugar refinery in Nigeria⁷ in which Olam's equity contribution for its share of investment would be approximately US\$80 million and LG US\$20 million.

- d) Acquisition of a 49 % stake in Zimbabwe's biggest cotton company, Aico Africa Limited, for \$50 million. In 2013, it was reported that Olam intended to sell of its cotton assets from in Zimbabwe, but these reports were unsubstantiated.
- e) Acquisition of the Northern Coffee Corporation Limited (NCCL) and its 4 400-ha coffee estate, with the intention of planting 2 000 ha to Arabica coffee.
- f) Acquisition of farmland in Ethiopia for Arabica coffee production, for which Olam was allocated farmland in the coffee growing regions.
- g) The establishment and incorporation of a subsidiary, Societe Senegalaise de Marchandises Alimentaires (SOSEMA), which imports and distributes milk powder and rice (2008).

⁷ See: <http://olamgroup.com/news/olam-international-partners-lababidi-group-in-8020-joint-venture-to-set-up-a-us200-m-port-based-sugar-refinery-in-nigeria/#sthash.NePVhMBg.dpuf>.

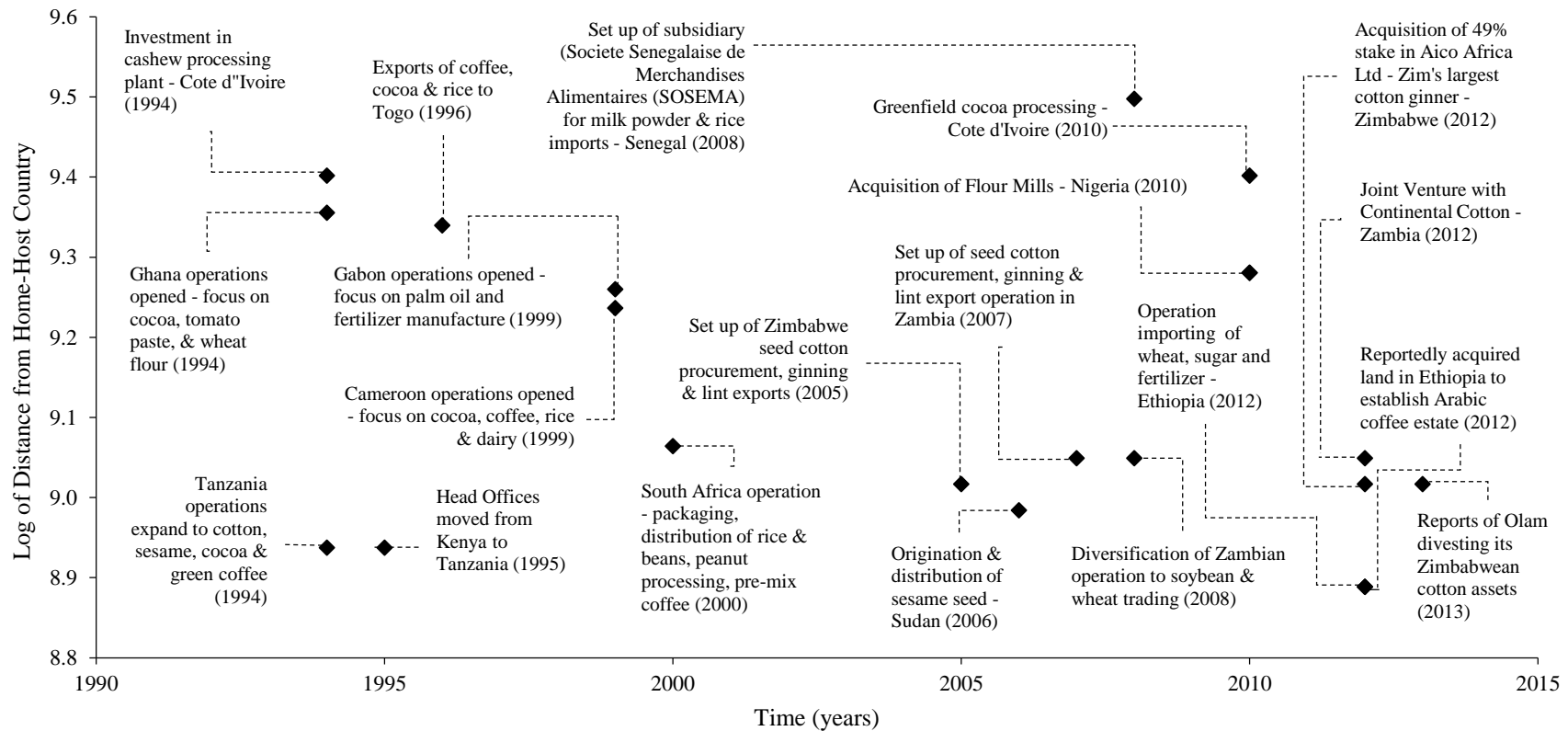


Figure 2.9: The internationalisation of the Olam International Limited (1994–2015)

Source: Olam Investor Relations /Financial Results (2010-2014), <http://olamgroup.com/investor-relations/financial-information/financial-results/>

After being initially based in Nigeria, Olam International Limited moved its headquarters to London, under Chanrai International Limited. However, the Group was incorporated in Singapore in 1995 as a public limited company. A year later in 1996, Olam strategically relocated its entire operations from London to Singapore because the latter granted a concessionary tax rate of 10 %, which was subsequently reduced to 5 % in 2004. Upon relocation to Singapore, the KCG's agribusiness was restructured such that it was wholly owned by Olam International Limited in Singapore. It was during this phase that Olam globalised its operations, establishing sourcing and marketing operations in Indonesia, Vietnam, Thailand, China, Papua New Guinea, the Middle East, Central Asia and Brazil.

2.4 SUMMARY

A review of agribusiness MNCs in sub-Saharan Africa shows that there has been a considerable amount of trans-boundary agribusiness investments over the past two decades. All the considered agribusiness case examples identified in this Chapter reveal various degrees of vertical and horizontal integration, which are reflected by the diverse scales and scopes of agribusiness acquisitions of farmland and “mid-stream” assets. There is no pattern that appears to be distinctly African, as the consolidation of value chain activities is common across all agribusiness firms regardless of geographic focus and operational environments. This presents clear evidence of convergence as strategies and practices are broadly common across the continent, regardless of sub-Saharan Africa being characterised by unpredictable trade and price policies, political risks, insecure supply of commodities, weak institutions and poor enforcement of regulations. Thus, strategies and practices are similar regardless of uniqueness of country-specific risks to cross-border investments.

Given the foregoing, there are two particular issues worth noting. The first issue relates to a key observation that most investment activities by ABCD firms are outside of sub-Saharan Africa. The previously noted high risks in sub-Saharan Africa might explain why ABCD firms – who are assumedly risk-averse – have not been as significantly dominant in the continent as they are elsewhere in the world. Therefore, this scenario partly explains why sub-Saharan

Africa has been previously overlooked by mainstream analysis of agribusiness consolidation and investment.

The second key observation relates to the distinct disparity in scale and size with respect to the turnover of ABCD firms versus agribusiness MNCs operating in sub-Saharan Africa. Initial observations indicate that cross-border market entry activities by large ABCD firms in sub-Saharan Africa is largely through exports, with relatively little entry activity through WOS or JV. Models of market entry by ABCD firms are mainly determined by market size (that is, commodity volumes), as their business models are volume-driven.⁸ Sub-Saharan Africa is regarded as a relatively small market compared to other parts of the world, accounting for 8 % of grain production and 10 % of global import demand (Own calculations based on FAO Stat, 2017).

The study argues that despite being regarded as a relatively small market, sub-Saharan Africa is significant enough to warrant scholarly attention given that the value and size of its agribusiness sector will treble over the next decade. In light of the observed evolution of agribusiness MNCs outlined in this Chapter's reference examples, the study further argues that the question of size and market entry is worth further interrogation. In Chapter 3, the question of whether size is significant in determining the market entry of agribusinesses into sub-Saharan Africa is therefore analysed within the context of convergence.

⁸ Personal Communication with Jean Craven.

CHAPTER 3

THE COVERGENCE – DIVERGENCE PARADOX: THE NOTION OF TWO EXTREMES

3.1 INTRODUCTION

The growing concentration and increasing dualisation⁹ of the agro-food sector in sub-Saharan Africa has been observed by analysts such as Anseeuw (2013) and Jayne *et al.* (2015), who projected this process to continue unabated if future scenarios of land consolidation and biased agribusiness investments persist. Observations by Felgenhauer and Labella (2008) seem to re-enforce the latter, albeit partially, when they summarised large agribusiness MNCs as players that “... enter the most dynamic economies of the [African] continent through a variety of [strategies] ... mostly non-equity linkages such as franchises and licensing, but also including wholly owned subsidiaries as well as sales and marketing offices.”

Two key initial interpretations can be drawn from the respective sets of observations outlined above. First is the divergence paradigm that can be explained by the increasing dualisation of the sector as described by Anseeuw (2013). Second is the convergence narrative that describes the commonality and dominance of internationalisation strategies of agribusiness MNCs outlined by Felgenhauer and Labella (2008). As these processes occur concurrently, the contradiction that emerges from divergence on the one hand and convergence on the other is akin to a convergence-divergence paradox.

According to Anseeuw (2013), the key drivers of the dual restructuring process (divergence) are two-fold, namely, (i) the pervasive influence of financial actors and large corporations who assert holistic control and influence over value chains, and (ii) the extensive integration of

⁹ Anseeuw (2014) defined a dual sector as a regime that is characterised by biased power relations between a dominant few large agribusiness MNCs on the one hand, and a heterogeneous set of marginalized and largely resource-poor small to medium scale farmers, on the other.

agricultural commodity value chains. However, key drivers for agribusiness internationalisation (convergence) are less well-known, not least because there have been no empirical studies undertaken to systematically analyse agribusiness entry modes in sub-Saharan Africa.

Against this backdrop, the need for a more grounded empirical analysis of agribusiness entry modes in sub-Saharan Africa can be further justified on several grounds. Firstly, there is evidence of internationalisation of agribusiness firms, as outlined in Chapter 2, with further evidence of cross-border regional agro-food value chains that is supported by earlier analyses by Luiz and Charalambous (2009) and Mhlanga (2010). Secondly, an emerging markets perspective offers scope for bringing new views to existing market entry mode literature, which hitherto has primarily focused on developed market observations (Sunje & Çivi, 2015). Unique characteristics of sub-Saharan Africa inspire the need for deeper empirical analyses, with motivation drawn from dissimilar market conditions such as inadequate commercial and physical infrastructure (communication, transport, and power generation), inadequate legal and regulatory frameworks, low levels of technology, cultural diversity, centrally controlled currencies, and a pervasive influence of government in markets (Sunje & Çivi, 2015). Thirdly, an agro-food sector perspective extends the breadth of knowledge to a field which has predominantly focused broadly on non-agribusiness sectors (Agarwal & Ramaswami, 1992; Blomstermo, Sharma, & Sallis, 2006; Bornkessel, Bröringb & Omtac, 2016).

This Chapter makes an attempt to answer the fundamental question of the factors that drive sub-Saharan Africa's agribusiness internationalisation, with a more specific enquiry that focuses on the influence of firm size on market entry decisions. The Chapter seeks to answer the following questions: As firms grow and increase in size, do they converge towards a common market entry strategy? If so, would this convergence phenomenon be significant enough to have implications on the duality (divergence) of the sector?

In order to address the questions above-mentioned, the Chapter is organised as follows: The second section discusses a theoretical framework, followed by a third section that describes the data and selected variables considered pertinent to the convergence-divergence questions. The fourth section outlines the empirical strategy and the fifth section discusses the model

applied in the analysis. This is followed by a discussion of results. Finally, the Chapter closes by summarising the concluding points, and discussing implications for future research.

3.2 THEORETICAL FOUNDATION

There are four strands of theory or models that are fundamental to entry mode research, namely transactions cost theory (TCT), bargaining power theory, and internalisation and resource-based theory (see Figure 3.1 below).

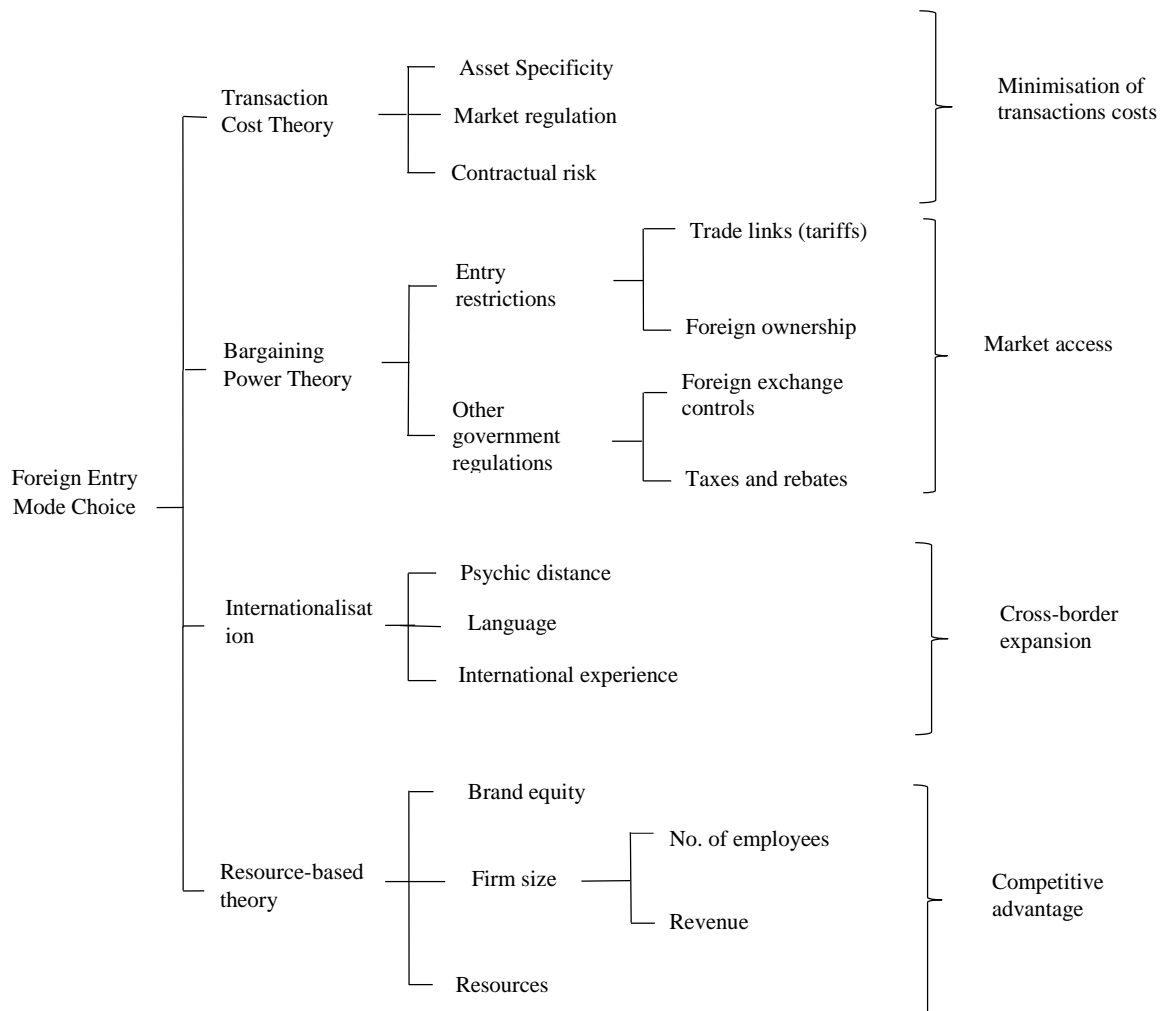


Figure 3.1: Integrated theory framework to entry mode choice

Transaction cost theory remains the basis upon which business decisions are made, particularly because it focuses on the minimisation of transaction costs (Coase, 1937; Williamson, 1975) as firms seek to attain efficient and competitive cross-border agro-food supply chain structures.

Transaction cost theory informs the structuring of markets and contracts (Palenzuela & Bobillo, 1999), both of which control opportunism in instances where, for example, a partner firm takes advantage of the entrant firm's dependency by abusing the entrant firm's assets (such as its technology and brand) (Madhoka, 1997). To reduce the threat of opportunism, firms entering new markets are more likely to use entry modes with higher levels of asset control. In this sense, transaction cost theory is instructive to our understanding of how firms select the most efficient entry modes in terms of optimising transaction costs and resource commitments when operating in a foreign market (Brouthers *et al.*, 2000). For instance, in a scenario where the firm has fewer resources to commit, a low-asset control entry mode (such as franchising or licensing) might be an ideal option (Chen & Mujtaba, 2007).

When the firm considers how to negotiate access to foreign markets, the bargaining power theory provides an important perspective. Bargaining power theory argues that a firm's entry mode choice depends on the relative bargaining power of the entrant firm when negotiating to gain access to the foreign market with the host government (Luo, 2001; Taylor *et al.*, 2000). The host government's leverage in negotiations lies in its hegemony over market access, whereas the firm's bargaining power stems from its proprietary assets and contributions to the host nation's economy (such as employment, tax, and foreign investment) (Taylor *et al.*, 2000). According to Palenzuela and Bobillo (1999), entrant firms choose entry modes that either match or enhance their bargaining power. Under a scenario in which countries are courting foreign firms to invest in their agro-food markets, entrant firms tend to have more bargaining power, and may opt for entry modes that afford them high levels of control (Taylor *et al.*, 2000). In such cases, it is possible that entrant firms enhance their bargaining power by setting up a JV and utilise the strength of a local partner in negotiating with the government (Tse *et al.*, 1997).

A more dynamic view of entry mode choice is proffered by the temporal trend by which internationalisation occurs as firms increase expansion capabilities in foreign markets as a result of experiential knowledge about the market, and accumulate more resources (Blomstermo *et al.*, 2006). The internationalisation perspective posits that firms typically start with domestic sales only, then start exporting to a certain foreign market through an agent before establishing WOS, and then at times going into foreign direct investments (FDI) (Johanson & Vahlne, 1977). Thus, as the firm acquires experience and resources in the foreign

market, it is more inclined to use entry modes with higher control levels and resource commitments, which ultimately become a source of advantage that can allow it to dominate the foreign market in the long run (Blomstermo *et al.*, 2006). The international theory views foreign market entry as inherently risky due to market uncertainties such as lack of market knowledge, political instability and cultural differences (Johanson & Vahlne, 1977).

An important dimension of entry mode choice is the entrant firm's resource deployment – which is reflected in resource-based theory. The theory views a firm as a unique collection of tangible and intangible resources, which allow for a cost-efficient operation that becomes the source of the firm's competitive advantage (Das & Teng, 2000; Sharma & Erramilli, 2004). According to the theory, a firm chooses the entry mode that can either exploit its existing resources more effectively, or enhance its ability to generate new resources in a foreign market (Sharma & Erramilli, 2004). Consider, for example, a firm which possesses resources that are sufficient to exploit emerging opportunities in a new market. The firm can choose an entry mode that allows for a high level of control, while enhancing its ability to maximise returns. In contrast, a low-control entry mode can also enhance a firm's competitive advantage in a new market by relying on its host country partner's resources (such as capital and physical facilities).

3.3 THE VARIABLES AND DATA DESCRIPTION

3.3.1 The variables

Due to a lack of information, the study collected primary data through a survey which sought to establish the drivers of agribusiness entry modes by gathering views and perspectives of 67 agribusiness executives of companies engaged in various forms of cross-border trade and investments. An open-ended questionnaire – set out in Appendix A – was administered between March and June 2015 to elicit opinions regarding what agribusiness executives regarded as the key drivers influencing their decisions to expand into agro-food markets in sub-Saharan Africa. Drawing from the thoughts and perceptions of agribusiness leaders, the study identified a total of 25 variables that are critical in entry mode selection. The identified variables are outlined in Figure 3.1 above and further explained in Table 3.1 below. Broadly, the variables were divided into two broad categories, namely:

- a) Firm-specific factors – which include asset specificity, brand equity, financial capability, international experience, and firm size,
- b) Country-specific factors – which capture the host country, home country, and home-host country conditions.

It is important to note that the TCT variables were captured through asset specificity,¹⁰ market controls, production factors and contractual risks. Bargaining power theory factors were captured by government policy variables under market entry restrictions, and these included regulations restricting foreign exchange, or foreign ownership of firms, taxes, rebates, and trade barriers such as tariffs. Internationalisation theory was embodied in market factors and “home-host country” factors such as trade agreements, distance, and cultural and language differences. Resource-based theory factors were expressed by variables such as financial capability, international experience (foreign market knowledge), and product and logistics synergies (integrated value chains).

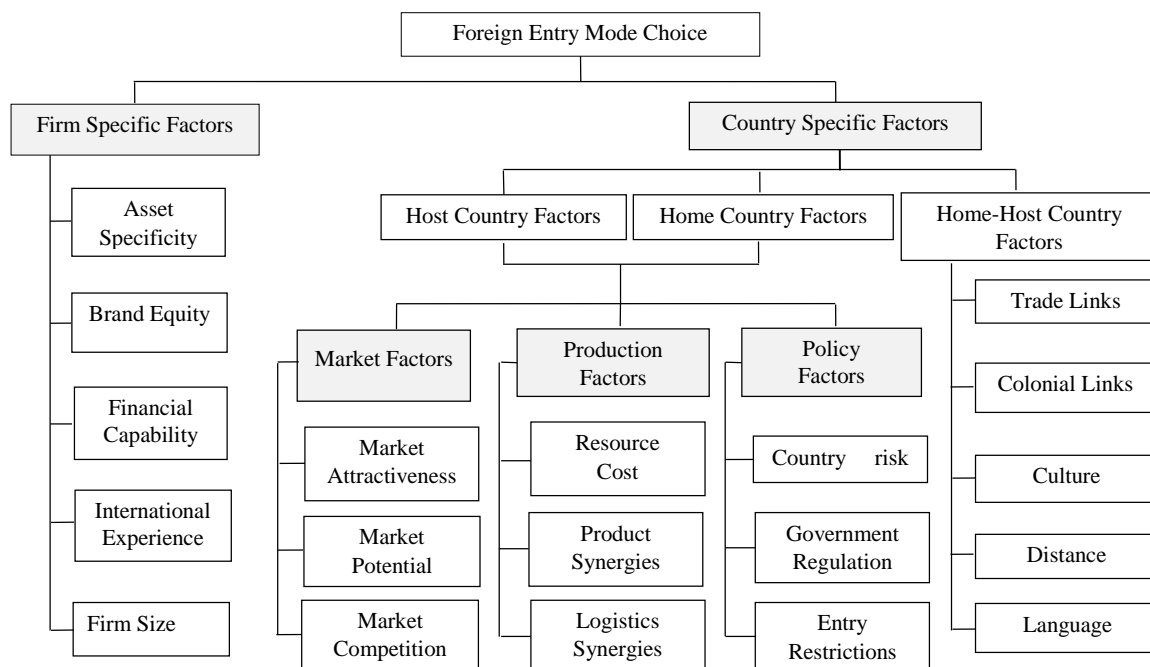


Figure 3.2: Factors influencing entry mode choice of agribusinesses

¹⁰ In TCT-terminology, specific assets have less value outside the transaction in which they are tailored to be utilised (Williamson, 1985).

Table 3.1 below provides definitions of the variables that were identified as being critical in the decision-making processes that influence market entry in foreign countries. The critical variable of concern – firm size – was classified under firm-specific factors. Firm size is defined in two ways – first as the number of employees in the firm, worldwide (Brouthers & Brouthers, 2000) and secondly, as the gross revenue of the firm. International experience was captured in two ways – first, as the number of countries in which the firm has a presence (diversity) and the number of years in which the firm has been present in foreign markets (intensity) (Brouthers, Brouthers & Werner, 2008a; Brouthers & Dikova, 2010).

Table 3.1: Definition of entry mode variables

Category	Variable name	Variable Definition
Firm Specific Factors	Asset Specificity	A unique and specialised asset that generates high value and competitive advantage for the firm (Hill, 1990).
	Brand Equity	Exclusive image rights of a firm's brand, associated with quality, uniqueness, and therefore, competitive advantage.
	Financial Capability	A firm's assortment of financial resources, including stock, cash flow, and assets.
	International Experience	The number of years since the firm's first cross-border business activity; The number of countries in which the firm has a presence
	Firm Size	The number of employees worldwide, and the revenue of the firm
Home-Host Country factors	Trade links	Bilateral trade agreements between host and home country
	Colonial links	Portuguese, anglo- and francophone colonial ties between host and home countries
	Common Language	Portuguese, English, and French language differences between home and host countries
	Distance	Distance between home and host countries
Market Factors	Market Growth Potential	Growth in sales in the host market
	Population Growth	Growth in the population
	Income Growth	Growth in average incomes
	Market Competition	Presence of other rivals in the host market
	Market Attractiveness	Profit and revenue potential of host market
Production Factors	Labour Costs	Relative cost of labour in host market
	Skills availability	Availability of skilled manpower
	Cost of Land	Relative cost of land in host market
	Transport Costs	Relative cost of moving goods in host market
	Electricity availability/ cost	Relative cost of electricity, and whether available
	Product/service synergy	If product/service in host market aligns with firm's core focus
Policy factors	Market Entry Restrictions	Tariffs, taxes and investment restrictions foreign ownership of firms in host market
	Political Risk	Political stability & democracy in host market
	Contractual Risk	Ability to enforce contracts in host market
	Investment Risk	Likelihood of loss due to politico-economic conditions
	Government regulation*	Regulations restricting foreign exchange and market controls.

The Chapter defined entry mode choice of agribusinesses either as the most common entry strategy or the last choice of foreign entry that the firm has made in Sub-Saharan Africa over the period 2011–2015, through categorical variables labelled (0), (1) and (2), explained as follows:

- (0) Independent exporting – defined as non-equity market-based modes where the agribusiness firm uses entities in the home country to either provide or produce their product or service,
- (1) JV – where the entrant firm shares equity ownership of the host country operations with a local partner firm, and
- (2) WOS – where operations where the investing firms hold an equity-share of 95 % or more, which can include greenfield, mergers and acquisitions (Brouthers *et al.*, 2008a).

The 2011–2015 reference time period ensured that changes in the institutional environment which occurred were relatively fixed (Brouthers, Brouthers & Werner, 2008b). Moreover, potential problems arising from recall bias were minimised by only asking the most recent entry (Brouthers & Brouthers, 2003).

Using the information above – and assuming that the observed data are generated by a small number of unobserved factors – the study made use of principal component analysis to extract from the standardised data matrix the unobserved common factors, or the linear combinations, of different “policy factor” measures to construct “policy uncertainty”. Therefore, the study ended up using a proxy for policy uncertainty which reduces omitted variable biases and model policy uncertainty in entry modes. The proxy also presented more explanatory power. More specifically, in the case the first principal component – which roughly corresponds to the mean of the data – accounted for 72 % of the variation in the four above-mentioned policy factor variables. This is important because with policy uncertainty, the study was able to reduce the dimensionality of a set of prospective policy explanatory variables, while retaining most of the information provided by the aforementioned policy variables. This process is discussed in more detail under sub-Section 3.4.1.

3.3.2 The sample data

3.3.2.1 Size of firms and their sample distribution

A key dilemma encountered in the study was the appropriate definition of the “size” variable. Firstly, there was the option of defining size according to the firm’s own attributes, or those associated with its market size. For instance, size may be best defined by using the volume the firm exports to sub-Saharan Africa, or the actual overall size of the country markets in which it has a footprint. For ease of measure, the study chose to measure size according to the attributes of the firm. Second was the problem of which firm attributes best describe firm size. In this sense, a number of firm-specific attributes were considered, namely gross revenue, product volume handled, and the number of people employed by the firm. Of the three considered options, revenue was adopted as being the appropriate firm size variable. Figure 3.3 below shows a histogram of the distribution of the sizes of the firms that were sampled, after applying the natural logarithm to firm revenues.

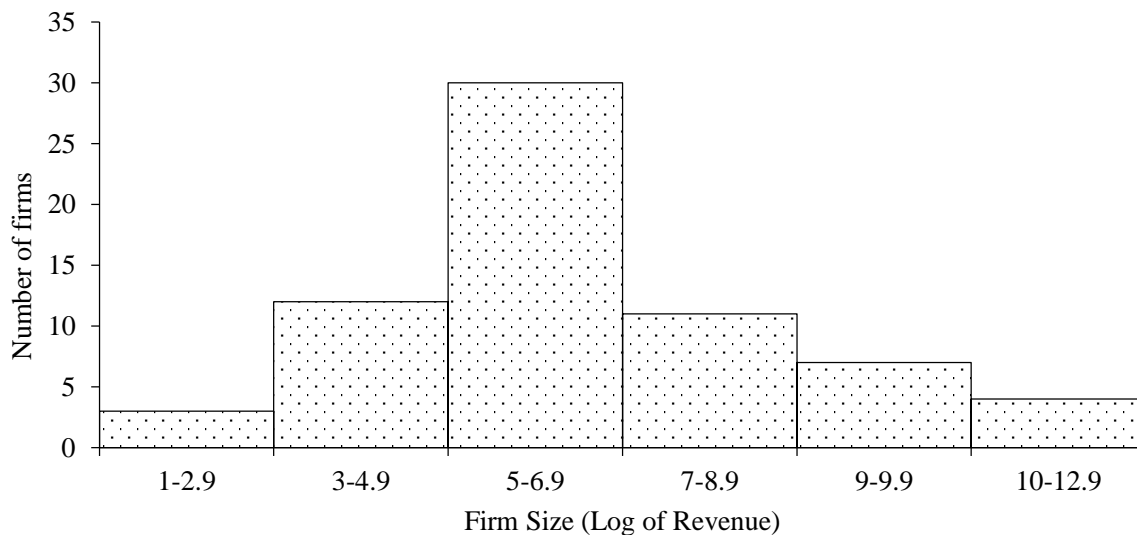


Figure 3.3: The sample distribution of firm size

Source: Analysis results

The smallest firm in the sample had an annual turnover of US\$3 million, while the largest firm had US\$120 billion. As these firms were at the extreme margins, most firms in the sample were located within the US\$160 million to US\$996 million range, which comprised 50 % of the total number of firms in the sample. As shown in Figure 3.3 above, this range was the peak of the

distribution. However, the mean of the distribution (US\$6.4 billion) was well above the mode (US\$662 million) and the median (US\$464 million), which therefore reflected a positive skew. In fact, 85 % of the firms in the sample were smaller than the average firm size.

3.3.2.2 Firm size and their entry modes

Given the firm-size distribution in the sample data, it becomes important to unpack the data from the perspective of observed entry modes. Figure 3.4 below splits the data into three parts, as follows: The top 10 largest firms (which account for 15 % of the sample), the bottom 10 small-sized firms (which also account for 15 % of the sample), and the firms within the middle (which account for 70 % of the sample).

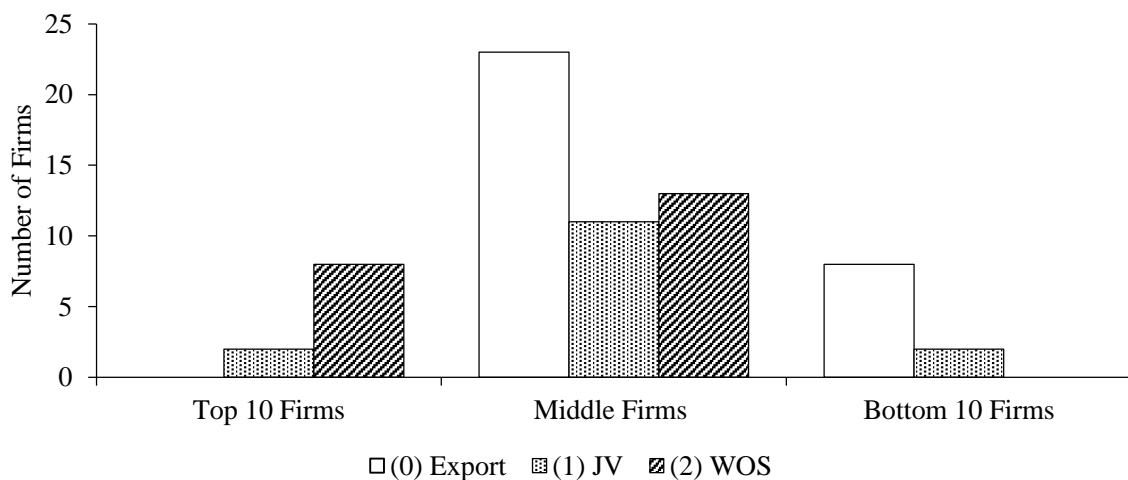


Figure 3.4: The sample distribution of firm size and entry mode

Source: Analysis results

The picture shown in the split sample is interesting for a number of reasons. Firstly, it shows that the top largest firms in the sample enter markets more through WOS, and less through JVs. None of the top 10 firms enters new markets through exports. Secondly, this picture is almost a mirror image of the bottom 10 firms, which are entering markets more through exports, and less through JVs. None of the bottom 10 firms is entering new markets through WOS. The firms in the middle show a mixed picture. That is, 50 % of the firms in the middle are entering new markets through exports, 23 % through JVs, and 28 % through WOS.

3.3.2.3 Types of firm and their entry modes

Agribusiness firms were initially asked to self-designate themselves according to eight different categories, namely input providers, farmers, manufacturing (coded from “Level One: Basic processing” through to “Level Four: Advanced processing”), wholesaler/distributor, retailer, intermediary, third party intermediaries, and others. Initial testing of the questionnaire showed that this nuanced gradation proved difficult to handle for most respondents. Therefore, the question was simplified to only three category options and these were: manufacturing, services and diversified. Manufacturing took into account all levels of agro-processing, while services included credit and insurance provision, warehousing and third party trading. Diversified firms covered all agribusiness MNCs that performed both manufacturing and services, or those that also included primary production in addition to manufacturing and services. Figure 3.5 below shows the three above-mentioned firm type classifications, grouped according to entry mode.

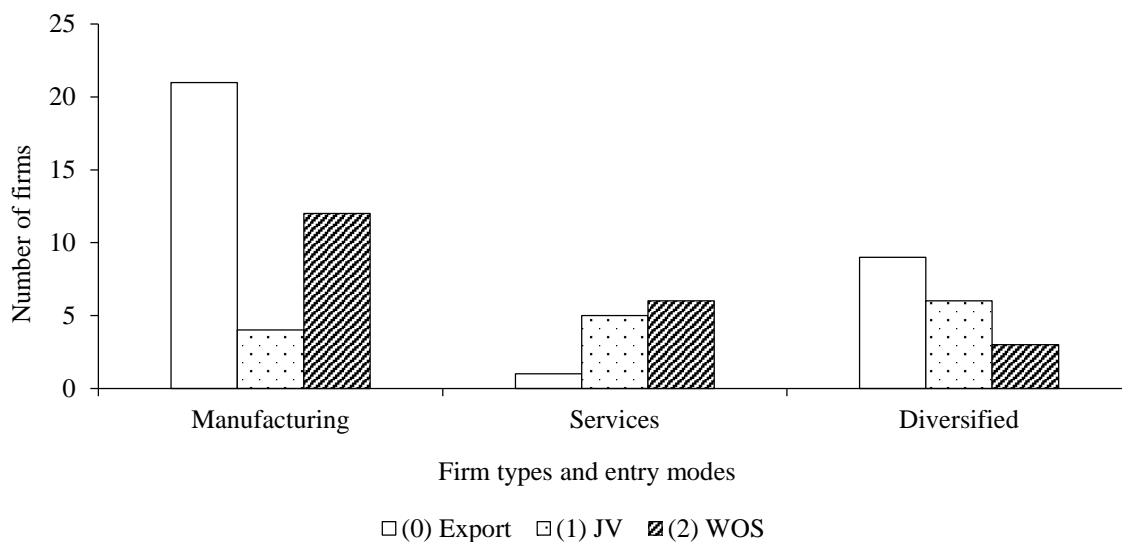


Figure 3.5: Firm types and entry mode strategy

Source: Analysis data

Overall, 55 % of agribusiness MNCs in the sample classified themselves as manufacturing-focused, with 18 % as services, and 27 % as diversified agribusinesses. Among manufacturing firms alone, 57 % are entering new markets through exports, 32 % as WOS, and 11 % as JVs. The reason why manufacturing firms engage more in exports rather than alternative entry modes is due to the high sunk costs associated with WOS investments abroad, and asset

specificity that could limit the chances of having JVs with other firms. Services firms are involved more in WOS and JVs, and less so in exports. The opposite seems to be true for diversified agribusinesses, which export more, while engaging less in WOS and JVs.

3.3.2.4 Origin of agribusiness firms

Agribusiness firms in the sample originate from various parts of the world. To simplify the diversity of their origin, the study partitioned the agribusiness MNCs into three categories, namely foreign/overseas-based firms (outside Africa), South African-based firms, and those based in the rest of sub-Saharan Africa (minus South Africa). Figure 3.6 below shows entry strategies according to the origin of the agribusiness MNCs.

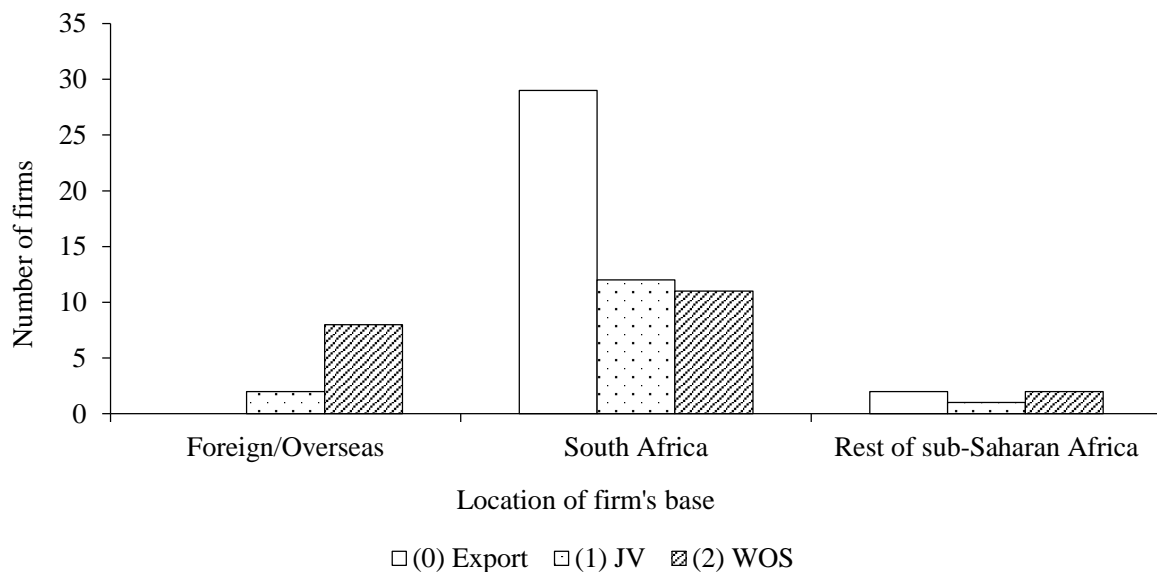


Figure 3.6: Location base of firm and entry strategy

Source: Analysis results

According to Figure 3.6, 15 % of the firms in the sample originate from foreign/overseas territories. None of the foreign/overseas-based firms is entering new markets in sub-Saharan Africa via exports, opting instead to use JVs and WOS. Firms within the rest of sub-Saharan Africa (in countries such as Mauritius, Kenya, Tanzania, Zambia, and Kenya, but not South Africa) constitute 7 % of the sample. The data shows that firms originating from the rest of sub-Saharan Africa are using a more or less equal mix of exports, JVs and WOS entry strategies

when entering new markets on the continent. Meanwhile, South African-based agribusiness MNCs enter new markets twice as much as they do through JVs and WOS. That is, 56 % of South African-based firms enter other markets within subSaharan Africa through exports, compared with 23 % through JVs and 21 % through WOS.

The sample, however, includes 78 % of agribusiness-firms which originate from South Africa. The reason why the sample contains a greater number of South African agribusiness firms arises from a number of factors. Firstly, agribusiness firms that originate from South Africa were more responsive to the electronic survey, as compared with their sub-Saharan African and foreign-based counterparts. South African agribusinesses were more responsive because part of the survey was implemented through the South African-based Agribusiness Business Chamber – a trusted institution. Secondly, follow-up visits to elicit responses from non-South African-based agribusiness firms were generally difficult and infeasible, due to distance and time. As a result, the general weakness of the study is that the sample is largely dominated by agribusiness firms originating from South Africa, and is therefore prone to sampling bias.

The redeeming feature of the study is that it focuses more on destination markets rather than on the origin of agribusiness firms. Moreover, agribusiness MNCs place little regard on their places of origin because they view themselves as cross-border supply chain managers whose bases of operations are determined by strategic decisions relating to tax and capital flow incentives. In that sense, locational base is a matter of chance, as agribusiness firms can change their base at any given time as firms seek new profit maximising havens that enhance their ability to move capital globally.

3.4 METHODOLOGY

3.4.1 Empirical Strategy

The variables mentioned in Table 3.1 above were used in a second round of interviews, in which agribusiness executives were asked provide their opinions regarding the importance of the identified variables. A questionnaire was administered to a sample of 67 agribusiness executives from across sub-Saharan Africa. Each variable was measured using a 7-point Likert scale, in which low values represented low importance, and high values represented high

importance. According to the categories outlined in Table 4.1, policy factors scored the highest average (6), while home-host country factors scored the least average points (3). The three most important variables were Contractual Risk, which scored an average of (6), Foreign Exchange Controls (5) and Investment Risk (5). The least important factors were Population Growth (3), Home-Host Distance (2) and Colonial Links (2).

Using the above information – and assuming that decisions of market entry are generated by a small number of unobserved factors – the study made use of a principal component analysis (PCA) to extract the unobserved factors from the standardised Likert scale data. For instance, a principal component analysis was applied to the seven different measures of policy uncertainty – Exchange Control, Market Control, Foreign Ownership Control, Market Entry Restrictions, Political Risk, Contractual Risk, and Investment risk – to end up with a proxy for policy uncertainty that reduces omitted variable biases. Such a proxy also presents more explanatory power. More specifically, in this case, the first principal component of policy uncertainty – which roughly corresponds to the mean of the responses – accounts for 72 % of the variation in the seven above-mentioned policy uncertainty variables. This is important because the new “policy uncertainty” variable reduces the dimensionality of a set of prospective policy uncertainty explanatory variables, while retaining most of the information provided by the respondents. The same technique was applied to “Firm Size” (Number of Employees and Revenue), “International Experience” (Number of Countries and Number of Years), and “Market Factor” (Growth Potential, Population Growth, Income Growth, Competition, and Market Attractiveness), and “Production Factor” (Labour Costs, Skills Availability, Land Cost, Transport Cost, Electricity Cost and Availability, and Product Synergy).

Furthermore, the study defined two categories of agribusiness – manufacturing and service – in order to control potential influences from intra-industry differences. Manufacturing in this case involved input manufacturing and agro-processing, while services entailed financial and credit providers, insurance, commodity trading services, and storage, among others. Adopting advice from previous research (Brouthers, 2002; Brouthers & Brouthers, 2003; Brouthers & Nakos, 2004), a dummy variable is assigned to the respondents’ answers to whether the firm had established a manufacturing (value of 0) or a service operation (value of 1). Following advice from Brouthers *et al.* (2008b), the study also controlled for potential

overseas and sub-Saharan Africa home country differences through a dummy variable, which were coded (1) if the firm is based in a specified home country in sub-Saharan Africa, and zero (0) if otherwise.

3.4.2 The Model Framework and Specification

The study applied a Multinomial Logit Model (MLM) to understand the relationship between the size of the agribusiness firm and its choice of entry into a foreign market. In applying this model, two caveats are worth noting and these relate to the interpretation of the model's coefficients. First, the coefficients represent differences between the various entry mode choices, making it problematic to discern implications for each entry choice from the coefficients (Wulff, 2015). To add, contrary to binary models, a positive MLM coefficient does not necessarily imply that an increase in the size of the firm will be associated with an increase in the probability of choosing a particular entry choice (Williams, 2006; Long & Freese, 2006). Second, the relationship between the size of the firm and the probability of a given choice outcome is non-linear and may change across a range of different firm sizes. To capture the variations in the relationship between firm size and the entry choice, the study adopted advice by Wulff (2015) and used predicted probabilities and marginal effects.

3.4.3 Predicted Probabilities

In interpreting the relationship between size and entry modes, the study considers the computation and plots of predicted probabilities. Graphical illustrations present a powerful way of interpreting the relationship between the size of the firm and its choice of entry in a foreign market. The dependent variable – which is the entry choice – was considered as an unordered categorical variable, taking the following values, as previously discussed: 0 (Exports), 1 (JV) and 2 (WOS). Predicted probabilities for the MLM approach can be calculated as follows:

Equation 3.1:
$$p_{ij} = \Pr(y_i = j | x_i) = \frac{\exp(x_i' \beta_j)}{\sum_{j=0}^2 \exp(x_i' \beta_j)}$$

Thus, Equation 3.1 calculates the probability that the i^{th} agribusiness MNC will choose a particular entry strategy j where ($j = 0,1,2$); where x_i represents independent variables that theoretically explain the choice of entry mode, β_j represents a set of regression coefficients which includes the intercept β_{0j} and slope coefficients β_{kj} . Each entry choice has a set of coefficients. Overall, the model in Equation 4.1 has $3(j)$ equations, with $2(j - 1)$ of these being estimated. For the model to be identified, β_j is set at zero for one of the entry mode choice categories. Such a category would be the base category, against which coefficients are interpreted. Setting $\beta_0 = 0$ and computing the predicted probability yields the following equations:

Equation 3.2:
$$p_{ij} = \Pr(y_i = j|x_i) = \frac{\exp(x'_i\beta_j)}{\exp(x'_i0) + \sum_{j=1}^2 \exp(x'_i\beta_j)}$$

Equation 3.3:
$$= \frac{\exp(x'_i\beta_j)}{1 + \sum_{j=1}^2 \exp(x'_i\beta_j)}$$

And the baseline category is prescribed as follows:

Equation 3.4:
$$p_{ij} = \Pr(y_i = 0|x_i) = \frac{\exp(x'_i0)}{\exp(x'_i0) + \sum_{j=1}^2 \exp(x'_i\beta_j)}$$

Equation 3.5:
$$= \frac{1}{1 + \sum_{j=1}^2 \exp(x'_i\beta_j)}$$

Equations 3.3 and 3.5 were used to calculate predicted probabilities that describe the relationship between the size of agribusiness MNCs and their market entry choices. A graphical plot of predicted probabilities is a useful and more effective way of presenting the changing relationship between the size of the agribusiness MNC and the predicted probabilities of the different entry options. Given that predicted probabilities are point estimates, the study

computes a confidence interval in order to account for sampling variability. In this study, the delta method is used to compute standard errors.

Despite being a powerful illustration, graphical information, as a means of interpreting predicted probabilities, can be highly subjective. For instance, it may be difficult to determine a “firm size-entry mode” relationship graphically with much precision, particularly at points where the slope of the curve is flat. In order to make sense of a given set of results, analysts are left to rely on marginal effects as an added interpretative tool.

3.4.4 Marginal Effects

Marginal effects measure the slope or curvature of the prediction function at a specified value of the explanatory variable (Bowen & Wiersema, 2004). Marginal effects are important in that they provide information about the change in predicted probabilities of an entry choice as a result of a change in firm size. The importance of measuring marginal effects is that it acts as a validation and confirmation technique that draws valid conclusions about the direction and magnitude of the relationship between firm size and entry modes. Despite their complicated derivation, marginal effects for a MLM assume a distinct and simple form (Wooldridge, 2010; Greene, 2003). Marginal effects for a continuous variable are expressed as follows:

Equation 3.6:
$$ME_{ij} = \frac{\partial p_{ij}}{\partial x_{ik}} = \frac{\partial \Pr(y = j | x_i)}{\partial x_{ik}} = p_{ij} (\beta_{kj} - \bar{\beta}_i)$$

where $\bar{\beta}_i = \sum_{m=1}^2 \beta_{km} \Pr(y = m | x_i)$ weighted average probability of β_{km} . It is important to note that Equation 4.6 is non-linear, and that the marginal effects differ across the range of values of all of the model’s variables. According to Wulff (2015), marginal effect values are dependent on a number of factors, which include the probabilities of other alternative entry mode choices, and the effect of x_{ik} on the probabilities. The implication is that changes in marginal effect values that arise as x_i changes could, in essence, lead to negative marginal effect for values of x_{ik} in some instances $\beta_{kj} < \bar{\beta}_i$ and positive marginal effects in others $\beta_{kj} > \bar{\beta}_i$. Thus, the sign of the marginal effect varies across the range of the predictor.

The study assesses marginal effects for a given firm size, ranging from the small- to the large-size agribusiness MNCs, holding all other variables in the model at their mean values. The marginal effects are then plotted against the corresponding firm size to demonstrate how the marginal effects vary over the different firm sizes.

3.4.5 Assumptions

The MLM approach is underpinned by the assumption of independence of irrelevant alternatives (IIA). The IIA assumption means that the odds of a firm's particular entry choice outcome are not dependent on the presence of alternative entry options. Therefore, the probability of opting for one entry choice versus another is not dependent on the number of alternative entry options included. That is, adding other choices does not affect the probability of choosing a particular option. Mathematically, this can be expressed as an "odds ratio" as follows:

Equation 3.7:

$$\frac{\Pr(y = m|x_i)}{\Pr(y = n|x_i)} = \exp\{x_i(\beta_{m|b} - \beta_{n|b})\}$$

The IIA assumption can be tested by way of two possible tests, namely the Small-Hsiao (1985) test and the Hausman McFadden (1984) test. The Small-Hsiao test randomly divides the data into subsamples, and compares estimated coefficients of the null model with those of the restricted model. Inevitably, the results of each computed sub-sample will be different with other sub-samples. In order to ensure that results can be replicated, the study sets the seed of the random-number generator at 1000 iterations. According to Cheng and Long (2007), both the Hausman McFadden (1984) test and the Small-Hsiao (1985) test are unreliable for small samples, with certain data structures showing poor properties and sometimes conflicting results. However, these tests remain the most commonly used and widely recommended tests to assess the IIA assumption (Bowen & Wiersema, 2004). If the test is significant, the test statistic rejects the assumption of IIA. In the analysis, both tests proved insignificant, and therefore failed to reject the assumption of IIA.

3.5 RESULTS AND DISCUSSION

The interpretation of the model results consists of three key themes, namely:

- a) Model selection – which includes testing the hypothesis and fitting the model,
- b) A synthesis of results using the summary measures, and
- c) Graphical analyses of predicted probabilities and then marginal effects.

Table 3.2 below presents the MLM regression results of entry mode choice against an array of explanatory variables. Entry choice is given as an unordered categorical dependent variable. In Table 3.2 below, Model A (Panels 1, 2, and 3) contains control variables only, and Model B (Panels 4, 5, and 6) contains control variables plus the predictor variable – firm size.

Table 3.2: Results of MLM regression

	Model A			Model B		
	(1) Export vs JV	(2) Export vs WOS	(3) JV vs WOS	(4) Export vs JV	(5) Export vs WOS	(6) JV vs WOS
International experience	-1.595 (0.208)	0.135 (0.187)	-0.206** (0.023)	-2.015* (0.068)	- 1.733** (0.006)	0.282 (0.816)
Sector	-1.121 (0.389)	0.568 (0.269)	0.924† (0.101)	-0.151 (0.447)	-6.240† (0.093)	-0.867*** (0.000)
Non-SSA based	0.301 (0.287)	0.741 (0.653)	0.232 (0.418)	0.008 (0.065)	0.120 (0.286)	-0.004 (0.323)
Production Factor	0.834 (0.315)	-0.125 (0.158)	-0.157 (0.240)	0.345 (0.543)	0.104 (0.186)	- 0.423 (0.123)
Policy uncertainty	0.011 (0.219)	-0.431*** (0.165)	-0.321 (0.613)	0.032** (0.006)	-0.002*** (0.191)	-0.030*** (0.001)
Firm Size				-0.520*** (0.000)	-0.257** (0.043)	0.263** (0.018)
Constant	1.952*** (0.009)	0.273 (0.552)	1.886*** (0.000)	1.248*** (0.031)	-2.480** (0.000)	1.233 (0.011)
R ² Nagelkerke	0.268	0.268	0.268	0.412	0.412	0.412
AIC	1.980	1.980	1.980	1.749	1.749	1.749
χ^2	51.96***	51.96***	51.96***	117.8***	117.8***	117.8***
Change in χ^2 Model A				74.81***	74.81***	74.81***

Source: Analysis Results

*** p<0.001, ** p<0.01, * p<0.05, †p<0.1

Standard errors in parentheses

3.5.1 Model Selection

Table 3.2 displays the coefficients of the model for the different entry choices. Three possible combinations of choices are analysed by comparing one choice against a selected base case. For instance, the last-mentioned category is the base, such that the choice equation outlined as JV vs. WOS will mean WOS is the base case.

In assessing the model fit statistics, the likelihood ratio (LR) test was significant in Model A ($p < 0.001$, $R^2 = 0.151$), implying that a subset of the explanatory variables has non-zero effects. Model B, which includes firm size, shows a large increase in χ^2 ($p < 0.001$) and a considerable increase in R^2 , which rises from 0.151 to 0.325. Therefore, Model B proves to have more explanatory power than Model A does. Moreover, Model B's Akaike's Information Coefficient (AIC) is lower (1.749), which indicates that the model fit has improved sufficiently to compensate for its enhanced complexity. Overall, the results show a good model fit when firm size is included as a predictor.

Given that the overall model is significant, and given that the predictor has more than one coefficient, a test of the significance of a predictor is required. The LR or Wald test can be used to test the following hypothesis:

H_0 : Firm size is insignificant when agribusiness MNCs consider the choice of entering new markets through either export, JVs or WOS.

With the LR test being used to compare the overall models "with" and "without" firm size, the Wald test is used, in this instance, to test the significance of the specific variable "firm size", as stated by the above-mentioned hypothesis. To that end, the study considers β_{1k} as the coefficient for firm size, and then applies the Wald test, which gives a value of 48.23 ($p < 0.000$). With this result, the study therefore rejected $H_0 : \beta_{1k} = 0$, where $k = 0,1,2$. The hypothesis that the size of an agribusiness MNC has no impact on its entry choice was therefore rejected. This conclusion is consistent with the coefficients in Table 4.2, which show that the size of an agribusiness MNC is statistically significant and positively related to:

- a) Opting for a JV over Exports ($p < 0.001$),

- b) Opting for a WOS over Exports ($p < 0.001$), and
- c) Opting for a WOS over JV ($p < 0.1$).

It is important to note that there are still grounds for carrying out an analysis of predicted probabilities and marginal effects, even if a variable is insignificant in the choice equation (Bowen and Wiersema, 2004). If individual LR statistics (or Wald test) of the firm size turn out insignificant, then predicted probabilities and marginal effects are unwarranted.

Given that JV and WOS are typically grouped in a single generic category of “equity modes”, it would be prudent to test if the two alternatives are non-distinct in this case. Thus, the study tested if coefficients of the explanatory variables for JV and WOS are the same. If $\beta_{1,1|2}, \dots, \beta_{k,1|2}$ are the coefficients for x_1, \dots, x_k from the choice of JV versus WOS, the hypothesis is therefore stated as follows:

Equation 3.8: $H_0 = \beta_{1,1|2} = \dots, \beta_{k,1|2} = 0$

The base case here is set to WOS. With a Wald statistic of 24.86 ($p < 0.001$), the study rejected classifying JV and WOS in the same category, which justifies why they should be treated separately, and not be collapsed into a single-entry strategy.

An important point to note is that the selected model is showing significance in the policy uncertainty variable. This is critical because agribusiness MNCs have noted this to a significant factor in their market entry decisions. Often cited as policy uncertainty is the effect of exchange controls, price controls, trade bans and other *ad hoc* policies that affect the day to day operations of agribusiness firms. Although one can never fully prepare for to deal with the negative impacts of *ad hoc* policy measures, selected entry strategies are chosen on the basis of their degree of effectiveness in mitigating the risks.

3.5.2 Graphical Assessment of Predicted Probabilities

The direction of the relationship between firm size and the probability of an agribusiness MNC choosing a particular entry strategy is dependent on the estimated coefficients of all variables, as previously discussed. However, as noted earlier, the estimates can vary across the range of

firm sizes, and as a consequence, estimated coefficients might not accurately reflect the relationship between the size of the firm and the probability of choosing a specific entry strategy since they capture only mean values. A more plausible approach is to compute and plot the predicted probabilities of the three different entry strategies across different firm sizes, as shown in Figure 3.7 below.

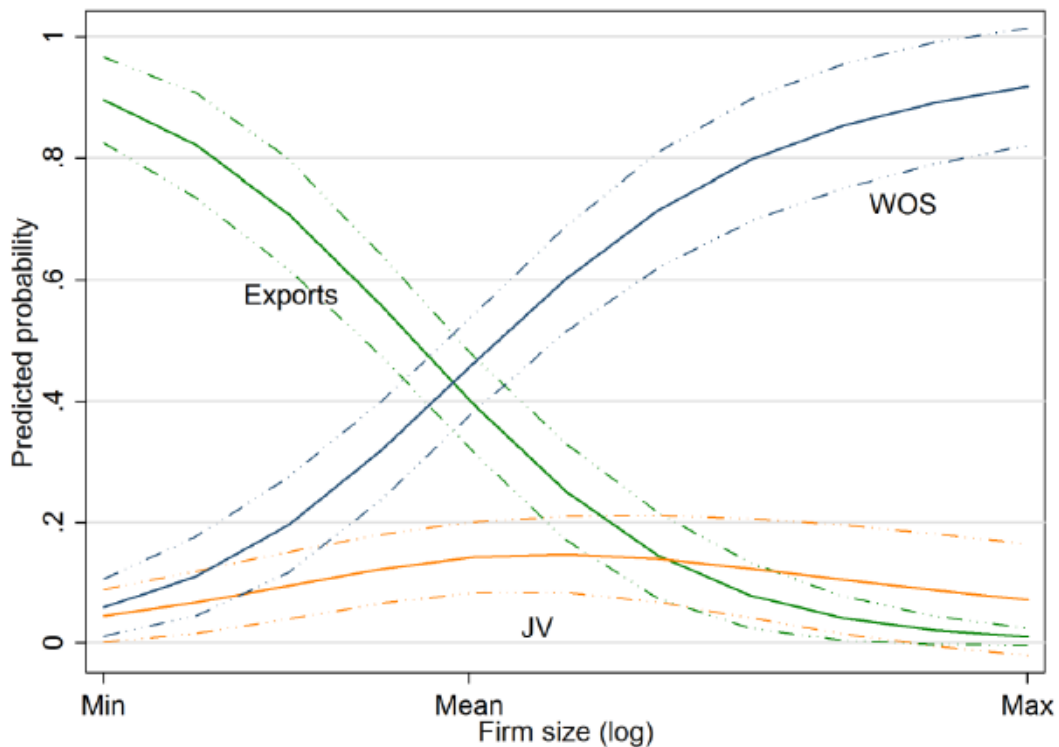


Figure 3.7: Predicted probabilities of choice of market entry

NB: Dotted lines are 95 % confidence intervals.

Figure 3.7 displays that the probability of agribusiness MNCs accessing markets through exports will drop drastically as their size increases. It seems that there is a negative relationship between the export strategy and the size of agribusiness MNCs. Smaller agribusiness MNCs (5th percentile) have an 84 % chance of entering through exports, while having a 10 % chance of selecting WOS as an entry strategy. Conversely, large agribusiness MNCs (95th percentile) have a predicted probability of 4.6 % of choosing exports and an 84.5 % chance of choosing the WOS strategy. Chances of entering via WOS increase from “minute” for small agribusiness MNCs to “considerably high” for large agribusiness MNCs, signifying a straightforward positive relationship. The results suggest that there is a threshold point around the mean, and this seems to be located somewhere around the steepest points of the “WOS” and “exports”

curves. Beyond this point, agribusiness MNCs have a higher probability of entering through the WOS strategy, than through the exports strategy.

Meanwhile, the relationship between the size of agribusiness MNCs and the JV strategy seems to be less obvious. Over the range of firm sizes, the probability of agribusiness MNCs entering markets through a JV strategy tends to first increase, but only up to a point, following which the probability begins to decline. Thus, for small agribusiness MNCs, the probability of a JV strategy seems to increase as firms become larger. However, as agribusiness MNCs grow larger, the probability of entering markets through JVs flattens off, and begins to decline.

Figure 3.8 is essentially an animated sketch of Figure 3.7, which shows the convergence-divergence phenomenon. Figure 3.8 shows that small and large firms are likely to converge around the export and WOS strategy, respectively. The more firms grow through cross border acquisitions, the more likely the increase in the gap between small and large firms, leading to divergence between the two firm groups.

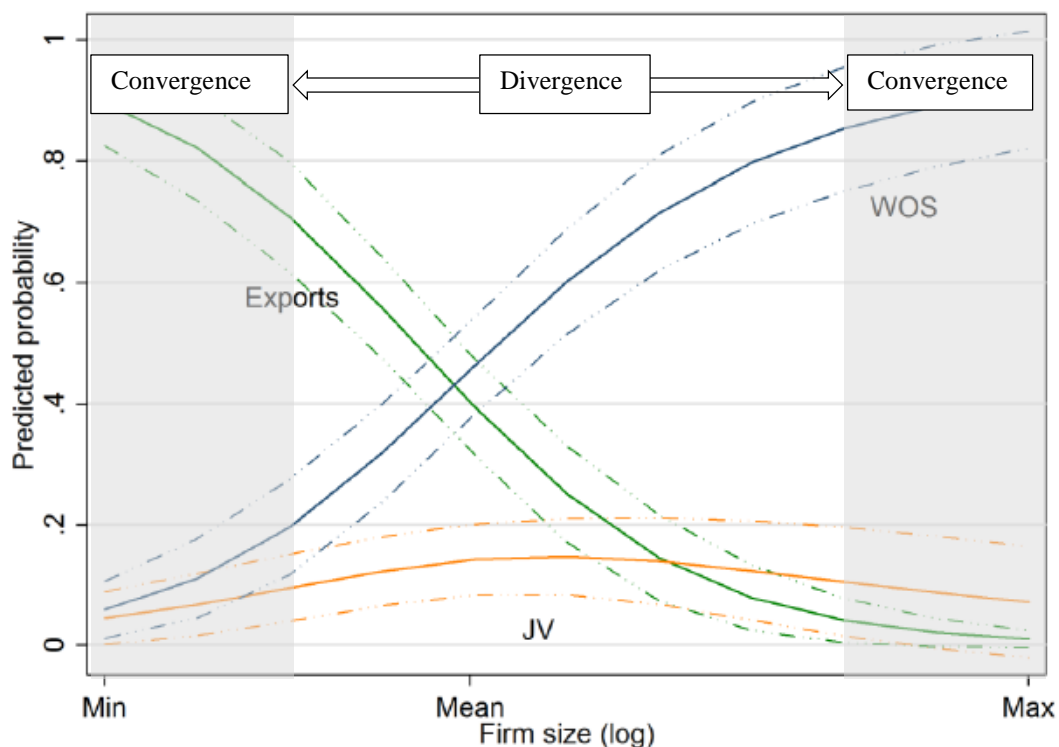


Figure 3.8: The Convergence - Divergence Phenomenon

NB: Dotted lines are 95 % confidence intervals.

The progression of convergence towards the extreme ends of the firm size spectrum on the one hand, and the widening of the gap between large and small firms on the other will likely lead to the gradual disappearance of medium-sized firms. Thus, the convergence-divergence phenomenon will lead to a deepening and widening duality of the broader agribusiness sector.

3.5.3 Graphical Assessment of Marginal Effects

The analysis of marginal effects focuses on the curvature of the relationship, instead of the relationship itself. Thus, marginal effects reflect how the relationship between the size of agribusiness MNCs and the entry strategy options changes across the range of different firm sizes. Interpreting marginal effects tends to be harder than for predicted probability curves, given that the former is based on second-order relationships. However, the loss in intuition is compensated for by the gains in information that can be extracted further, as marginal effects are able to track the relationship between the size of agribusiness MNCs and their entry choices across the range of the firm sizes.

Figure 3.9 below is a graphical illustration of the marginal effect estimations, bounded by 95 % confidence intervals. Bearing in mind that Figure 3.8 shows marginal effects that represent the slope of the curve of the predictor values, the study notes a key observation. That is, the values of the marginal effect of agribusiness MNC size on the predicted probability of WOS strategy grow increasingly positive, and start to decline for higher values of the predictor beyond the mean size of agribusiness MNCs. Great caution needs to be taken when interpreting this result. In this case, the decline in marginal effect values does not necessarily mean that the probability of agribusiness MNCs entering through WOS is declining, but rather, the rate at which the probability is increasing is now slowing down.

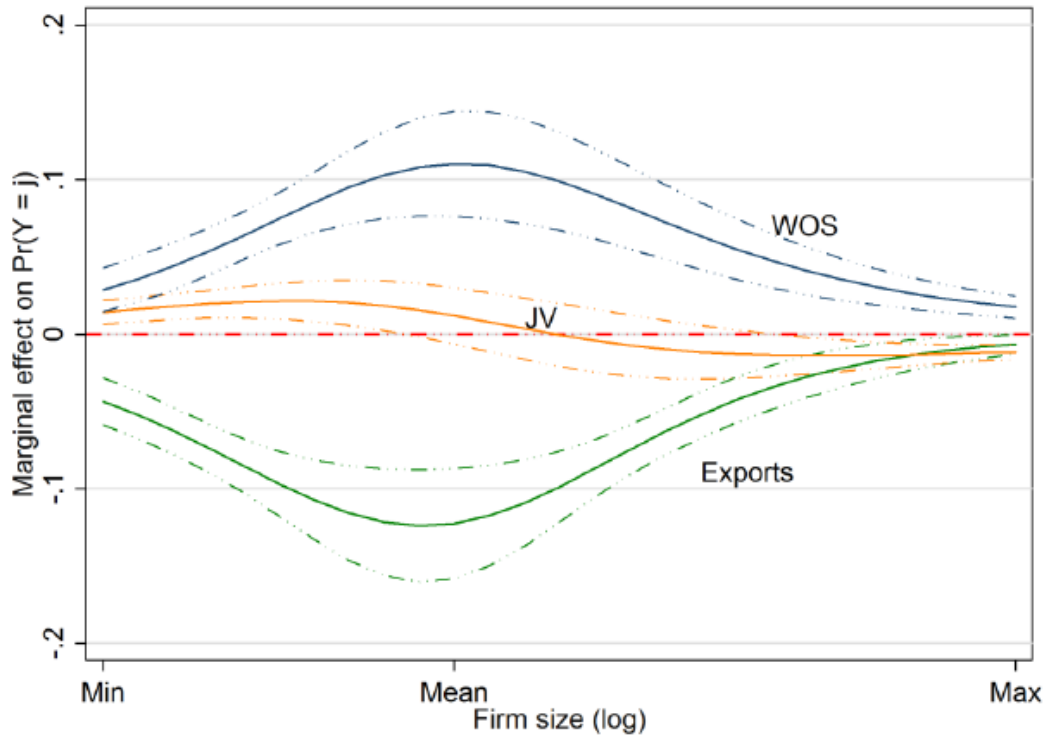


Figure 3.9: Marginal effects of firm size on entry choice

NB: Dotted lines represent 95 % confidence intervals.

The smaller agribusiness MNCs in the sample (5th percentile) have a value around 0.03, mean-sized agribusiness MNCs have a peak value around 0.11, and the largest agribusiness MNCs (95th percentile) have a marginal effect value around 0.02. Intuitively, it means that the smallest (largest) agribusiness MNCs in the sample have a low (high) probability of entering markets via a WOS strategy.

Agribusiness MNCs of sizes around the mean provide an equally interesting perspective. For mean-sized agribusiness MNCs, a 1 % increase in size is associated with an increase of 0.1 % increase in the predicted probability of entering a market through WOS strategy. Meanwhile, a 1 % increase in firm size for small agribusiness MNCs is associated with an increase of 0.02 % in the predicted probability of entering a market via a WOS strategy. These interpretations are consistent with the information contained in Figure 3.7, in which the WOS curve peaks around the mean. Equipped with the computation and plot of the marginal effects, the study can draw further conclusions regarding the shifts in the predicted probabilities for a given entry strategy, relative to changes in the size of the agribusiness MNCs at specific values.

As previously discussed, and shown in Figure 3.7, the relationship between the probability of JV strategy and the size of agribusiness MNCs is not so straightforward. To elaborate and reinforce the complexity of this relationship, Figure 3.9 shows how the marginal effects change from positive for small agribusiness MNCs, to negative for big agribusiness MNCs. From Figure 3.9, it is evident that the marginal effects for larger agribusiness MNCs close to the extreme margins of large-size firms become negative and significant.

3.5.4 Summary of Marginal Effects

To expand on the analysis of predicted probabilities and marginal effects, summary measures such as the “marginal effect and the variable mean” (MEM) and the “average marginal effect” (AME) are computed. The MEM and AME measures are particularly important in that they capture otherwise valuable information that would be lost from the prior graphical analyses. Table 4.3 reports the MEM, AME and semi-elasticity for the size of agribusiness MNCs with regard to the exports, JVs and WOS strategies.

Table 3.3: The marginal effect of firm size on the probability of entry choice

Marginal effect on the probability of:	Marginal effect at the variable means (MEM)	Average marginal effect (AME)	Semi-elasticity at variable means
<i>Exports</i>	-0.1962*** (0.002)	-0.0754*** (0.001)	-0.2001*** (0.0043)
<i>JV</i>	0.0087 (0.0064)	0.0076 (0.0067)	0.0756 (0.0698)
<i>WOS</i>	0.1467*** (0.0098)	0.0591*** (0.142)	0.2868*** (0.0321)

Source: Analysis Results

Standard errors in parentheses (Delta-method)

* p<0.05; ** p<0.01; *** p<0.001

The MEM measure shows that, by holding all variables – including the size of agribusiness MNCs – at their mean value, a 1 % increase in firm size is associated with:

- a) An insignificant increase in the probability of a JV entry strategy, of near zero (0.0087),
- b) A significant increase in the probability of WOS (0.1467), and
- c) A significant and declining probability of exports (see Table 3.4 below).

There is reason to believe that interpretations of firm size relationships at the mean completely ignore the marginal effects at the extremes. Therefore, for the avoidance of doubt, it is

imperative to look at the marginal effects of both small- and large-sized agribusiness MNCs. To show a snapshot of relationships at low and high values, Table 3.4 presents marginal effects and averaged marginal effects at one standard deviation, below and above the mean firm size.

Table 3.4: The marginal effect of firm size on the probability of choosing JV

Value of predictor	Marginal effect at variable means (MEM)	Average marginal effect (AME)	Semi elasticity at variable means
Low (1 SD below)	0.0128*** (0.0095)	0.0212*** (0.0037)	0.4351* (0.0210)
Mean	0.0299 (0.0101)	0.0251* (0.0092)	0.0986 (0.0127)
High (1SD above)	-0.249 (0.0091)	-0.0386 (0.0121)	(-0.0543) (0.0981)

Source: Analysis Results

Standard errors in parentheses (Delta-method)

* p<0.05; ** p<0.01; *** p<0.001

The summary results outlined in Table 3.4 reflect the behaviour of agribusiness MNCs with respect to the JV strategy. At low values of the predictor, the marginal effect of agribusiness MNC size is significantly positive. The semi-elasticity measure reveals that for those agribusiness MNCs that are of a size one standard deviation below the mean, a 1 % increase in their size is associated with a 43.51 % increase in their predicted probability of entering a new market through a JV strategy. To add, the AME measure reinforces this observation, revealing that a 1 % increase in the size of an agribusiness MNC is associated with a 2.12 % increase in the probability of a JV entry. In this instance, the AME measure is computed by averaging the marginal effects for the sample while holding the predictor at one standard deviation below the mean.

3.6 SUMMARY AND CONCLUSIONS

The Chapter sought to answer two key questions: Are agribusiness MNCs converging towards a common market entry strategy as they increase in size? If they do, what would be the implications of this growth path on the duality (divergence) of the continent's sector? With respect to the first question, the results of the analyses reveal that agribusiness MNCs are more likely to enter new markets through WOS as firms become larger. This means that as sub-Saharan Africa grows its agriculture and agribusiness sector towards the US\$1-trillion-mark, such growth will expectedly be dominated by progressively fewer agribusiness MNCs that are

either acquiring existing smaller firms or establishing new ones through subsidiary brands and trademarks. With JVs less likely to occur and with export entry being dominant among smaller firms, it is highly probable that over time, the continent will be dominated by fewer mega-agribusiness MNCs which are absorbing and acquiring smaller firms to form WOS in newly entered markets. This process approximates to agribusiness convergence.

Meanwhile, the convergence in agribusiness MNCs – characterised by internationalisation via WOS – will inevitably re-enforce the duality of the sector in a manner that is consistent with Anseeuw's (2014) predictions. Regardless of whether the traditional smallholder sector grows in the future or not, the corporate agro-food sector will most likely continue to consolidate, integrate and converge towards a few large-sized agribusiness MNCs. Scenarios of modest and slower-than-anticipated growth will only serve to slow down the pace of convergence, rather than halt it entirely. The key reason for this trend is that agribusiness MNCs will continue to aggressively pursue risk-reduction strategies associated with sourcing of raw materials, weather shocks and climate change, as well as risk mitigation strategies that aim to manage price volatility. In addition, sub-Saharan Africa's lack of market infrastructure such as storage, collateral management, and efficient logistics will continue to compel agribusiness to absorb non-core functions through value chain integration and consolidation via WOS. In Chapter Four and Five, the study unpacks the two dimensions that agribusiness convergence might take, namely, cluster and supplier (or sigma) convergence, respectively.

CHAPTER 4

CLUSTER (β) CONVERGENCE AND STRATEGIC AGRIBUSINESS ALLIANCES IN SUB-SAHARAN AFRICA

4.1 INTRODUCTION

The formation of strategic alliances has been a major path of expansion for many agribusiness companies across the world over the last two decades, leading to the rapid expansion of mega-agribusiness MNCs such as Archer Daniels Midland, Bunge, Louis Dreyfus and Cargill (Heffernan, 1999; Murphy, *et al.*, 2012). As noted, Felgenhauer and Labella (2008) have observed the formation of strategic alliances between domestic and foreign-based agribusiness MNCs within sub-Saharan Africa. Also noted in previous discussions were South Africa's agribusiness MNCs that have been involved in a number of M & As, a process that is now leading to broader consolidation of the agribusiness sector (ACB, 2013; Hamman, 2014; Ernst & Young, 2014). Further support for this evidence was presented through a review of some of sub-Saharan Africa's largest MNCs – which include Olam International, ETG, Zambeef and AFGRI – in Chapter 2. These examples showed that agribusiness MNCs are entering into various forms of strategic agribusiness alliances to expand into new markets across sub-Saharan Africa.

Despite the growing recognition that agribusiness alliances in sub-Saharan Africa are becoming the norm rather than the exception, existing literature seldom evaluates this subject matter empirically. In the sub-Saharan African context, as shown in Chapter 2, the intensity and scope of agribusiness alliances is a fairly new trend that is yet to receive much scholarly attention. The key specific questions answered in this Chapter are: what is the process of establishing strategic agribusiness alliances? What is the likelihood of strategic alliances surviving? These questions are important in that they help in gaining an understanding of whether the observed strategic agribusiness alliances across sub-Saharan Africa are a long-term phenomenon, or a short-term phase in the consolidation of the sector. This Chapter therefore, assesses the likelihood and stability of possible agribusiness alliances in order to better understand the process of consolidation that is currently underway. A cooperative game theory approach is used to unpack strategic alliances of agribusiness MNCs in sub-Saharan Africa. Game theory

is particularly relevant because it is used to study multi-person decision problems, and to predict the outcomes of various “game” situations. For the purposes of this Chapter, “games” are essentially commercial scenarios that involve two or more agribusiness MNCs with interlinked or interdependent commercial interests.

This Chapter is organised as follows: The section 4.2 describes the different types of games. Section 4.3 describes the theoretical foundation of cooperative games and deliberates the relevance of corporative games by discussing the empirical applications of game theory to various industry-specific case studies. Section 4.4 describes the sample data used for analysis and describes the framework of the agribusiness game model. Section 4.5 describes the agribusiness game model, and illustrates how the core solution concept, a Monte Carlo simulation and a stability index, were used to describe the behaviour of agribusiness MNCs. Section 4.6 closes with a summary of key points and some concluding remarks.

4.2 REVIEW OF GAME THEORY

4.2.1 Typology of Games

Game theory literature consists of a number of different models that can be classified using various criteria, such as the number of players in the game, whether there is cooperation or not, the distribution of benefits to players, the amount of information available to players, and the duration of the game. Figure 4.1 below outlines a schematic representation of the types of games, consistent with the categorisation by Peleg and Sudhölter (2003) and Gibbons (1992).

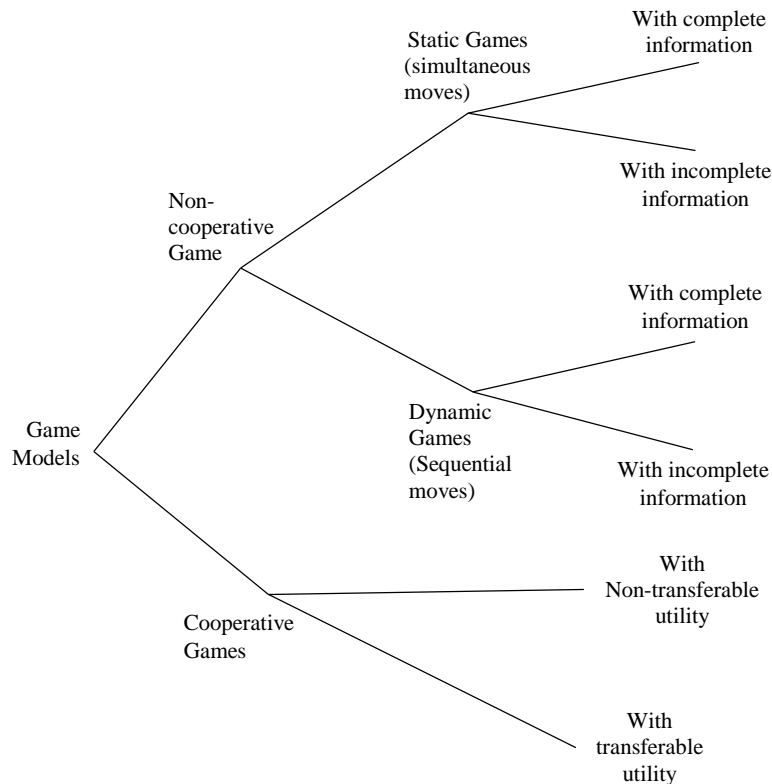


Figure 4.1: Typology of game theory?? models

Source: Adapted from Peleg and Sudhölter (2003) and Gibbons (1992).

As shown in Figure 4.1, there are two broad types of games, namely cooperative and non-cooperative games. The difference between the two types of games is that the former allows for strategic decisions to be made by “coalitions”, while the latter allows for strategic decisions to be made only by individual players. Non-cooperative games can be partitioned according to information availability¹¹ and whether moves are played sequentially or simultaneously.¹²

Cooperative games – which are otherwise known as coalitional games – are essentially situations in which a coalition, instead of individual firms, determines strategies. In such scenarios, the individual firms ‘cooperate’ by way of binding agreements about the sharing of revenue, which are technically called “pay-offs” in game theory literature (Harsanyi & Selten, 1988). Cooperative games can be further split into two sub-categories, namely games with “transferable” and “non-transferable” utility. In games with transferable

11 Information (a)symmetry is when the players’ pay-off functions are (un)known to all players, in which case, it will be a game of (in)complete information.

12 Sequential or simultaneous move games – In the former, players make moves after the other player has already made a choice, while in the latter, all players choose their actions at the same time, without knowledge regarding the other players’ choices.

utility, a player's utility can be shifted to another player, without any loss in utility to the overall coalition. However, this is not possible in a game with non-transferable utility, since the utility is not transferable among the members of a coalition.

4.2.2 Game Theory Applications

Game modelling has been the subject of extensive theoretic analysis. Paradoxically, the development of game theory models has not been matched with a similar level of empirical application to practical industry work. In fact, the use of game theory modelling in empirical strategic alliance work has been limited. The paucity of applied industry game models has more to do with the pre-eminence of "industrial organisation" and "business management" qualitative methodologies, rather than quantitative mathematically inclined game theoretic approaches (Savunen, 2009). The divide between the two perspectives and the lack of a unifying framework that intersects these distinct disciplines explains, to a large degree, the surprisingly moderate contribution of computational methodologies to what has ostensibly been a business management-dominated field. Closing this gap is part of the efforts of this study.

Recent contributions of applied work that intersect strategic alliances and cooperative game theory have focused on narrow and well-defined areas of business cooperation, providing practical models and solution concepts to explain particular industry trends. They also introduce numerical calculations to verify proposed theoretic concepts as a basis of understanding business behaviour. The recent literature on strategic alliances and game theoretic applications has been extended to various industry sectors which include shipping, boat construction, energy, water and telecommunications – but none in the agribusiness and food sector (see Table 4.1 below). Nonetheless, the Shapley value solution concept has been a widely applied method of choice in scholarly contributions that analyse alliance relationships, with other additional other methods – such as the core and τ -value – also being employed.

Table 4.1: Related strategic alliance studies and methods used

Author(s)	Title	Industry	Solution Concept(s)
Song and Panayides (2002)	A conceptual application of cooperative game theory to liner shipping strategic alliances	Shipping	Core solution
Jarimo (2004)	Innovation Incentives in Enterprise Networks – A Game Theoretic Approach	Boat construction	Egalitarian solution without threats; Relative threats solution; Modified Shapley value.
Parrachino, Zara and Patrone (2006)	Cooperative Game Theory and its Application to Natural, Environmental And Water Resource Issues	Water	Several solution concepts reviewed
Savunen (2009)	Application of the Cooperative Game Theory to Global Strategic Alliances	Telecom	Shapely value
Muller (2013)	Optimal exercise and profit sharing of joint real investments in the energy industry	Energy	Shapely and τ -value

Source: Song and Panayides (2002); Jarimo (2004); Parrachino, Zara and Patrone (2006); Savunen (2009), Muller (2013)

In their analysis of strategic alliances of liner shipping companies, Song and Panayides (2002) conceptualised alliances as a game in which inter-organisational relationships among “liner companies” are based on deliberate and strategic decisions. Song and Panayides (2002) apply the core solution approach to determine the incentives for liners within an alliance, compared with those that continue to operate singly. Similar work by Jarimo (2004) used a game theoretic approach to analyse how enterprise networks create incentives for innovation. Using an illustrative example of the boat-building industry, the analysis identified a supplier network of cooperative companies with individual, shared, and partly conflicting interests. The author described alliance strategies as a combined optimised solution that was based on “relative threats”, an “egalitarian solution without threats” and a modified Shapley value.

In another study, Parrachino *et al.* (2006) provided a review of various ‘water use’ cases in which they apply game models to multi-objective water projects. In their analysis, Parrachino *et al.* (2006) were able to determine optimal situations to allocate scarce water resources under various cost-sharing scenarios and institutional arrangements. The application of game theory enabled the authors to identify stable and efficient water-use agreements that would allow for long-term sustainable water project investments.

In analysing the energy sector, Muller (2013) applied a combination of ‘real option theory’ and game theory to determine optimal investments, and how to share profits of joint investments.

In combining real option theory and game modelling techniques, Muller (2013) presented a novel, integrated approach to assessing investment options and profit sharing mechanisms. The mathematical modelling of the game was interesting in that it presented and contrasted two well-known mechanisms, namely the Shapely value and the τ -value, the comparison of which led to the introduction of some innovations to the solution concept. All the associated solutions were in the “core” of the game, with fair but different allocative pay-off shares for the companies.

In a case study of global telecommunication operators, Savunen (2009) provided a behavioural analysis of the industry in forming strategic alliances through network roaming agreements. The agreements between global mobile operators were modelled as alliance games of a cooperative nature, illustrated through a core solution concept. In the analysis, Savunen (2009) extended the broader understanding of alliance formation by introducing a ‘stability indicator’ to capture the likelihood and stability of strategic alliances in the global telecommunication industry. Monte Carlo simulations were further applied to complement the core solution concepts in assessing alliance stability against changing business environments.

The literature survey here suggests a recent but growing recognition of how game theoretic models offer practical and tractable analytical solutions in understanding industry optimisation behaviour. Among the various applied approaches and solution concepts, the Chapter considers the approach offered by Savunen (2009), who provided a richer analysis that can be usefully applied to an agro-food game model. The Chapter therefore draws much of its insight and inspiration from Savunen (2009), and adopts an appropriately modified computational model that can help understand agribusiness alliances and the likelihood of agro-food system consolidation.

4.3 THEORETICAL FRAMEWORK

This section describes the theory of game modelling in three parts. Firstly, by articulating the cooperative game model which was used to assess strategic alliances in the study. Secondly, by describing the mathematical process that is used to attain solutions, which in this case involves the “core solution concept”, and lastly, by describing the alliance stability index that is used to assess how stable strategic alliances are.

4.3.1 Cooperative Games

When coalitions are formed, agribusiness firms have to agree on how pay-offs are to be allocated. A ‘solution’ or a ‘solution concept’ is a set of rules that determines the optimal allocations from a range of possible pay-offs that are consistent with a particular alliance agreement (Parrachino *et al.*, 2006). Several solution concepts can be found in the literature and these can provide either a “one-point” solution or a “set of solutions”. One point solutions include nucleolus (Schmeidler, 1969), Shapely value (Shapley, 1953) and τ -value (Tijds, 1981). Sub-set solutions include stable sets (Von Neumann and Morgenstern, 1944), kernel (Davis & Maschler, 1965), bargaining sets (Aumann & Maschler, 1964), the core (Gillies, 1959), and least core (Maschler *et al.*, 1979).

If Γ is a set of ‘agribusiness alliance games’, then a solution mapped on Γ will be a function of σ which is associated with a specific ‘agribusiness alliance’ $(N, v) \in \Gamma$ that forms a subset $\sigma(N, v)$ of $X^*(N, v)$. In characterising different solutions to the agribusiness game, three fundamental properties (or rules) of solutions are in order.

- a) Rule One: Each firm i extracts a pay-off that is worth at least what it could get on its own. This property suggests that a solution has to be individually rational for firms to have an incentive to join the grand coalition N . This means that a solution σ on Γ is individually rational if $(N, v) \in \Gamma$ and $x \in \sigma(N, v)$, then $x^i \geq v(\{i\})$ for all $i \in N$.
- b) Rule Two: A solution has to be efficient. When the solution is efficient, the total value of the pay-off $v(N)$ is divided proportionally among the players.

A solution that fulfils both Rules One and Two – meaning that pay-off vectors are both individually rational and efficient – is called an imputation. In that case, a particular solution σ that is mapped on a set of agribusiness coalitions Γ is efficient if $(N, v) \in \Gamma$ and $x \in \sigma(N, v)$ such that $x(N) = v(N)$.

Rule Three: A solution σ on Γ should be reasonable, from above and below. According to this rule, a firm should neither be paid more than its maximum contribution nor below its minimum contribution to any coalition. This means that for all $i \in N$:

Equation 4.1: $(N, v) \in \Gamma$ and $x \in \sigma(N, v) \rightarrow x^i \leq b_{\max}^i(N, v)$

Equation 4.2: $(N, v) \in \Gamma$ and $x \in \sigma(N, v) \rightarrow x^i \geq b_{\min}^i(N, v)$

where $b_{\max}^i(N, v)$ and $b_{\min}^i(N, v)$ are the maximum and minimum of firm i 's incremental contribution to a coalition in the “agribusiness alliance game” (N, v) . A firm i can demand at least $b_{\min}^i(N, v)$ what they have contributed, and that would not harm any coalition.

The three guiding properties discussed above construct solution concepts that essentially define the stability of a coalition. Stable coalitions are based on pay-off allocations among firms which are deemed acceptable by the agribusiness firms that are part of the coalition. Solution concepts provide both “one-point” solutions and also “a range” of solutions.

4.3.2 “The Core” Solution Concept

The core solution concept is an elegant way of expressing how coalition stability is attained if deviation is unprofitable. Within the context of cooperative games, the ‘core’ specifies that the profitability of individual companies is subject to approval by every other company within the coalition. The requirement of the core extends to also cover all possible potential coalitions.

From an ‘agribusiness alliance game’ perspective, a core solution within a particular coalition outcome is deemed stable if a coalition yields a comparatively better pay-off for all affiliate agribusiness firms. In this sense, an alliance game is stable if no other coalition can generate a pay-off which exceeds the sum of existing pay-offs for its members (Osborne, 1994). This fundamental definition of the core introduces a new condition called ‘coalition rationality’ (Parrachino *et al.*, 2006), in addition to the efficiency and individual rationality previously discussed in Chapter 1 under Subsection 1.5.2. Given the foregoing, a cooperative game with

transferable utility (N, v) with a set of feasible pay-off vectors $X^*(N, v)$, with a core (N, v) denoted by $C(N, v)$ will be given as:

Equation 5.3: $C(N, v) = \{x \in X^*(N, v) \mid x(S) \geq v(S) \text{ for all } S \subseteq N\}$

Equation 5.3 states that for an imputation x to be in the core, it has to be unmatched in terms of pay-offs to affiliate member firms, such that no other coalition could provide a better pay-off than x . By extension, this definition implicitly includes the efficiency condition, since $X^*(N, v) \rightarrow x(N) \leq v(N)$ and $S = N \rightarrow x(N) \geq v(N)$ which implies that $x(N) = v(N)$. What makes core allocations uniquely important to our understanding of coalition stability is the fact that they specify clear incentives for cooperation within the grand coalition. However, if assumedly the core contains an allocation in which no single firm attains a better pay-off alone, and if no alternative coalition could provide all its member agribusinesses a better outcome than the grand coalition N , then two possibilities may arise. The core solution can either have an infinite number of possible allocations, or can be an empty set.

4.3.3 Alliance Stability in a Cooperative Game

The concept of alliance stability was introduced by Savunen (2009) in an analysis of global telecom industry alliances. In measuring alliance stability, Savunen (2009) proposed a “stability index” which was essentially a ratio of samples in the core, relative to all simulated alliance revenues. The index was calculated as follows:

Equation 4.4:
$$\varphi_c = \frac{\eta_{core}}{\eta_{sample}} \quad \text{where, } 0 \leq \varphi_c \leq 1$$

where $\varphi_c = 1$ is absolute alliance stability, and $\varphi_c = 0$ is absolute alliance instability. The existence of a core for any particular alliance implies that the alliance is able to generate revenue levels that are satisfactory for all coalition members, hence creating an incentive for cooperation. In this sense, the revenue generated by the alliance exceeds the revenue generated by individual members, as well as all other sub-alliances. What remains unknown, however, is the optimal coalition-member-allocation of extra revenue generated by an alliance.

The core solution contains a countless number of possible allocations, but imposes limitations on applicable allocations. The core could potentially contain alliance outcomes in which coalition members are dissatisfied with pay-off allocations, thus posing an existential threat to the stability of the alliance. Given this distinct possibility, the study applies two different revenue-sharing schemes to investigate their impact on alliance stability.

- a) The first revenue-sharing scheme (φ_1) is direct allocation – that is, there is no redistribution of pay-offs among alliance members. Each coalition member keeps their portion of the pay-off that they gain from the alliance.
- b) The second revenue-sharing scheme (φ_2) is where additional revenue of an alliance is proportionally divided among coalition members. This implies that larger players receive greater pay-off benefits than the smaller ones do.

The important aspect of the study is to determine which and how many of the two different pay-off allocation schemes are located in the core solution. The two schemes can be compared and their impact on alliance formation can be determined.

4.4 SAMPLE DATA AND MODEL DESCRIPTION

4.4.1 Model Description

In Chapter 2, the study outlined the evolution of four agricultural commodity-trading firms, namely Olam International, AFGRI, Zambeef and ETG. The firms were drawn from a sample of 67 firms using four criteria: their size (revenue), their product diversity, the number of countries in which they have a market presence (footprint), and the number of cross-border alliances (which include JV and WOS).

In this Chapter, the four firms mentioned above are taken as a starting point. On the basis of the strategic alliances of the core firms, additional firms are purposively selected to generate a new sample of inter-connected but distinct firms. Thus, six more firms were added to the list through snowball sampling that was defined by an additional set of criteria: They had to be either partially or wholly owned by the core, or they had to be direct or indirect competitors of

the core firms, and they had to come from the initial sample of 67 firms that were surveyed in Chapter 3.

Figure 4.2 below outlines the main firms (in red text) and how they are linked, directly or indirectly, with other firms through various forms of strategic alliances. The schematic diagram shows an elaborate web of various interconnected firms that coalesces into ecosystems of corporates, which can be viewed as agro-food clusters, as shown by the various shades of colour. Even though the main firms are linked to at least 35 other firms, the analysis limits its scope to a limited number of key firms that are at the core of the alliances on the basis of data availability. Firms that responded to an additional set of alliance-related questions provided critical information which allowed for alliance and coalition analysis.

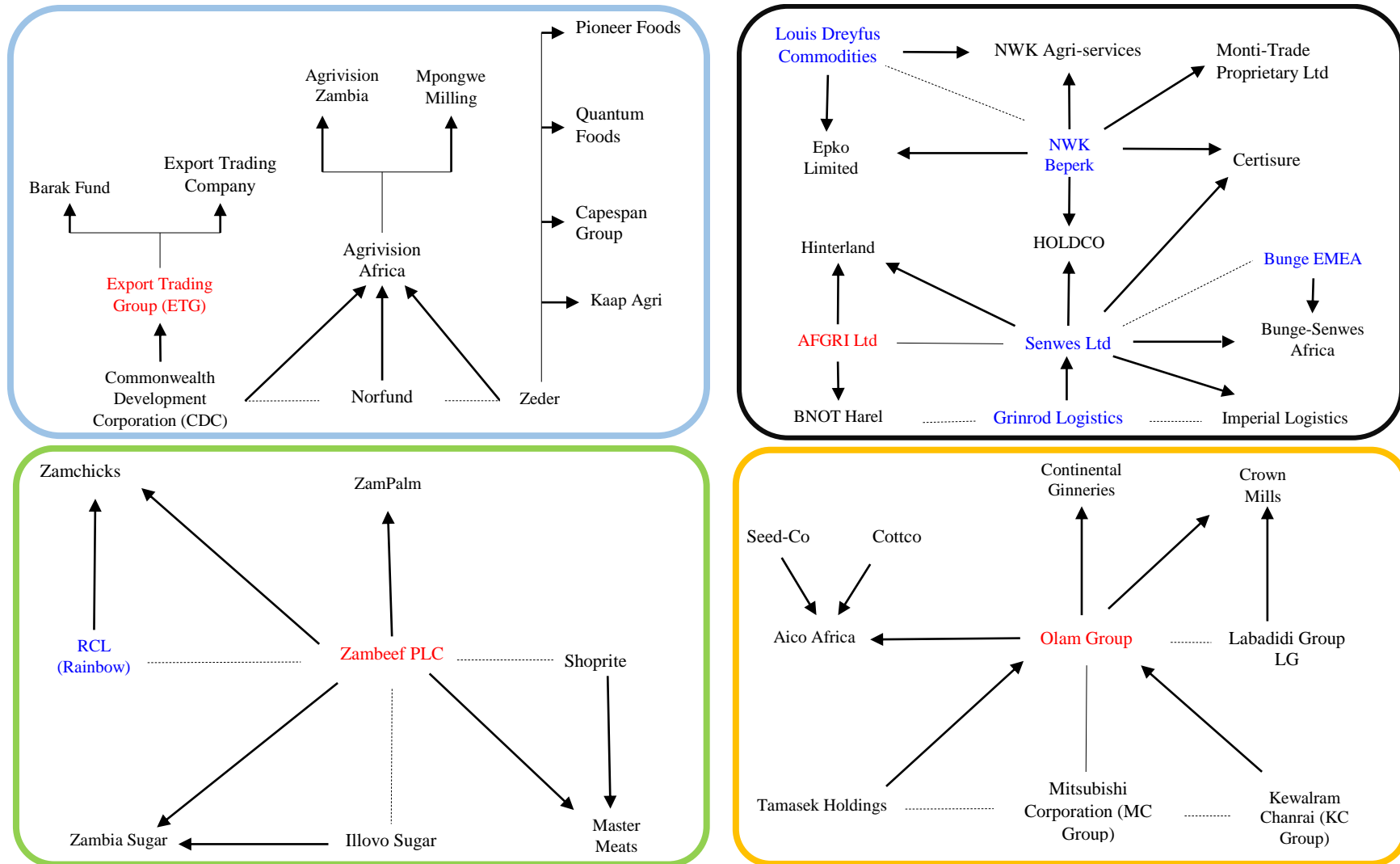


Figure 4.2: Strategic alliances and agro-food clusters in sub-Saharan Africa

Key: —> (Direct link) - - - - - (Indirect link) **Red:** (Core firms) **Blue:** (Additional firms)

Figure 4.2 provide an illustration of nine of the 10 agribusiness MNCs that were analysed, with the other one being Astral. Unlike any of the other nine, Astral has no strategic alliance and its inclusion in the sample was meant to provide the “control” experiment of the sample. The behaviour of Astral would be used to provide a benchmark or baseline for the study.

Given the schematic illustration of the ecosystem of firms shown in Figure 4.2, the study assumes that strategic alliances among agribusiness MNCs in sub-Saharan Africa represent a set of coalition configurations that could be explained by a cooperative game with transferable utility. The study further assumes that the stability of these coalitions is underpinned by the assumptions outlined in sub-Section 4.3.3. To understand coalitions and their configurations, it is important to unpack the characteristics of the firms or players involved in the “game”.

Table 4.2 below outlines the sizes of the 10 agribusiness MNCs in the agro-food game according to revenue over the five-year period 2010–2014. The sample of firms has a weighted average of US\$14 billion. The largest firms are Bunge and LDC, whose revenues averaged \$56 billion and \$58 billion, respectively, which are four times the weighted average of the sample. The smallest firms in the sample are Zambeef and NWK, whose revenues average US\$246 million and US\$278 million, respectively, which is 2 % of the sample’s weighted average.

Table 4.2: Annual revenues of 10 agribusiness MNCs, nominal US\$ millions (2010–2014)

	Senwes	NWK	Zambeef	AFGRI	Astral	Olam	RCL	Bunge	LDC*	Grinrod
2010	\$563	\$270	\$161	\$1 137	\$957	\$10 696	\$950	\$43 953	\$46 119	\$4 015
2011	\$1 041	\$315	\$206	\$1 013	\$996	\$15 928	\$1 188	\$56 097	\$59 562	\$4 946
2012	\$769	\$292	\$255	\$921	\$993	\$17 145	\$956	\$60 991	\$57 140	\$3 319
2013	\$1 358	\$269	\$300	\$889	\$884	\$20 908	\$1 057	\$61 347	\$63 596	\$1 624
2014	\$1 058	\$228	\$279	\$733	\$886	\$19 421	\$1 819	\$57 161	\$64 700	\$1 734
Avg	\$1 012	\$278	\$246	\$973	\$948	\$17 219	\$1 263	\$55 954	\$58 260	\$3 710

Sources: NWK Corporate Financial Results (2010–2014); Zambeef Market Announcements 2010–2014), Zambeef Results Presentations (2014); Astral Financial Results (2010–2014); Olam Investor Relations /Financial Results (2010–2014), <http://olamgroup.com/investor-relations/financial-information/financial-results/>; RCL Financial Results (2010–2014); Senwes Annual Financial Statements (2010–2014).

Note: *Rainbow Chicken Limited

Table 4.3 below shows the present value (PV) of the gross revenues outlined in Table 5.2. By definition, the present value in a given time t is the current revenue relative to a future period when the revenue has been invested at compound interest. The stylised definition of PV, by Brealey and Myers (2003), states that “*a dollar today is worth more than a dollar tomorrow, because the dollar today can be invested to start earning interest immediately.*” Therefore, present value is given as follows:

Equation 4.5:
$$S_i = \sum \frac{C_t}{(1 - r_t)^t}$$

where C_t is the expected revenue (in US\$ millions), r_t is the discount rate (cost of money) and t is time, in years. Table 4.3 shows the present value of the computed revenue of the 10 agribusiness MNCs in years 2010–2014, as previously noted. An arbitrary discount rate $r_t = 12\%$ is used; and in year 2010, ($t = 0$), meaning that no discount is given for that year.

Table 4.3: Computed revenues of 10 agribusiness MNCs, based on present values in US\$ millions (2010–2014)

	Senwes	NWK	Zambeef	AFGRI	Astral	Olam	RCL	Bunge	LDC	Grinrod
2010	\$563	\$270	\$161	\$1 137	\$957	\$10 696	\$950	\$43 953	\$46 119	\$4 015
2011	\$1 182	\$358	\$234	\$1 151	\$1 132	\$18 100	\$1 350	\$63 747	\$67 684	\$5 620
2012	\$993	\$377	\$329	\$1 189	\$1 283	\$22 140	\$1 235	\$78 759	\$73 786	\$4 286
2013	\$1 993	\$395	\$440	\$1 304	\$1 297	\$30 681	\$1 552	\$90 021	\$93 322	\$2 383
2014	\$1 765	\$380	\$465	\$1 223	\$1 477	\$32 385	\$3 033	\$95 317	\$107 888	\$2 892

Source: Based on own calculations, with statistics derived from Table 4.2.

The model generates all possible alliances that can potentially be formed among the 10 agribusiness MNCs outlined in Table 4.3 and simulates additional revenue that could be generated by the alliance combinations. Altogether, the model considers 1013 different alliance combinations of two or more agribusiness MNCs. Alliances can consist of anything between one and 10 firms, with any empty alliances excluded. However, one-member alliances were considered to be trivial because they are, by definition, not alliances since agribusiness MNCs act singly. In Figure 4.3 below, we show that the 1013 alliance combinations follow a normal distribution.

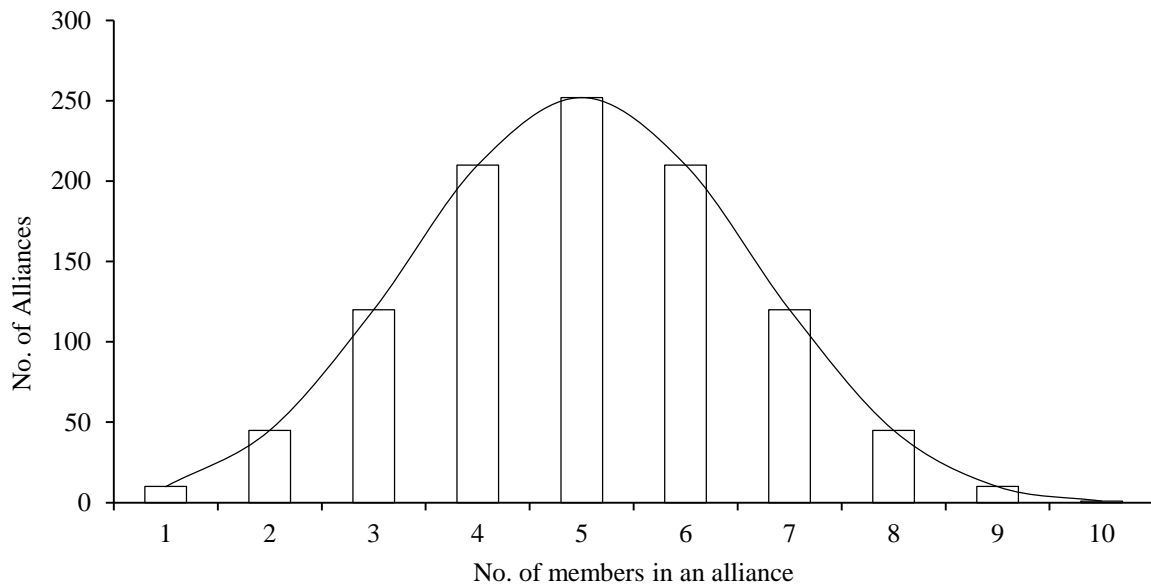


Figure 4.3: Distribution of the number of potential alliances

Source: Analysis results

To estimate the additional revenue generated by an alliance, the study assumes parametric estimates of the pay-offs among members of the coalition and revenue elasticities of the agribusiness MNCs involved, based on a normal distribution. On the basis of normally distributed alliance behaviour, the results are, expectedly, also normally distributed. A Monte Carlo simulation was used to generate a range of possible additional revenues for each potential alliance. The distribution of additional revenue can partially be explained by uncertainties of the model and input data, and partially by what can be specified as changes in the business environment. This is particularly important in assessing the stability of an alliance, and the underlying question relates to the stability of an alliance across different alliance configurations, against changes in time and the environment.

4.4.2 Conceptual Framework

The modelling process consists of the four key phases shown in Figure 4.4 below. The first phase involved the collection of data on firm revenue and market share, alliance contribution, and the probability of an agribusiness MNC joining an alliance.¹³ As some of the information

¹³ The probability of joining an alliance is drawn from direct responses of agribusiness executives who gave their views and opinions regarding the appetite for their firms to enter into partnerships and JVs.

was confidential, the data collected was largely incomplete and the study had to rely on both triangulation and cross-verification processes that involved broader consultations with other key informants.

The second phase comprised of data processing. Information gathered from agribusiness firms had to be translated into a format that would allow for a behavioural model of agribusiness firms to be constructed. For instance, the likelihood of a firm entering into an alliance was captured through a Likert scale question that would be converted into a probability estimate. The conditional probability of the firm joining an alliance is one of three parameters that were considered – the others being the weighted size (weighted mean revenue) and the annual change in revenue (growth). These three parameters capture the alliance behaviour of the agribusiness MNCs. The basic data organisation of the parameters was executed in a Microsoft Excel spreadsheet.

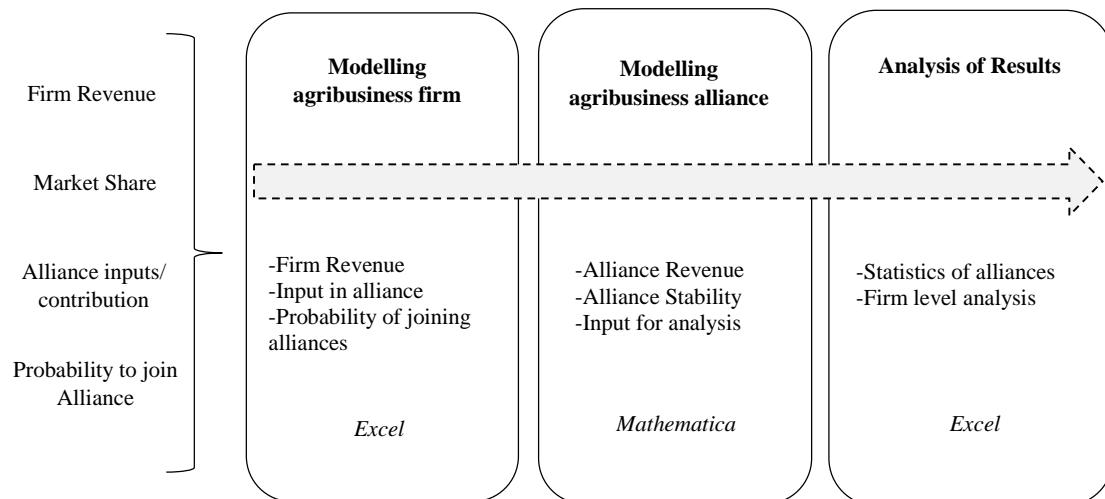


Figure 4.4: Components of the agribusiness game model

The third phase involved further data processing by assessing the alliance formations of the various agribusiness MNCs. This part of the modelling exercise was done using Wolfram’s Mathematica 5.2 software programme. Several Mathematica analysis techniques were applied, and these include statistics, linear algebra and graphics packages. The analysis of the core involves the use of two additional Mathematica packages, namely:

- a) Cooperative Games, which is a software package which contains basic analytical tools to assess cooperative games (Carter, 1993), and
- b) TuGames, which is an extension that enhances the capabilities of Mathematica (Meinhardt, 2005).

The fourth phase of the analysis involved the interpretation of results by identifying appropriate and feasible alliance structures. The results generated in Wolfram were imported into a Microsoft Excel spreadsheet, where they were cleaned and re-organised in tabular form.

4.4.3 Model Structure

Building on the conceptual flow map shown in Figure 4.5 below, this section shows the model structure and how the various components and variables of the model are connected and inter-linked. A schematic representation of the model structure is presented in Figure 4.5.

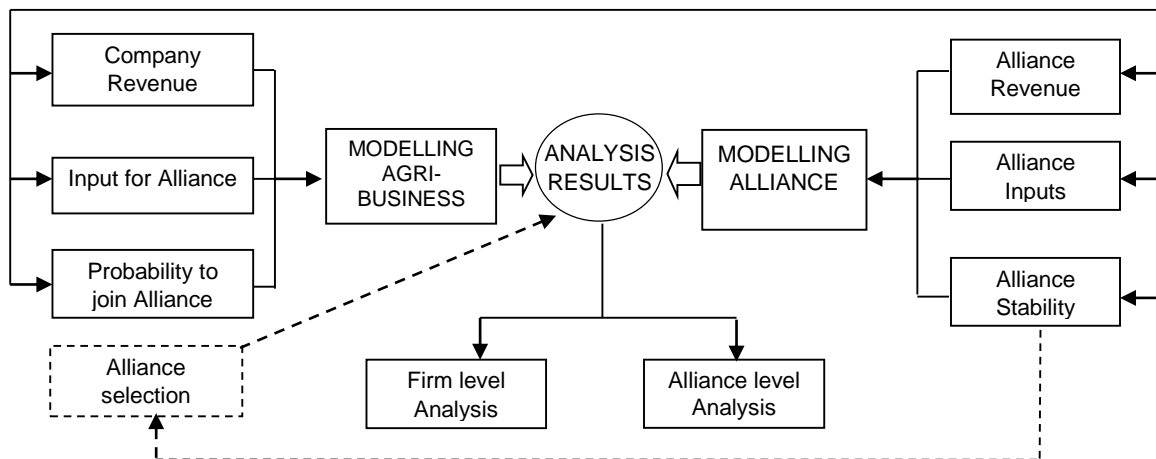


Figure 4.5: Model structure for an agribusiness alliance game

The structure of the model is such that a feedback process occurs through the alliance stability measure in order for the study to determine the appropriate alliance coalitions that will be feasible among the agribusiness MNCs in sub-Saharan Africa. This allows for a greater level of accuracy, since the core solutions might potentially contain a number of alliances that might not be feasible under the set of prescribed pay-off allocations.

4.5 THE AGRIBUSINESS GAME MODEL

4.5.1 Empirical Application

The empirical application of the model involved two key steps. The first step was to re-simulate potential alliance revenues through a Monte Carlo simulation. The second step involved an analysis of all the alliances that emerged from the sample data. For each potential alliance, the study calculated the additional revenue generated by each alliance member and the associated pay-offs for each member. The model also simulated overall alliance revenue and additional revenue to total revenue as a percentage of the total overall revenue.

4.5.2 Monte Carlo Simulation

Monte Carlo simulation is a widely applied technique that is used to model the probability of outcomes that cannot be predicted easily due to the influence of random events and processes. In this study, Monte Carlo simulation is used to estimate the likelihood of “stable” alliance formation through several steps. Firstly, on the basis of three parameters defining each agribusiness firm’s alliance behaviour (vis-a-vis mean of revenue, probability of entering into an alliance), the study estimation process involved generating 1 000 possible revenue outcomes for each agribusiness MNC, the average of which will provide a simulation loop. By simulating the loops of agribusiness revenue combinations 100 times, the mode generates the revenue distributions of each alliance. In total, the analysis computes revenue simulations for all potential alliances 100 000 times. The results of the estimation are shown in Figures 4.6 through to 4.8 below. The variation of the simulated revenue figures of potential alliances shows potential scenarios for each pay-off $v(S)$ which is defined as follows:

Equation 4.6:
$$v(S) = \sum_{i \in S} \Delta r_i + \sum_{j \in S} \Delta r_{ij}$$

where $\sum_{i \in S} \Delta r_i$ is the firm’s change in own revenue, and $\sum_{j \in S} \Delta r_{ij}$ is change in firm revenue due to its membership of an alliance. The location of the core varies from one simulated sample to another, depending on the model’s underlying assumptions. The variance of the iterated

simulations partly explains the uncertainties of the model, which in essence, define the changes of the business environment.

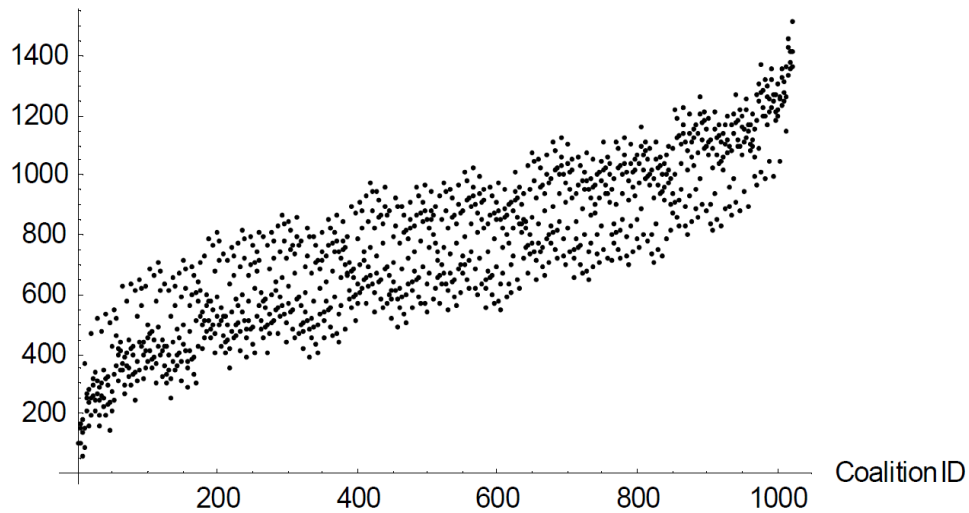


Figure 4.6: Total revenue of potential coalitions (US\$ Million)
Source: Analysis Results

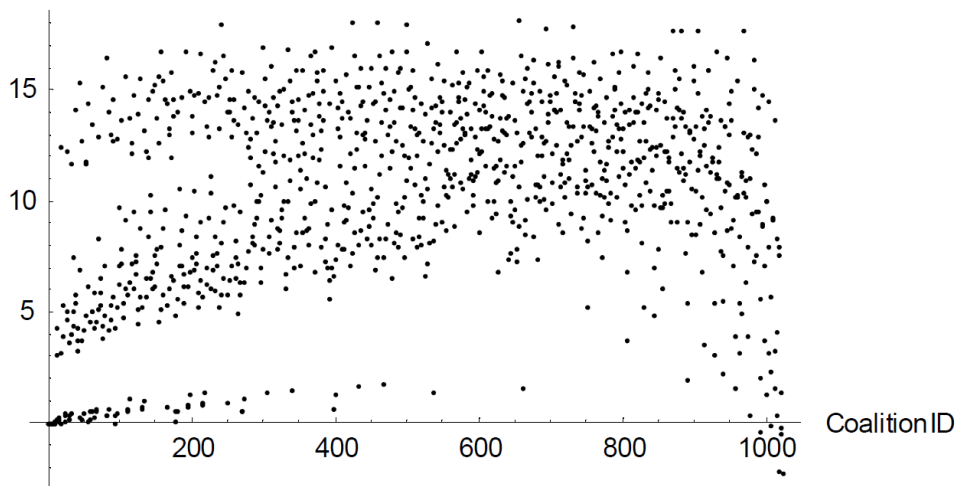


Figure 4.7: Additional revenue of potential coalitions (US\$ Million)
Source: Analysis Results

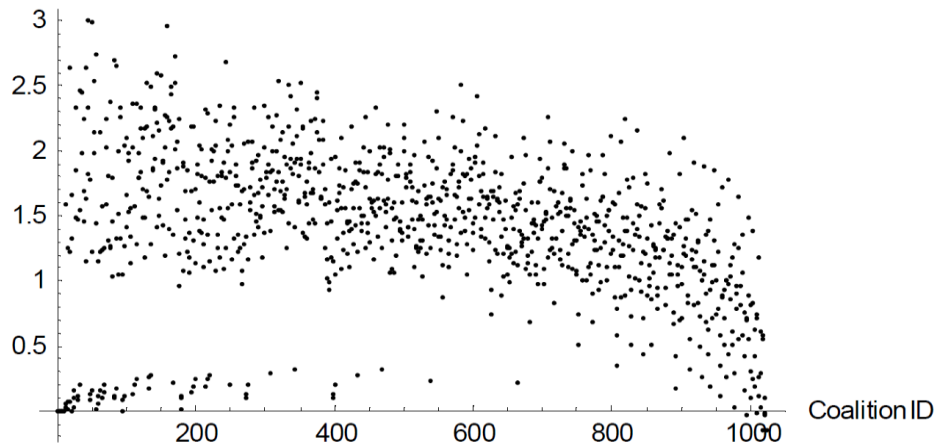


Figure 4.8: Proportion of additional revenue to potential coalition revenue (%)
Source: Analysis Results

The summary statistics of potential alliances in the agribusiness game are outlined in Table 4.4 below, which show the mean values of number of alliances, number of players in an alliance, revenue, additional revenue and stability. Also shown in Table 4.3 are the category descriptions of three key variables which are (i) all potential alliances; (ii) all alliances in the core, and (iii) alliances with revenue-sharing schemes φ_1 and φ_2 that are in the core. The qualifying condition for the latter to be in the core is if φ_c , φ_1 and φ_2 are non-zero.

Table 4.4: Summary of mean statistics of potential alliances and alliance stability

	Number of alliances	Average No. members	Revenue (US\$ mil.)	Δ Revenue (US\$ mil.)	Δ Revenue (%)	Stability (Index)
All alliances	1023	5	760	10.3	1.4	
φ_c	424	4	536	8.6	1.5	0.99
φ_1	145	3	440	6.3	1.3	0.87
φ_2	78	2	305	3.3	0.9	0.99

Source: Analysis results

Overall, 424 (41 %) alliances can be found in the core, with 145 (14 %) of them being revenue-sharing Scheme One and 78 (7.6 %) under revenue-sharing Scheme Two. Given that a lower average number of alliance members is associated with a lower number of alliances found in the core, and vice versa, one can reasonably conclude that the boundary typically set by the core to ensure stable cooperation places more demands upon smaller alliances, as compared with large coalitions.

Revenue-sharing Scheme One was more likely to be in the core than revenue-sharing Scheme Two was. It appeared that the former was a more preferred option because alliance members get to keep additional pay-offs. Table 4.5 below further unpacks the statistics in accordance with the stability per size of alliance.

Table 4.5: Alliance stability according to number of members

Mean Stability per No. of members	Core exists φ_c	Revenue sharing Scheme 1 (φ_1)	Revenue sharing Scheme 2 (φ_2)
2	1.00	1.00	1.00
3	1.00	1.00	1.00
4	0.99	0.91	0.96
5	0.99	0.78	1.00
6	0.98	0.48	-
7	0.91	-	-
8	1.00	-	-
Average	0.99	0.87	0.99

Source: Analysis results

According to Table 4.5, revenue-sharing Scheme Two (φ_2) is very stable, with index values of at least 0.96 across all alliance of various members. Despite revenue-sharing Scheme One having a reasonably high average stability (0.87), alliance stability is, nonetheless, not consistent, as the index falls with alliances with more than four members. Alliances with six members under revenue sharing Scheme One are relatively less stable (0.48), while alliances with five members are less stable, but with moderate improvement. The difference in the average stability of alliances under Scheme One (0.87) and Scheme Two (0.99) means that revenue-sharing rules have a significant impact on the stability of alliances.

4.5.3 Model Results

Table 4.6 below shows the number of possible alliances for each agribusiness in the core and in the two revenue-sharing schemes. NWK, Bunge, Senwes, and Zambeef have 200 alliances in the core more than any other agribusiness has. Meanwhile, Astral has the lowest alliance combinations in the core. However, Bunge has only one alliance possibility under revenue-sharing Scheme One. This shows that Bunge prefers re-allocation of revenues in accordance with size, rather than direct allocation. This is not surprising, given that Bunge is one of the

largest global agribusinesses in the sample, and this revenue-sharing scheme would almost work to the company's advantage.

Table 4.6: Number of possible alliances in the core, and the revenue-sharing schemes

	The core (φ_c)	Revenue sharing	
		Scheme 1 (φ_1)	Scheme 2 (φ_2)
Senwes	201	62	19
NWK	207	67	24
Zambeef	201	60	21
AFGRI	137	54	11
Astral	50	10	10
Olam	133	25	12
RCL	193	64	24
Bunge	205	1	23
LDC	196	54	12
Grinrod	192	59	18

Source: Analysis results

The study makes the assumption that firms keep the revenue they are able to gain from alliances, and revenue is directly shared without any re-allocation (revenue-sharing Scheme One (φ_1)). The reason for adopting revenue-sharing Scheme One is that it is empirically simpler, since it does not require any additional agreements among alliance members. Moreover, solutions derived from revenue-sharing Scheme One appear to be more analytically tractable. Tables 4.7 through to 4.9 below outline the results of inter-company alliances in the sampled agribusinesses. Table 4.7 illustrates the number of alliances between all alliance pairs, Table 4.8 shows the average stability of those alliances, and Table 4.9 shows the average percentage of the additional revenue of such alliances. The results displayed here represent only a fraction of the total number of 145 alliances under revenue-sharing Scheme One. Important to note, is the finding that 123 of the 145 alliances are stable.

Table 4.7: Number of alliances in revenue-sharing scheme 1 (φ_1)

	Senwes	NWK	Zambeef	AFGRI	Astral	Olam	RCL	Bunge	LDC	Grinrod
Senwes	59	2	23	10	0	20	19	22	29	27
NWK	2	10	1	1	0	1	2	3	1	1
Zambeef	23	1	62	10	0	24	23	25	31	29
AFGRI	10	1	10	25	0	1	1	6	11	8
Astral	0	0	0	0	1	0	0	1	0	0
Olam	20	1	24	1	0	54	20	24	26	25
RCL	19	2	23	1	0	20	54	24	26	25
Bunge	22	3	25	6	1	24	24	60	29	25
LDC	29	0	31	11	0	26	26	29	67	32
Grinrod	27	1	29	8	0	26	25	25	32	64

Source: Analysis results

Table 4.8: Average stability of alliances in revenue-sharing scheme 1 (φ_1)

	Senwes	NWK	Zambeef	AFGRI	Astral	Olam	RCL	Bunge	LDC	Grinrod
Senwes	0.70	1.00	0.24	0.66	0.00	0.67	0.71	0.76	0.68	0.65
NWK	1.00	1.00	1.00	1.00	0.00	1.00	–	1.00	1.00	1.00
Zambeef	0.24	1.00	0.72	0.66	0.00	0.74	0.77	0.78	0.70	0.69
AFGRI	0.66	1.00	0.66	0.86	0.00	1.00	1.00	1.00	0.85	0.78
Astral	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olam	0.67	1.00	0.74	1.00	0.00	0.88	0.99	0.87	0.88	0.87
RCL	0.71	1.00	0.77	1.00	0.00	0.99	0.90	0.91	0.88	0.90
Bunge	0.76	1.00	0.78	1.00	0.00	0.87	0.91	0.91	0.89	0.91
LDC	0.68	0.00	0.70	0.85	0.00	0.88	0.88	0.89	0.86	0.85
Grinrod	0.65	1.00	0.69	0.78	0.00	0.87	0.90	0.91	0.85	0.85

Source: Analysis results

Table 4.9: Average additional revenue of alliances in revenue-sharing scheme 1 (φ_1)

	Senwes	NWK	Zambeef	AFGRI	Astral	Olam	RCL	Bunge	LDC	Grinrod
Senwes	0.15 %	0.30 %	0.00 %	0.12 %	0.00 %	0.23 %	0.21 %	16.00 %	0.16 %	0.17 %
NWK	3.32 %	2.89 %	2.90 %	3.01 %	0.00 %	3.00 %	3.32 %	3.40 %	3.20 %	3.15 %
Zambeef	0.00 %	0.93 %	0.51 %	0.37 %	0.00 %	0.80 %	0.77 %	0.62 %	0.53 %	0.57 %
AFGRI	3.88 %	2.11 %	3.55 %	3.11 %	0.00 %	1.83 %	3.14 %	2.86 %	3.61 %	4.00 %
Astral	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
Olam	3.91 %	1.37 %	3.61 %	1.55 %	0.00 %	3.30 %	3.02 %	0.10 %	3.62 %	3.77 %
RCL	3.58 %	2.51 %	3.36 %	1.44 %	0.00 %	3.24 %	3.13 %	3.58 %	3.45 %	3.56 %
Bunge	0.15 %	0.19 %	0.11 %	0.01 %	0.00 %	0.10 %	0.15 %	0.14 %	0.11 %	0.10 %
LDC	0.46 %	0.50 %	0.46 %	0.37 %	0.00 %	0.60 %	0.54 %	0.45 %	0.43 %	0.49 %
Grinrod	1.02 %	0.05 %	1.00 %	0.79 %	0.00 %	1.35 %	1.21 %	0.97 %	1.02 %	0.93 %

Source: Analysis results

In interpreting the results, we provide an example of Senwes and NWK. The results show that Senwes has two possible alliances with NWK (Table 4.7) which are completely stable (stability index of 1.00, in Table 4.8). The alliances contribute an average of 0.3 % of additional revenue

to Senwes' total revenue (Table 4.9). The number of possible alliances and their related stability are the same for both Senwes and NWK, and this is reflected in the Tables 4.7 and 4.8, where the row 'Senwes' in column 'NWK', and vice versa, are the same. However, this is not the case for Table 4.9, which shows the percentage additional revenue. Whereas Senwes' gains from alliances with NWK averaged 0.3 %, the gains for NWK with Senwes alliances were 3.32 %. Hence, NWK receives a higher relative benefit from the alliances with Senwes. The opposite is true. In that sense, the principle is to read the table from the right column, measuring the additional revenue proportional to a firm's total revenue. The grey-coloured squares show own company statistics, for instance, for "Senwes at column Senwes". The total number of Senwes' "own-revenue-sharing" Scheme One alliances is 59, and the average stability of its alliances is 0.7, which, on average, contribute 0.15 % of its total revenue. Thus, the study can conclude that Senwes' alliances with NWK are, on average, better from a Senwes perspective than its other revenue-sharing Scheme One alliances are.

As previously discussed, Astral is treated as the control experiment, against which other alliance outcomes are evaluated. In this sense, Astral is only capable of having one possible alliance in the revenue-sharing Scheme One, which implies that it is an alliance of its own. Astral's behaviour is modelled under a set of assumptions which define the firm as averse to direct revenue sharing, such that it cannot become a member of any alliance under revenue-sharing Scheme One. Table 4.10 below presents a summary of the agribusiness firms' preferred and non-preferred alliance partners.

Table 4.10: Summary of alliance results

	Preferred partner	Non-preferred partner	Comment
Senwes	Bunge, NWK, Olam, Grinrod, LDC, RCL	Astral and Zambeef	
NWK	Senwes, RCL, Bunge, LDC, Zambeef, Grinrod, Olam	Astral	All of NWK's alliances are quite stable
Zambeef	Olam, NWK, RCL, Bunge, LDC, Grinrod	Senwes and Astral	
AFGRI	Senwes, Zambeef,	NWK, Astral, Olam, RCL, Bunge,	
Astral	-	-	Astral is not able to form an alliance within the revenue-sharing One scheme. (The control)
Olam	Senwes, Zambeef, LDC, Grinrod	NWK, AFGRI, Astral, RCL, Bunge	
RCL	Senwes, Zambeef, Olam, Bunge, LDC, Grinrod	NWK, AFGRI, Astral	
Bunge	Senwes, NWK, RCL	Zambeef, AFGRI, Astral, Olam, LDC, Grinrod	
LDC	Senwes, NWK, Zambeef, Olam, RCL, Bunge	AFGRI, Astral	
Grinrod	Senwes, Zambeef, Olam, RCL, Bunge, LDC	NWK, AFGRI, Astral	

Source: Analysis results

The results shown in Table 4.10 further show which alliances are likely to occur in sub-Saharan Africa's agro-food sector, given each agribusiness MNC's preferred and non-preferred partners. The study defined a preferred alliance partner as one in which an agribusiness MNC can gain a source of additional revenue, greater than its average of all alliance combination (that is, the grey squares in Table 4.8). A non-preferred partner is, therefore, one in which an agribusiness gains additional revenue that is less than in its average over-all alliances. However, overall, the largest stable alliance among the 143 alliances within the core was found to have six members (alliance number 65), namely Senwes, Bunge, NWK, Olam, Grinrod and LDC.

4.6 SUMMARY AND CONCLUSIONS

The model in this Chapter provided some level of understanding regarding the likelihood of agribusiness alliances forming, and therefore agro-food system consolidation, in sub-Saharan Africa. This point was demonstrated and described by the conditions for alliance formation between agribusiness companies when investing in the sub-Saharan Africa. The behaviour of

each company in different alliance formations was recognised and determined. The model results showed that an alliance can be either stable, unstable, or conditionally stable, contingent on the agribusiness firm's overlapping and complementary assets, as well as on the changing business environments. As such, the model described strategic alliance formation in dynamic business environments and long-term alliance stability.

Alliances of up to four firms are generally stable under a revenue-sharing scheme that allows firms to keep additional gains derived from a coalition. Alliances with more than four firms tend to become less stable, and therefore less likely to be sustainable in the long run. The results show that the trend of consolidation will likely see a gradual disappearance of firms in the US\$160 million to US\$996 million annual turnover range, as they enter into alliances to "converge" to form multi-billion-dollar agribusiness clusters. The experimental analysis shows that a duality will likely emerge, with an oligopoly of a few mega-agribusiness MNCs on the one hand, and a heterogeneous set of small players on the other. The former will likely lead to a convergence of agribusiness MNCs, and the latter will underline the divergence between the corporate and traditional agri-food system. The small heterogeneous players in the traditional food system will probably compete favourably at local level, but they will most likely be squeezed out in international markets. The option for the small players will be to form their own cross-border clusters that can match the multi-billion-dollar firms in competitiveness.

CHAPTER 5

SUPPLIER (σ) CONVERGENCE: AN AGRIBUSINESS CLUSTER CASE STUDY IN ZAMBIA

5.1 INTRODUCTION

Supplier (or sigma (σ)) convergence is an agribusiness model in which firms vertically integrate their value chains and as a consequence, combine production and service functions under a parent firm (Slywotzky, Morrison, Muser, Mundt & Quela, 1999). This process involves the firm performing value chain activities that were otherwise previously considered non-core to the its initial focus. This Chapter analyses a case study of Agrivision Zambia, an agribusiness cluster shown in Figure 4.2 which embodies fundamental features of σ convergence through its attributes of internationalisation and vertical integration. Based in Zambia¹⁴ but headquartered in Mauritius, Agrivision Zambia is managed under a holding company called Agrivision Africa, previously called Chayton Atlas Investments Africa. The firm acquired 6 347 ha of large-scale farmland in Mkushi and Mpongwe in Zambia's Copperbelt Province, with farming enterprises which include maize, wheat, soybeans and barley.

The Chapter's illustration of supplier convergence focuses on the firm's wheat-to-flour value chain. In 2013, Agrivision Africa acquired Mpongwe Milling in Kitwe, a plant with an annual milling capacity of 60 000 tons of maize and 16 000 tons of wheat. With an installed capacity of 96 tons/day, a bran output of 16 tons/day, and average sales of 18 tons/day, the milling subsidiary forms part of the firm's diversification strategy along the agribusiness value chain, which creates synergies across its portfolio of investments.

Agrivision is planning to acquire and add two farms to its existing five farms – one farm has an area of 784 ha and the other is 1 720 ha. In developing these two farms, the agribusiness is planning to adopt a phased approach, in which land investments are done in two stages: the

¹⁴ Like many countries in sub-Saharan Africa, Zambia is a developing country with an relatively less developed food marketing system (Tembo, Chapoto, Jayne & Weber. 2010).

first phase will establish two centre pivot irrigation systems on one of the farms (one of 80 ha and one of 70 ha, respectively). The second phase will establish five centre pivots (two of 60 ha and two of 50 ha) on one farm; and one 30-ha pivot on the other farm.¹⁵ The irrigation infrastructure has been complemented by provisional water rights of 3 000 m³/day. These land investments extended the company's existing irrigated crop area by 400 ha, from 660 ha to a total of 1 040 ha (which is 42 % of the total area of the two farms).

The overall long-term strategy of the firm is to acquire an aggregate of 100 000 ha of farmland in Zambia and other countries within Southern Africa over the next decade, following which the firm will exit through a trade sale or an Initial Public Offering (IPO). However, grain prices – particularly wheat – have been declining steadily, to the extent of threatening the viability of farm-level production. Over the past 10 years, average annual wheat prices declined from US\$460/ton in 2006 to US\$380/ton in 2013, while Zambia's national wheat production increased from 93 510 tons to 352 905 tons over the same period. Given the long-term decline in wheat prices, the decision makers have to decide if farm acquisitions are still feasible.

Meanwhile, Zambia's demand for wheat flour and bread is projected to grow in tandem with a 40 % increase in per capita income over the next five years. Accordingly, an increase in milling capacity will become part of the firm's expansion strategy in the medium to long term. What is the optimum farmland acquisition and processing capacity that can maximise the firm's profit? This study develops a System Dynamics Model (SDM) of Agrivision and applies it to various milling capacity and farm production scenarios.

5.2 THE BASIC MODEL

An optimisation model of a typical agribusiness firm is constructed within the context of two theoretical and practical strands of literature. The first includes farmland acquisitions that are subject to production risks such as price volatility (Arezki, Deininger & Selod, 2011; Anseeuw, 2012; Borrás, Franco & Chunyu, 2013; Margulis, McKeon & Borrás, 2013), while the second refers to value chain optimisation that can be captured through system dynamics

¹⁵ The water demand for the farms, once irrigation expansion of the centre pivots was completed, increased from 325 l/sec to 507 l/sec (i.e. 657 m³/day or 5 256 m³/8-hour day).

(SDM) (Kibira *et al.*, 2010; Hamza, 2012; Sterman, 2000). Combining the two perspectives allows for a framework to be designed that can be used to derive value chain equilibrium, under a given set of assumptions.

Key assumptions postulate that the firm is risk-neutral, financially constrained, and seeks to fund its expansion plans through a partnership with either development funders or private equity funds. A further supposition assumes that a firm has a bilateral investment protection agreement (BIPA) with the host government for \bar{L} hectares of land. The milling plant can be assumed to have a maximum fixed capacity of \bar{M} tons/day. A corporate income tax $\sigma \in (0,1)$ is paid on each unit of profit accruing from land and agro-processing investments. The goal of the firm will be to completely internalise its sourcing of grain.

The model imposes a Cobb-Douglas production function for wheat production and milling technology with diminishing returns to scale (DRTS). Production inputs include land, capital, fuel, water, electricity and all other inputs required across the value chain. The approximate factor elasticities are obtained by computing the share of variable costs of producing a hectare of grain, and a tonne of flour, respectively. The degree of DRTS is captured by a separate parameter κ that needs to be specified exogenously in order to allow for factor elasticity of land and milling plant, derived as a composite of the factor elasticity of all other inputs. This is done to allow for the production function to be well behaved, such that as the DRTS parameter approaches infinity, the production technology approaches the behaviour of constant returns to scale. Table 5.1 below outlines all of the assumptions underpinning the model.

Table 5.1: Exogenous parameters for simulation of the Agrivision's grain supply chain

Variable	Description	Value	Assumption
\bar{L}	Desired Farmland size	100 000 ha	Intended farmland acquisition
L_1	Starting farm size	3 164 ha	Developed
\bar{M}	Installed Processing capacity	96 tons/day	Maximum capacity
M_1	Utilised capacity	30 tons/day	Starting capacity
θ	Wheat price volatility	[0.05;0.5]	Randomly drawn ¹⁶
γ	Flour price volatility	[0.005;0.3]	Randomly drawn
P_1	Starting Wheat price	\$365/ton	Average domestic price
P_2	Starting Flour price	\$898.90/ton	Average flour price
ζ	Degree of DRTS	[2;40]	-
κ	Cobb-Douglas	0.3	Factor elasticity
t	Duration of time	100 months	Adjustment period
ρ	Risk-free interest rate	0.02	-
λ	Loss probability	[0.04;0.06]	Poisson process
ω	Loss share	[0.5;1]	Share of farm investment due to price movement
σ	Corporate income tax	[0;0.5]	-

L_1 denotes the hectares of land invested for farming (that is, through cultivation and the development of irrigation infrastructure on the farm) A_t at each $t \geq 0$ land is utilised as follows:

Equation 5.1: $A_t + L_t = \bar{L}$, with $A_0 = 0$

Assume that land under cultivation guarantees the following profit flow:

Equation 5.2: $\pi_1(\theta_t, A_t) = \theta_t A_t^{1-\phi} / (1-\phi)$

¹⁶ Volatility in price in this case is assumed to be a stochastic variable that is drawn from a normal distribution with a mean price difference of 0.05 and a standard deviation of 0.5. The same applies to other volatility parameters.

where $0 < \phi < 1$ is a constant term representing the degree of DRTS and θ_t is a random variable shifting profits, $\pi_1(\theta_t, A_t)$, over time. Meanwhile, the study denotes the processing capacity invested in a milling plant as Z_t at each $t \geq 0$, in which the utilised capacity is as follows:

Equation 5.3:
$$M_t + Z_t = \bar{M}, \text{ with } M_0 = 0$$

Assume that profit under a particular level of processing capacity guarantees the following profit flow:

Equation 5.4:
$$\pi_2(\gamma_t, M_t) = \gamma_t M_t^{1-\mu} / (1-\mu)$$

where $0 < \gamma < 1$ is a constant term representing the degree of decreasing returns to scale (DRTS) and γ_t is a random variable shifting profits, $\pi_2(\gamma_t, M_t)$, over time. Let θ_t and γ_t evolve according to the following diffusion:

Equation 5.5:
$$d\theta_t = \mu\theta_t dt + \varphi\theta_t dZ_t, \text{ with } \theta_0 = \theta$$

Equation 5.6:
$$d\gamma_t = \mu\gamma_t dt + \varphi\gamma_t dZ_t, \text{ with } \gamma_0 = \gamma$$

where μ and φ are drift and volatility parameters and dW_t is the increment of Wiener prices with $E[dZ_t] = 0$ and $E[dZ_t^2] = dt$. Using Equation 3.3 and Equation 3.5, the farm-level profit dynamics can be expressed as:

Equation 5.7:
$$\begin{aligned} d\pi(\theta_t, A_t) &= (\partial\pi(\theta_t, A_t)/\partial\theta_t) + (\partial\pi(\theta_t, A_t)/\partial A_t) \\ d\pi(\theta_t, A_t) &= (\partial\pi(\theta_t, A_t)/\partial\theta_t) + (\partial\pi(\theta_t, A_t)/\partial A_t) \\ &= [(\mu dt + \sigma dZ_t) + (1-\phi)(dA_t/A_t)]\pi(\theta_t, A_t) \end{aligned}$$

Using Equations 3.4 to 3.7, the factory milling profit dynamic can be expressed as follows:

Equation 5.8:

$$d\pi(\gamma_t, M_t) = (\partial\pi(\gamma_t, M_t)/\partial\gamma_t) + (\partial\pi(\gamma_t, M_t)/\partial M_t) \\ = [(\mu dt + \sigma dZ_t) + (1 - \phi)(dM_t/M_t)]\pi(\gamma_t, M_t)$$

The expressions in Equation 5.5 and Equation 5.6 represent the marginal effect of changes in θ_t and γ_t while Equation 5.7 captures the marginal effect due to additional farmland conversion, and Equation 5.8 represents the marginal effect of adding additional processing capacity. It is important to note that the model may easily be adjusted in order to account for varying one part of the value chain without adjusting the other. Finally, the model set up is underpinned by the following assumptions:

- a) Farmland and agro-processing investments are costly and irreversible. In particular, the study assumes that irrigation development and expansion of the processing capacity require a sunk investment in capital of k_1 per hectare and k_2 per tonne, respectively.
- b) Farmland and agro-processing investments are undertaken within the context of price risks. In this regard, our definition of price risk includes all factors that affect commodity price movements (such as droughts and floods) which reduce the profitability of the value chain.

Optimisation involves unlocking the maximum value from the firm's value chain assets, given its farmland acquisitions and milling expansion once capital, land and milling capacity constraints are taken into account. Fixed sunk costs are incurred once the milling plant and farmland are acquired, irrespective of whether the assets are fully utilised or not. However, the opportunity for optimisation of land and milling capacity utilisation depends on:

- a) The random fluctuating wheat prices, and
- b) The associated returns at the farm and milling plant.

Suppose that at time period t , farmland $A_t \leq \bar{L}$ and processing plant $M_t \leq \bar{M}$ capacity is utilised, while the residual farmland and plant capacity remaining untapped, i.e. $L_t = \bar{L} - A_t$, and $M_t = \bar{M} - Z_t$. Hence, assuming a profit function $\pi_{1,2}(\theta_t, \gamma_t, A_t, M_t)$ is such that the

optimal investment is to maintain balanced profits from farmland and plant processing operations, with the value of investment across the agribusiness' value chain given by a Bellman equation:

$$V_{1,2}(\theta_t, \gamma_t, A_t, M_t) = (1 - \sigma)\pi_{1,2}(\theta_t, \gamma_t, A_t, M_t)dt + (1 - \omega\lambda dt) \frac{E[V_{1,2}(\theta_t + d\theta, A_t)(\gamma_t + d\gamma, M_t)]}{1 + (\rho + \eta)dt}$$

Equation 5.9:

where $\rho + \eta \geq \mu$ is the discount rate. By solving Equation 3.9, the agribusiness invests in land $\partial A_t \succ 0$ every time the process $\{\theta_t : t \geq 0\}$ equates to $\partial M_t \succ 0$ at a time period $\{\gamma_t : t \geq 0\}$ such that $\theta^*(A_t) = \gamma^*(M_t)$:

$$\frac{\beta}{\beta - 1} \cdot \frac{k_1}{1 - \sigma} (\delta - \mu) A_t^\phi = \frac{\alpha}{\alpha - 1} \cdot \frac{k_2}{1 - \sigma} (\delta - \mu) M_t^\varphi$$

Equation 5.10:

If re-arranged in terms of profit, the optimum profit for primary production $\pi_1^*(A_t)$ and $\pi_2^*(M_t)$ reach a critical threshold level:

$$\pi_{1,2}^*(A_t, M_t) = \frac{\beta(\alpha - 1)}{\alpha(\beta - 1)} \cdot \frac{A_t^\phi}{M_t^\varphi} \cdot k_1 k_2 \geq 0$$

Equation 5.11:

Equations 5.9 through to 5.11 make the proposition that an agribusiness firm develops and utilises a particular level of farmland, and utilises a certain level of its plant capacity at a certain commodity price, until a point where the value chain profit is optimised. The critical profit threshold, $\pi_{1,2}^*(A_t, M_t)$ is linearly increasing in A_t and M_t . That is, the higher the commodity prices are, the larger the farmland acquired and utilised for primary production is, with increasing profit inducing additional land utilisation and processing capacity (i.e. $\partial \pi_{1,2}^*(A_t, M_t) / \partial \theta \succ 0$). Note also that elements that may deter farmland investments comprise not only the high capital investment in irrigation and farmland development k_1 but also agro-

processing expansion, since the critical profit threshold rises in higher fixed costs k_2 associated with milling plant investments, $\partial \pi_{1,2}^*(A_t, M_t) / \partial \gamma > 0$.

5.3 THE MODEL STRUCTURE

A System Dynamics Model (SDM) for grain was designed using the framework outlined in Chapter One under Section 1.5.4. The process of designing the model is outlined in Figure 1.3. The SDM is simulated in two of the four possible scenarios: (a) high and increasing wheat prices, and (b) low and decreasing wheat prices. Both of these scenarios are examined under circumstances in which the agribusiness increases its farmland holding for wheat production, while at the same time increasing its milling operations and utilisation of wheat. System Dynamics models have been developed in a number of market situations, but overall, literature available concerning their application to the agricultural sector is still relatively scanty.

At first, SDM was referred to as Industrial Dynamics (ID), because it was a tool that was designed to analyse the information-feedback characteristic of industrial activities in order to describe the interactive influence of organisational structures and time delays in the success of companies (Forrester, 1961). The transition from ID to SDM recognised the fundamentals of feedback and delays that affect system behaviour over time, which is an approach that provided a greater emphasis on policy analysis and design. SDM is based on the premise that the structure of a system (such as the way in which the essential system components are connected) generates its behaviour. Two essential features of the SDM are that (a) it has to be dynamic (that is, have a lag effect); and (b) it should have a feedback where one component affects another, and vice versa.

Developing a system dynamics model involved two stages: firstly, the study constructed the building blocks relating to the cause and effect of the behaviour of factors in the grain system. Out of this exercise, the analysis generated a causal loop diagram (CLD), which provides a graphical visual of the interrelationships between different factors relevant to the agribusiness grain system. The components are connected by links drawn as arrows which show the causal direction of one factor onto the other. A polar sign is added between connecting arrows to

indicate how one factor influences another, either positively or negatively, as shown in Figure 5.1 below.

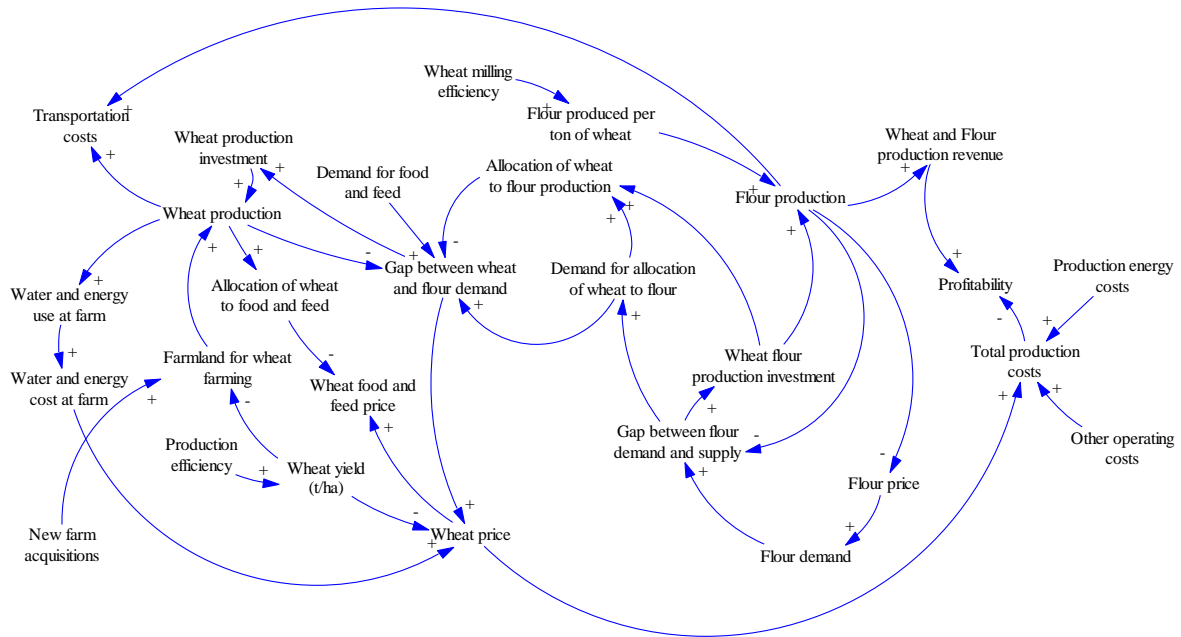


Figure 5.1: Causal loop diagram of the dynamics of the wheat system

Secondly, the study develops a quantitative model in terms of flow rates, levels and delays – reflective of the agribusiness supply chain. The SDM analysis of the agribusiness shows the impact of delays on system behaviour, shown in Figure 5.2 as “Time”, “Time Step” and “Stock Adjustment Time”.

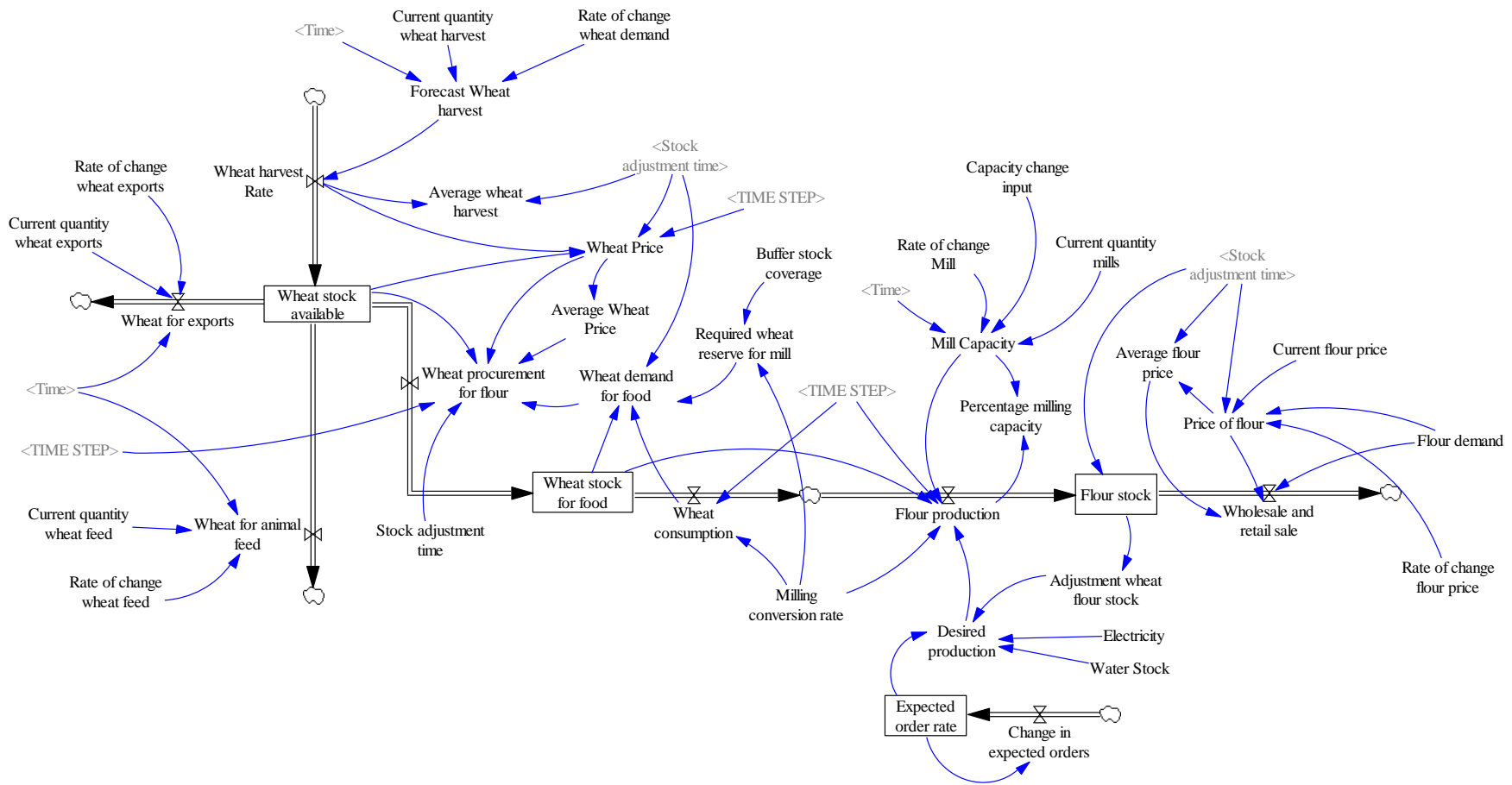


Figure 5.2: Stock and flow diagram of the agribusiness' wheat-to-flour supply chain system

There are a number of rules and restrictions that are imposed on the SDM in order to operationalise the agribusiness value chain. These include:

- a) Rule 1: All of the wheat used by the mill is sourced internally.
- b) Rule 2: The wheat price movements in the agribusiness system are set within the parameters of a 5 % parity band of the national domestic prices. Thus, the price within the system will not exceed or fall below the domestic wheat prices by more than 5 %.
- c) Rule 3: The firm will store and maintain a stock reserve equivalent to a five-month supply of the mill's wheat demand. The flour production rate depends on the demand and capacity to fill the reserve stocks.
- d) Rule 4: Flour production is modelled as a projection with a conversion factor of 880 kg per ton of wheat grain milled. Production of feed by-product is modelled according to the wheat output projection, based on a conversion factor of 90 kg per ton of wheat grain.
- e) Rule 5: Exogenous inputs are fixed. Water consumption for wheat at the mill is estimated at 1 090 kl p/a. The electricity consumption at the farm is 1 879 000 kWh/kVa, and at the milling plant is 1 918 000 kWh/kVa.

Before running the model, its validity and structure was checked for dimensional consistency. The unit of time applied in the model is month-on-month, with the model being run over a period of five years (2009–2014).

5.4 SIMULATION RESULTS AND SCENARIO ANALYSIS

The “base” run of the model is set at benchmark levels of demand, prices, production of wheat and flour. Also set at forecast levels, is the “base” run for land acquired/cultivated under wheat, as well as the firm's milling capacity. After setting the base run, the model is executed using the two “feasible” scenarios that were previously discussed. The agribusiness behaviour is therefore determined by simulating the system behaviour under: (a) an increase in wheat prices;

and (b) a decline in wheat prices. The two scenarios consequently capture the shifts in the firm’s wheat production and milling capacity. These scenarios were developed using intuitive logic scenario thinking – described in Chapter One under Section 1.5.3, under the guidance of a framework outlined in Figure 1.3. The scenarios are further discussed below.

5.4.1 Scenario 1: Rising wheat prices with increased milling capacity and wheat production

This scenario depicts the period between 2007/08 and 2011/12 when wheat prices increased from US\$365 per ton to US\$628 per ton. The study, however, postulates a more conservative increase of 20 % from the 5-year average baseline price of US\$487 per ton. The results of the scenario are shown in Figure 5.3 below, respectively. Trader and farm-level margins improve by 5 % and 12 %, respectively, with miller and baker margins declining to 15 % below the baseline. Nevertheless, the milling margins in the Zambian market are relatively protected by a weaker exchange rate that supports the import parity price of wheat.

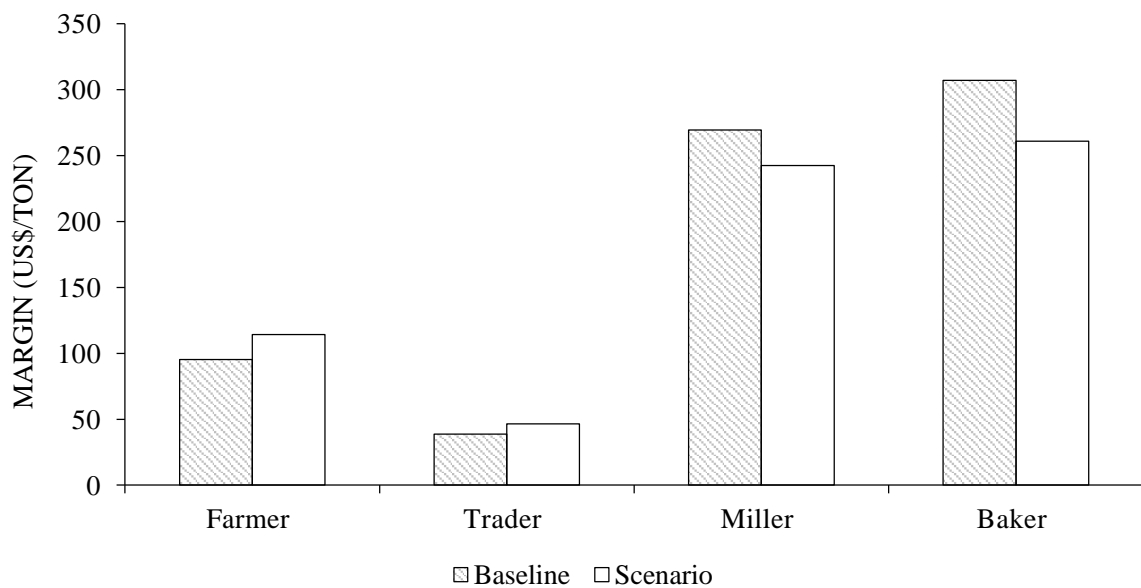


Figure 5.3: Wheat-to-bread value chain margin (re)structure in scenario 1

Source: Analysis results

The simulation results show that an increase in wheat prices causes a decline in the demand. The model initially shows an increase in desired wheat production, wheat demand, and wheat purchases for the mill. As the simulation executes, the wheat and flour begin to flow through

the system, and the flour stock builds. The sale of wheat increases until it catches up with the wholesale demand. Wheat stock will rise, as reflected in Figure 5.4, until it reaches the predetermined reserves of 400 tons.

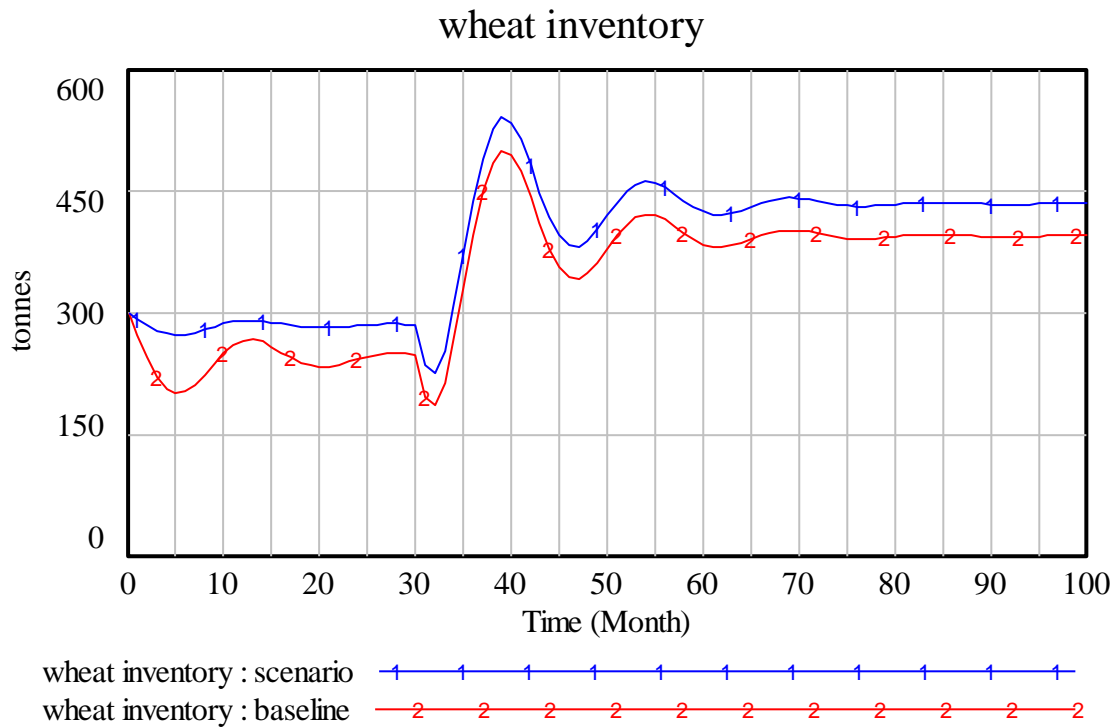


Figure 5.4: Wheat inventory stocks at farm level (Scenario 1)
 Source: Analysis results

Once inventories reach 500 tons, no further rise in wheat stock is seen, as shown in Figure 5.4 above. This is because the study uses the rule that the stocking rate is utilised to satisfy the need for a buffer stock and to satisfy demand for flour. Further flour production beyond these requirements will lead to a build-up of flour stock. The accumulation of flour stock leads to a slight reduction in the rate of wheat purchases around month 30. The wheat in stock begins to rise, since the wheat harvest rate remains unchanged.

A 20% increase in the firm’s milling capacity in the month 30 (which reflects the decision maker’s plan) will lead to a proportionate increase in flour production. Wheat production will increase as a result of the increase in milling capacity, as the system balances off the primary and secondary nodes of the supply chain. Inevitably, the agribusiness will have to acquire additional farmland in order to expand its production possibility frontier in order to enhance value chain profits, as well as ensure secure supply, in case the market enters into another

“global food price crisis-like” situation. Due to increases in production and milling capacity, the flour stocks will also increase sharply up to 300 tons, the level that reduces desired flour production. The increases in wheat production (at farm level) will reduce the demand for wheat and the purchases for wheat for milling by 6 %.

5.4.2 Scenario 2: Low and declining wheat prices with increased milling capacity and wheat production

This scenario mimics the post-2012 situation where prices declined from over \$600 per ton to US\$520 per ton, with surpluses on the market putting a downward pressure on prices. The continuous decline of prices threatens the viability of wheat production. However, the philosophy and long-term strategy of the agribusiness company is to acquire more farmland, even though an aggressive land investment strategy under a scenario of declining wheat prices might not be ideal, given the farm-level margin squeeze. Figure 5.5 below shows declining farm margins under a situation where net farm income becomes negative.

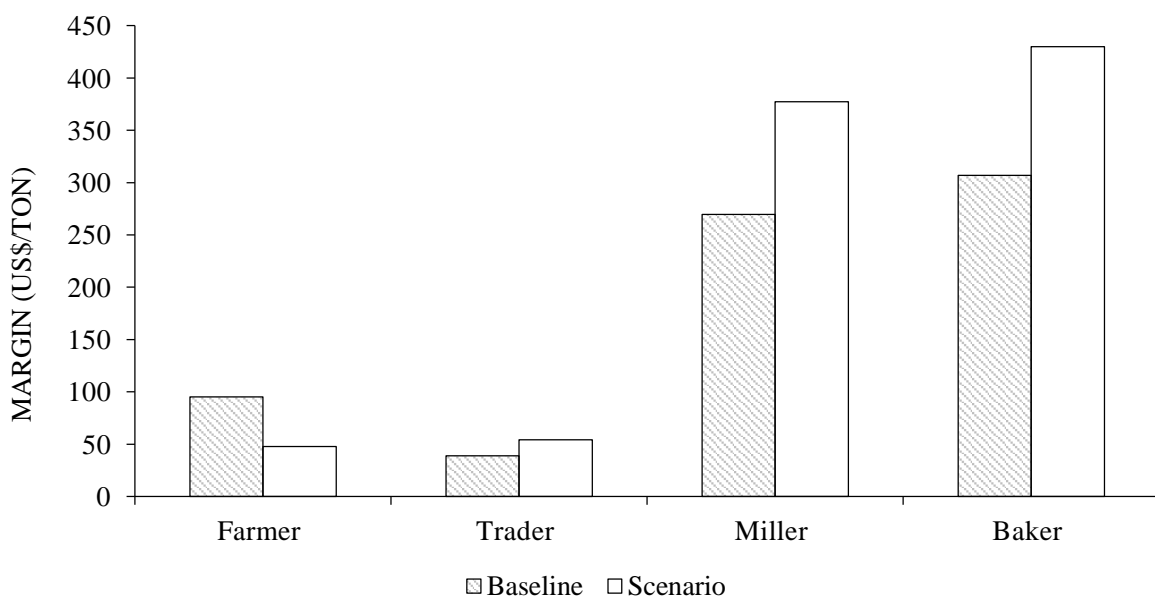


Figure 5.5: Wheat-to-bread value chain margin (re)structure in Scenario 2

Source: Analysis results

Under the scenario where producer prices are trading at export parity prices below the break-even prices of around US\$354 per ton, the farm makes a negative net return of US\$184 per ton.

In this scenario, the milling capacity is increased from 96 tons/day to 115 tons/day; and wheat production from 7 040 tons to 8 450 tons (that is, a 20 % increase in milling and production capacity) in month 30, under export parity wheat prices. The results of this scenario, as shown in Figure 5.7 above, show an adjustment process that takes place during the initial months as the company's target farmland acquisitions respond to declining wheat prices. Figure 5.6 above shows an increase in farm-level stocks, as reflected by increasing wheat stocks from 300 tons per month to 395 tons per month. The flour stocks also increase from 100 tons per month to 580 tons per month (Figure 5.8 above) as the low wheat prices at farm-level give the agribusiness some leeway to absorb higher storage costs.

5.5 SUMMARY AND CONCLUSIONS

Agrivision Africa epitomises features of an internationalising firm that is undergoing supplier (σ) convergence. The firm is seeking to internalise its wheat procurement through farmland acquisitions, integrating its wheat-to-flour value chain vertically and horizontally across farm production and milling activities, and internationalising through geographic expansion into the Zambian market. The SDM analysis described the optimisation behaviour of the firm under scenarios of increasing and declining commodity prices. Under the latter, farmland acquisitions on their own would not make economic sense due to declining and negative returns. However, in a vertically integrated firm, farmland acquisitions allow for the firm to manage price risk and ensure a secure supply of raw materials at a reasonable cost. As the firm benefits from lower procurement costs for its milling activities, it allows its entire operation to overcome short-term negative price cycles. What makes farm acquisitions a feasible long-term strategy – even under conditions where wheat prices are moving towards export parity – is that squeezed farm margins can easily be offset by milling margins (whose cost structures are relatively more stable), and thus ensure the sustainability of the entire value chain.

For firms with access to financial resources, value chain integration and internalisation of non-core activities is a strategic necessity, especially given the under-developed institutional and commercial infrastructure in sub-Saharan African markets. This approach has allowed firms to better manage market risks associated with price volatility, as well as production risks associated with secure supply of raw materials that are better managed. In Zambia, as is the

case in the rest of sub-Saharan Africa, added risks come through segmented and thin markets, which imply that firms have to consolidate their systems by building their own supply chains by extensively internalising non-core value chain activities. In such circumstances, agribusiness firms with long-term goals are prepared to sacrifice current profits in order to develop local markets and build sustainable supply chains in the long run. Entry into these sub-Saharan African markets involves significant investments through WOS, an entry strategy that was shown in Chapter 3 to be associated with large-sized firms that typically can afford such significant investments.

CHAPTER 6

CONCLUSION

Over the past 20 years, agribusiness MNCs have expanded their growth through increased cross-border activities in sub-Saharan Africa. This expansion coincided with rapid transformation in African agro-food markets, which was characterised by transitions from regulated to semi-regulated, and in certain instances, liberalised, market environments. Over the next decade to a decade-and-a-half, the value of agribusiness is expected to treble and reach a trillion dollars. The potential growth-path that will define this future evolution was the object of this research.

In undertaking this objective, the study combines fields and sub-fields of intra-firm strategy, international trade and international marketing, with particular emphasis on market entry strategies and development economics of agro-food systems. The study raises one of the most important questions in economic development – will sub-Saharan Africa’s agribusiness sector undergo a process of convergence that is characterised by internationalisation, value chain integration and consolidation? In answering this question, the study also partially addresses important sub-questions for sub-Saharan Africa’s agribusiness sector such as conflicts related to big versus small, international versus domestic, industrialised development models versus emerging country paradigms, value chain coordination versus market coordination, and convergence versus divergence.

6.1 SUMMARY

Chapter 1 laid out the objectives of the study, namely to understand the character and content of internationalisation of agribusiness MNCs in sub-Saharan Africa, and to understand the processes of value chain integration and acquisitions when firms expand beyond their borders. The hypothesis of the study is that there is convergence in strategy and practice in sub-Saharan Africa’s corporate agro-food sector.

To set the scene, Chapter 2 outlined the evolution of the ABCD firms and four comparable agribusiness MNCs in sub-Saharan Africa over the past two decades. Observations made from the Chapter showed that agribusiness MNCs are undertaking various degrees of vertical and

horizontal integration in the form acquisitions of farmland and “mid-stream” assets. With consolidation being a common feature across all firms, there was a general underlying recognition that operational environments differ globally, and sub-Saharan Africa is uniquely high risk. To add, sub-Saharan Africa constitutes a relatively small market compared with other parts of the world. High risks, coupled with a relatively small sized market, could explain why ABCD firms are virtually absent in sub-Saharan Africa, which is a scenario that has provided opportunities for emerging market agribusiness MNCs. Regardless of differences between sub-Saharan Africa and the rest of the world, there are clear similarities in the internationalisation activities among agribusiness MNCs, suggesting evidence of convergence in strategies and practice.

Chapter 3 endeavoured to unpack the convergence-divergence paradox by assessing the entry mode strategies of 67 agribusiness firms with a presence in over 35 sub-Saharan African territories. Large firms were seen to be more likely to enter into new markets through WOS. The key reason for this trend is that larger agribusiness MNCs with greater financial resources will continue to seek greater control over their supply chains in order to reduce risks. The lack of market infrastructure, such as storage, collateral management, and efficient logistics in sub-Saharan Africa, are catalytic factors that are quickening the trend of consolidation. This process is seen to be exacerbating the duality of the continent’s agricultural industry, characterised by a corporate sector with few large-sized firms and a traditional sector with a heterogenous set of resource-poor smallholders.

Chapter 4 unpacked cluster convergence as a key fundamental dimension of the broader process of convergence in the continent. The Chapter used a cooperative game theory perspective to analyse the likelihood of strategic alliances forming in sub-Saharan Africa’s agro-food sector. The Chapter discussed the conditions for alliance formation between agribusiness companies when investing beyond the border, with the behaviour of each company being captured by a set of parameters that define their conduct in strategic alliances. The model’s results showed that stable alliances will continue to emerge as agribusiness MNCs seek to manage risks by leveraging complementary assets of other potential partners. The results suggest that firms that generate a turnover of between US\$160 million and US\$996 million per annum will likely disappear as they merge with larger ones. The alliances will lead to the formation of stable multi-billion-dollar agribusiness clusters. The clusters might result in a highly dualistic, quasi-oligopolistic structure that consists of a few mega-agribusiness

MNCs on the one hand, and a heterogeneous group of small agribusinesses. The Chapter noted that the high-volume business model will become the dominant strategy for attaining global competitiveness, as agribusinesses seek to match the scale and scope of the ABCD firms.

Chapter 5 unpacks supplier convergence through a case study analysis of an agribusiness cluster that reflects the features of an internationalising, vertically integrating and internalising agribusiness MNC. The Agrivision cluster case study described a Mauritian-based agribusiness firm (Agrivision Africa) with investments in Zambia through a subsidiary called Agrivision Zambia. The agribusiness firm has significant investment interests in wheat, which constitutes a commodity sector that is relatively more liberalised than the maize market is. The argument made was that agribusiness firms are seeking to optimise returns through vertical integration (internalisation) in an effort to establish greater control of value chain assets, particularly but not only, the commodity. An optimisation model was designed to reflect the vertical integration behaviour of the agribusiness firm with respect to asset acquisition of capital, farmland and processing plants. The case example shows that agribusiness firms with access to financial resources are overcoming price and production risks by integrating and internalising non-core functions. Given that these agribusiness firms are operating in food markets that are underdeveloped, agribusiness firms in sub-Saharan Africa sacrifice current profits in order to develop local markets and build sustainable supply chains in the long run. Due to the significant resource requirements needed to undertake such strategies, agribusinesses are leveraging assets through WOS and JVs. A key question that emerged from the analysis is whether the significant resource requirements make particular methods of entry – such as WOS and JVs – exclusive to large-sized firms.

6.2 THEORETICAL CONTRIBUTION

The study found evidence of convergence in sub-Saharan Africa, a process that is essentially defined by a gravitation of the corporate agro-food system towards fewer large-sized agribusiness MNCs which are growing through two phenomena, namely growth through value chain integration and growth through strategic alliances. The study defines the two types of convergence, as follows:

- a) σ convergence which occurs when firms seek to gain competitive advantage in new markets by internalising critical but non-core value chain functions; and
- b) β convergence which occurs when agribusiness MNCs leverage supplementary and complementary assets of other competing firms, and use collaborative advantage as a means to gain competitive advantage in new markets. This study predicts that there will be a gradual disappearance of firms within an annual turnover range of between US\$160 million and US\$996 million, leading to the formation of large clusters that will morph into multi-billion-dollar agribusiness firms, which are comparable to ABCD firms.

In both instances, firms are seeking greater control of value chains in order to manage and mitigate production and market risks, as well as uncertainties related to policy and climate change. Strategically, this means that agribusiness MNCs will grow larger in size, and fewer in number, as they enter into partnerships (JVs) or acquisitions of existing in-country firms (WOS).

The theory of convergence in sub-Saharan Africa's agro-food sector is premised on the view that the continent's rich diversity should not necessarily lead to an "atheoretical" indeterminateness based on the perspective that "every case being different". The study argues that broad similarities can be analysed and trends can be identified without understating the diversity of the continent's agribusiness experiences. Based on this assumption, the study suffices to argue that comparisons from a selected set of firms show internationalisation of agribusiness MNCs in sub-Saharan Africa as advancing using *modus operandi* that are similar to those of the ABCD firms. To that end, the study also observed that aspects of consolidation and value chain integration – which are defining features of internationalisation – that reflect convergence in at least one part of sub-Saharan Africa's agriculture, which is the corporate agro-food system.

6.3 IMPLICATIONS OF RESEARCH FINDINGS

There are three key messages that are of strategic importance to agribusiness MNCs that are seeking foreign market presence in sub-Saharan Africa. Firstly, despite high risks (that is,

market- and production-related risks) and uncertainties (political and policy) being factors that have made sub-Saharan Africa an unattractive market for large-scale cross-border investments for many large agribusiness MNCs, their reluctance has created space and opportunity for small- to medium-sized agribusiness MNCs. The past 20 years have seen the latter expanding their growth potential through entry into new markets via value chain integration and cross-border acquisitions. There are still opportunities for new entrants, as many agro-food markets in sub-Saharan Africa remain under-developed. However, these opportunities can only be exploited by firms that have a relatively high risk appetite, and possess the patience and willingness to implement a holistic strategy that involves building value chains “from the ground up” over an extended period of time. This approach entails the patient capital that is willing to incur losses and negative returns on investment for several years before positive profits can be realised.

Secondly, the patient capital that has managed to outlive and outgrow years of below par returns has seen agribusiness MNCs consolidating and integrating their value chains. The momentum of farmland and mid-stream asset acquisitions among agribusiness MNCs over the recent past is a reflection of the need to tighten efficiencies to become globally competitive. The global trend and further evidence from sub-Saharan Africa shows that this trend will most likely continue unabated. Consolidation of agribusiness MNCs will, however, lead to the creation of a fewer but much larger-sized firms. The likelihood of stable strategic alliances being formed among both competing and complementary agribusiness MNCs has created emergent mega-corporate clusters which will likely become multi-billion-dollar agribusiness MNCs, over time. The latter will shift from small-scale to large-scale “volume-driven” business models which are comparable to those of ABCD firms. As the emergent corporate clusters become large enough to capture a significant share of the sub-Saharan African market, their growth in size will deepen and widen the duality between large formal agribusiness MNCs and small domestic firms.

Thirdly, as corporate clusters develop into multi-billion dollar firms, their transition into mega-agribusiness MNCs that are implementing volume-driven business models in sub-Saharan Africa will attract the attention and buying appetite of ABCD firms. It is entirely possible that the maturity of strategic alliances within sub-Saharan African will ultimately lead to clusters being swallowed up by the ABCD firms – absorbing what is largely the last geographic frontier

of their otherwise extensive global footprint. This type of consolidation has been witnessed in the global beer industry through the merger of SAB Miller and Anheuser-Busch InBev.

The three points outlined above define a process of “convergence” in sub-Saharan Africa, which not only aligns the region’s agro-food sector with the global trend, but also links most of the previously fragmented and segmented markets in the continent in the long run. However, the process of convergence will either be disrupted or quickened by two key variables, namely climate change and government policy. The on-going risk of climate change that has caused El Niño- and La Nina-induced droughts in Southern and East Africa, respectively, has led to *ad hoc* trade bans that prevent the cross-border movement of grains. Such policy responses have discouraged agribusiness MNCs from making investment commitments. Climate change and trade bans will remain two key biological and institutional risks that will continue to play a leading role in influencing agribusiness market entry strategies.

An additional inherent risk will be presented by the pace and scale of public infrastructural development in sub-Saharan Africa. Unlike mining investments which can afford to roll out supportive public commercial infrastructure such as road and railway systems, agriculture and agribusiness are lower-return sectors that rely on government for such public-sector investments. Investment blueprints such as Zambia’s farm blocks, the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) and the Beira Agricultural Growth Corridor were sold on the basis of governments providing public commercial infrastructure. Alternative agribusiness strategies now focus more on piggy-backing emerging and existing mining investments. Servicing mining communities is seen as a low-hanging fruit which can attract quick gains at a relatively low cost in new markets. This is an old strategy that gained prominence during the establishment of colonial states in sub-Saharan Africa, and is re-emerging as a way of advancing cross-border agribusiness investments in post-colonial towns. This trend will likely gain prominence in the future, with new mining towns and cities becoming opportunity centres for agribusiness entry through WOS.

6.4 POLICY RECOMMENDATIONS

The findings of this study, and the propositions thereof, provide some degree of understanding of market entry strategies among agribusiness MNCs in sub-Saharan Africa. Overall, a deeper

understanding of cross-border behaviour of agribusinesses can equip policy makers with the necessary intelligence that can assist in crafting policy responses that attract and sustainably grow agricultural investments in the continent. Two key policy considerations can be made from the preceding conclusions.

Firstly, the study's findings underscore the need for host governments to create more favourable operational environments, which can reduce the level of risks and uncertainties. The trend of agribusiness firms consolidating and integrating their activities is largely driven by the need to manage production and market risks as well as policy uncertainty. One key reference is the policy of liberalising staple (and foreign currency) markets, within the context of strong free market institutions that can bring some predictability to agro-food markets. Predictability inevitably reduces risks, and would trigger higher levels of investment as agribusiness MNCs are able to engage in longer-term planning, and thereby potentially reduce the use of contingency approaches and short-termism.

Secondly, the emergence of strategic alliances and corporate agro-food clusters suggests that the sector is undergoing some degree of consolidation, which raises concerns about the impact on competition, and the survival of smaller players in the industry. The phenomenon of consolidation is consistent with a global trend where a few larger agro-food players control a giant share of the world market. In sub-Saharan Africa, much of this trend is less prominent, but nonetheless significant for the continent's agro-food industry. Policy responses so far have attempted to encourage sustainable investments that promote the broader integration of small players into the market – otherwise known as inclusive business models. The study's findings reinforce the need for inclusive business models, which should, however, be allowed to grow without over-regulation. Policy responses should therefore be crafted in a manner that offers agribusinesses more incentives to create alliances with smaller players, without necessarily creating obstructions that penalise or discourage their formation.

6.5 WEAKNESSES OF THE RESEARCH AND LESSONS LEARNT

The conclusions drawn from this study were based on a number of previously discussed assumptions, empirical tools and experimental processes. Although every effort was made to ensure that the models and tools applied in this study were accurate, the study was confronted

with a number of challenges associated with sampling, data collection and measurement of variables. From a sampling point of view, the study was prone to sampling bias, as 75 % of respondents were South African-based agribusiness MNCs. This systemic flaw is attributable to the fact that the sampling frame itself consisted of a relatively large number of South African-based agribusiness MNCs. With non-South African-based agribusiness MNCs being much fewer in number, the problem was exacerbated by an even lower response rate from them. Although efforts were made to improve the respondent coverage, time and resource constraints became a major limiting factor.

From a data collection perspective, the questionnaire survey experienced low response rates. For those questionnaires that were answered, there were instances in which responses were incomplete. To alleviate this challenge, follow-up enquiries were made to confirm responses. However, the follow-up enquiries increased the costs of the survey, and also proved to be infeasible for those respondents who live in faraway countries, as some of them were not readily available. Where possible, cross-references were made with other key informants from the same firm, and in instances that required numerical estimates, triangulation was used instead.

From a measurement perspective, the study measured perceptions of respondents through Likert scale-based questions that gave choice options of between one and seven. As Likert scales are ordinal psychometric measurements of attitudes, beliefs and opinions, they were useful in providing the respondents' degree of agreement or disagreement on a number of critical issues of interest for the study. However, the true feelings and perceptions of respondents are not always well captured because Likert scales are unidimensional tools that aim to measure people's views, which are shaped by multi-dimensional sets of factors.

6.6 AREAS OF FUTURE RESEARCH

This study fills a research gap that has a much larger scope for further analysis. The general weakness of this study is that it did not cover the entirety of sub-Saharan Africa, sufficing to draw its conclusions from a relatively small set of agribusiness case studies. Whereas the objective of the research sought to establish the content and character of internationalisation, and how agribusiness MNCs have evolved over time, the general perception emerging from

this analysis is that further case studies from other parts of sub-Saharan Africa would be important for broadening our understanding of the diversity of agro-food sector strategies across the continent. Therefore, future entry mode research should seek to expand beyond the geographic reach of the case examples specified in this study.

This study's emphasis on market entry strategies, by nature, focuses on multinational agribusiness firms, much to the exclusion of domestically focused agribusiness companies. Nevertheless, these firms form a significant part of the sub-Saharan African agro-food system. Future research will need to focus on the evolution of domestically focused agribusinesses that, at times, act as lead firms that also partner with foreign-based agribusiness MNCs in strategic alliances. In this sense, future research will have to expand the body of literature on small to medium agribusiness enterprises, and also draw inferences from all parts of sub-Saharan Africa. This line of argument will offer other dimensions that are defining the changes that are occurring in the continent's agro-food sector.

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APPENDIX A

QUESTIONNAIRE ON AFRICAN AGRIBUSINESS INVESTMENT IN AGRICULTURE

1. Background Information

Respondent Name	
Respondent E-mail	
Contact Number	
Name of Firm/Institution	
Revenue/turnover	
No. of Employees	

2. What is the ownership structure of the firm?

- (a) Family Owned
- (b) Private Limited Company
- (c) Public Limited Company

3. What products or services is the firm involved in?

.....

4. Does your company have international experience?.....

5. If you answered “Yes”, what is the number of years that the firm has been operating internationally?

.....

6. What is the total number of foreign African countries in which the firm has made foreign entries?.....

7. If your company has international experience, how does your company or institution enter foreign markets in Africa? (tick/circle relevant answers from (a) to (d))

- (a) *Exports* (i.e. direct exports, indirect exports, intra-firm trade)
- (b) *Joint Ventures* (i.e. Equal partnership, Majority Ownership, or Minority Shareholder)
- (c) *Contracts* (i.e. Licencing, Franchising, Contract Management, Contract Manufacturing)
- (d) *Foreign Direct Investment* (i.e. Acquisition, Merger, Greenfield investment)

8. What is the proportion (%) of the firm's sales derived from operations outside the home country to the company's total sales?.....

Firm Specific Factors

9. Please tick the number that represents how you feel about the following factors in your business when considering entry into foreign markets in Africa?							
	Not important	Less Important	Moderately important	Undecided	Important	Very Important	Extremely important
When the firm set up involves highly specialised assets	1	2	3	4	5	6	7
Brand recognition	1	2	3	4	5	6	7
Financial Capability	1	2	3	4	5	6	7
International Experience	1	2	3	4	5	6	7
Firm Size	1	2	3	4	5	6	7

Country Specific Factors

10. Please tick the number that represents how you feel about the following factors about a particular African country when considering entry into its market?							
	Not important	Less Important	Moderately important	Undecided	Important	Very Important	Extremely important
If there are trade agreements	1	2	3	4	5	6	7
If there are colonial links	1	2	3	4	5	6	7
Common Language	1	2	3	4	5	6	7
Distance between Home & Host Market	1	2	3	4	5	6	7

Production Factors

11. Please tick the number that represents your feelings regarding the following factors about a particular host African country when considering entry into its market?							
	Not important	Less Important	Moderately important	Undecided	Important	Very Important	Extremely important
Labour Costs	1	2	3	4	5	6	7
Skills availability	1	2	3	4	5	6	7
Cost of Land	1	2	3	4	5	6	7
Transport Costs	1	2	3	4	5	6	7
Electricity Availability & Costs	1	2	3	4	5	6	7
If products and/or services opportunities are in synergy with company's core focus	1	2	3	4	5	6	7

Market Factors

12. Please tick the number that represents your feelings regarding the following factors about a particular host African country when considering entry into its market?							
	Not important	Less Important	Moderately important	Undecided	Important	Very Important	Extremely important
Market Growth Potential	1	2	3	4	5	6	7
Population Growth	1	2	3	4	5	6	7
Income Growth	1	2	3	4	5	6	7
Market Competition	1	2	3	4	5	6	7
Market Attractiveness	1	2	3	4	5	6	7

Environmental Factors

13. Please tick the number that represents your feelings regarding the following factors about a particular host African country when considering entry into its market?							
	Not important	Less Important	Moderately important	Undecided	Important	Very Important	Extremely important
Government Regulations on Foreign Exchange	1	2	3	4	5	6	7
Government Regulation on Market Control	1	2	3	4	5	6	7
Foreign Ownership Regulations	1	2	3	4	5	6	7
Market Entry Restrictions	1	2	3	4	5	6	7
Political Risk	1	2	3	4	5	6	7
Contractual Risk	1	2	3	4	5	6	7
Investment Risk	1	2	3	4	5	6	7

Please note that all the information contained herein will be handled in the strictest of confidence.

Thank you for participating in the survey. Your inputs are highly appreciated.
